

# SARATOGA ASSOCIATES

Landscape Architects, Architects,  
Engineers and Planners, P.C.

## PROJECT MANUAL

City of Schenectady

Central Park Pool, Spray Pad, and Facilities

**Bid Number RFB #2023-01-ENG**

November 30, 2022

Prepared for:

City of Schenectady  
City Hall  
105 Jay Street  
Schenectady, NY 12305  
Schenectady County

Prepared by:

Saratoga Associates  
21 Congress Street, Suite 201  
Saratoga Springs, NY 12866

SA Project No. 2022-038.10

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**NOTICE TO BIDDERS**

**TITLE:** RFB #2023-01-ENG, Central Park Pool, Spray Pad, and Facilities

**RECEIVING DATE AND TIME:** **10:30 AM WEDNESDAY, JANUARY 4, 2023**

**OPENING DATE AND TIME:** **11:00 AM WEDNESDAY, JANUARY 4, 2023**

**Owner:** City of Schenectady  
City Hall  
105 Jay Street  
Schenectady, NY 12305  
Schenectady County

**Consultant:** Saratoga Associates  
Attn: Emily Gardner  
21 Congress Street, Suite 201  
Saratoga Springs, NY 12866  
[egardner@saratogaassociates.com](mailto:egardner@saratogaassociates.com)

**The anticipated schedule is as follows:**

Issue RFP November 30, 2022

Pre-Bid Meetings (Mandatory) December 7, 2022  
Site Walk through 11am on site in Central Park Meeting: 1pm, City Hall, Room 110

Questions Submitted by 2pm on December 19, 2022 to [egardner@saratogaassociates.com](mailto:egardner@saratogaassociates.com)

Proposals Due January 4, 2023, by 10:30am (Bid Opening at 11am)

Substantial Completion Date September 30, 2023

The Owner, City of Schenectady, shall receive sealed bids at City Hall, 105 Jay St, Schenectady, NY 12305, until 10:30 AM local time on January 4, 2023. Any bid received after that time and date specified above will not be considered.

Written and sealed proposals must be clearly identified, mailed, or hand delivered to:

Samantha Mykoo, City Clerk  
City of Schenectady City Hall  
105 Jay Street, Room 107  
Schenectady, New York 12305.

A Non-Collusive Bidding Certification form shall be submitted with the bid.

Bid Security: Bid Security equal to 5% of the bid.

Performance and Payment Bonds for 100 percent of the Contract Sum payable to the City of Schenectady will be required as a condition of the award for contract. The Agreement will be written between the successful Bidder and the City of Schenectady.

No Bidder may withdraw their bid within 45 days after the actual date of opening.

The City of Schenectady is an equal opportunity employer and attention of Bidders is particularly called to requirements that no person shall be discriminated against on the basis of race, religion, color, national origin, sex, gender, age, disability, sexual preference, marital status, or Vietnam Era Veteran status.

See section 00 43 90 –MWBE Requirements.

Upon selection, all contractors and subcontractors must provide proof of Workers' Compensation and Disability Benefits Insurance Coverage for employees, or proof of exemption from the New York State Workers' Compensation Board.

Attention of Bidders is particularly called to the requirements of New York State Prevailing Wage Rates, required for this contract.

#### Qualifications

All bidders shall submit the Statement of Vendor Qualifications as part of the bid. Each bid must contain evidence of the bidder's qualification to do business in New York State or covenant to obtain such qualification prior to award.

In addition, the City of Schenectady may make such investigations it deems necessary to determine the ability of the Bidder to perform the work. The bidder shall furnish to the City, within five (5) days of a request, all such information and data for this purpose as may be requested. The City reserves the right to reject any bid if the information submitted by, or investigation of, a bidder fails to satisfy the City that such bidder is properly qualified to carry out the obligations of the contract and to complete the work contemplated therein. Conditional bids will not be accepted.

The Owner reserves the right to accept or reject any or all Bids, to re-advertise for new bids, or to waive any informality in connection with the bids.

Only those Contractors who have demonstrated past experience on similar projects in the last five years shall be considered a qualified bidder for this Project. A minimum of five (5) references are required in order to be considered a qualified bidder for this Project. All Bidders shall submit the fully completed "Contractor's Qualification Statement and Questionnaire" included in the Project Manual with the submission of their bids in order to verify the qualifications.

Those submitting bids do so at their own expense. The City of Schenectady will not be responsible for expenses incurred by the contractor while preparing and delivering bid submissions.

#### Disqualification

The City reserves the right to refuse to issue Bidding Documents to a prospective bidder should such bidder be in default for any of the following reasons:

- (a) Failure to comply with any pre-qualification regulations of the City, if such regulations are cited, or otherwise included, in the Bidding Documents as a requirement for bidding.
- (b) Bidder's failure to pay, or satisfactorily settle, all bills due for labor and materials on former contracts in force (with the Owner) at the time the City issues the Bidding Documents to a prospective bidder.
- (c) Bidder's default under previous contracts with the City.
- (d) Bidder's unsatisfactory work on previous contracts with the City.
- (e) No bid will be accepted from, or Contract awarded to, any person who is in arrears to the City of Schenectady upon debt or Contract or who is in default, as surety or otherwise, upon any obligation to the said City, nor shall a bid be accepted or Contract awarded to any Contractor whose performance of any previous Contract has been unsatisfactory. The bidder whose bid has

been accepted will be required to attend at the Office of the Clerk of the Council and execute the Contract within three (3) days from the date of the service of a notice delivered to him in person or mailed to the address given in the bid that the Contract has been awarded to him. In case of failure to execute the Contract within the time stated, he or they shall be deemed to have abandoned the Contract and the amount of the deposit made by him or them will be forfeited to and retained by the City of Schenectady as liquidated damages.

Bids received from bidders who have previously failed to complete contracts within the time required, or who have previously performed similar work in an unsatisfactory manner, may be rejected. A bid may be rejected if the bidder cannot show that it has the necessary ability, plant and equipment to commence the work at the time prescribed and thereafter to perform and complete the work at the rate or within the time specified. A bid may be rejected if the bidder is already obligated for the performance of other work which would delay the commencement, performance or completion of the work.

The City of Schenectady reserves the right to reject any bid if the information submitted by, or investigation of, such bidder fails to satisfy the City that such bidder is properly qualified to carry out the obligations of the contract and to complete the work contemplated therein.

Bids will be considered irregular and shall be subject to rejection for the following reasons:

- (a) If the bid is on a form other than that furnished by the City of Schenectady, or, if the City's form is altered, or, if any part of the bidding documents is detached.
- (b) If there are unauthorized additions, conditional or alternate pay items, or irregularities of any kind which make the bid incomplete, indefinite, or otherwise ambiguous.
- (c) If the bid is not accompanied by the bid security specified by the City of Schenectady.

#### Bid Evaluation & Award of Bid

Bids received will be evaluated by City of Schenectady and will be based, as a minimum, upon the following criteria:

- (a) Lowest total bid cost and projected timetable for completion of services and/or delivery of goods described herein;
- (b) Completeness of the bid; and
- (c) Bidder's demonstrated capabilities and professional qualifications.

The City reserves the right to award this contract on a per item or aggregate basis, whichever is most beneficial to the City of Schenectady. Bidders need not submit bids for all items listed to be eligible for an award of this contract.

The City reserves the right to purchase items pursuant to General Municipal Law 103 from New York State Contracts, other County, political subdivision or district contracts, or New York State Preferred Sources within its discretion.

No successful bidder to whom a contract or purchase order is let, granted or awarded, shall assign, transfer, convey, sublet, or otherwise dispose of same, or of its right, title, and interest herein, including the performance of the contract or purchase order or the right to receive monies due or to become due, or of its power to execute the contract or purchase order without the prior written consent of the City of Schenectady Purchasing Supervisor. In the event the contractor shall without prior written consent assign, transfer, convey, sublet or otherwise dispose of the contract or purchase order or of its right, title and interest therein, including the performance of this contract or purchase order, or the right to receive monies due or to become due, or its power to execute such contract or purchase order to any other person or corporations, or upon receipt by the City of Schenectady of an attachment against the

Successful Bidder, the City of Schenectady shall be relieved and discharged from any and all liability and obligation growing out of such contract or purchase order to such contractor, and the person or corporation to which such contract or purchase order shall have been assigned, its assignees, transferees or sub lessees shall forfeit and lose all monies theretofore assigned under the contract or purchase order, except so much as may be required to pay its employees.

#### Trade Union Work

The current agreement between the City and the local trade unions requires that any work contracted out which is normally performed by employees of the bargaining unit such subcontractor must be party to a Collective Bargaining Agreement with the Union. This includes the following trade unions:

- The International Brotherhood of Painters and Allied Trades
- National Union of Bricklayers and Allied Craftsmen
- United Association of Journeymen and Apprentices of the Plumbing and Pipefitting Industry

#### Traffic

Contractor shall submit to the City for approval a logistics plan including pedestrian protection. The plan must provide for pedestrian and vehicles traffic restoration at the end of each day. Plan shall be in conformance with Spec Section 32 1100: Maintenance and Protection of Traffic.

Traffic upon the street where work is in progress or upon any intersecting street shall not be hindered or inconvenienced needlessly nor shall the street be closed to traffic except by direction or prior approval of the Engineer. In such cases, the Contractor shall erect plainly and properly worded signs which shall be placed with approved barricades at the nearest cross street on each side of such obstructed portion and upon intersecting streets where traffic may take detour in the shortest and easiest way.

Where it is necessary to interfere with private ways, roads or railroads, the Contractor shall give reasonable notice to the owners thereof before such interference; shall, at his own expense, provide suitable and safe bridges or other sufficient crossings for the accommodation of the travel thereon; shall maintain the same in good and safe condition until the said private ways, roads or railroads can be restored; shall then remove all bridges and other temporary structures and restore such private ways, roads or railroads to the satisfaction of the Engineer.

#### City Water

In all cases where existing water mains have to be valved off temporarily the Contractor shall notify, in advance, all customers served from said water main. Connections to existing water mains shall, when work commences, be carried out to completion in one continuous operation so as to afford a minimum period of time said existing mains shall be out of service. If deemed necessary, the Engineer or by the designee of the Commissioner of General Services may require said connections to be made at night.

Where the City water is available it will be furnished to the Contractor by the Water Department, subject at all times to the control and supervision of its Engineer. Prior to making use of any City water, permission in writing, to use the same for particular purposes must be obtained from the Engineer or by the designee of the Commissioner of General Services. The permit shall be on the site of the work at all times. The Contractor's attention is called especially to Rule 35 of the Rules, Regulations and Rates of the Department of Water in regard to supplying water, standard hydrant wrenches and reducing caps; to Rule 66 in regard to the penalty for opening hydrants without permission; to Rule 67 in regard to the responsibility for damages done; to Rule 69 in regard to the operation of valves; to Rule 70 in regard to the displacing or covering valve boxes, manhole covers, etc; to Rule 71 in regard to the fines which may be levied in case of any of the Rules & Regulations are violated; all of which Rules & Regulations shall be considered a part of the Contract whether attached hereto or not.

Subject to an approved logistics plan, the Contractor may use City hydrants but must obtain a hydrant meter with a back flow preventer from the City's Department of Water.

The Contractor who is awarded this bid should be aware that there is a THREE THOUSAND DOLLAR (\$3,000.00) deposit required for use of the hydrant meter.

### Interpretation

In the event of any discrepancy, disagreement or ambiguity among the documents which comprise this RFB, and/or, the Agreement (between the City and the successful bidder/proposer) and its incorporated documents, the documents shall be given preference in the following order to interpret and to resolve such discrepancy, disagreement or ambiguity: 1) the Agreement; 2) the RFB; 3) the Contractor's bid.

### Health and Safety Requirements

Pursuant to the General Duty Clause of the U.S. Occupational Safety and Health Act of 1970 (OSHA), Public Law 91-596, Section 5, the contractor is directly responsible for the health and safety of their staff, subcontractors, and other firms working for the contractor, Department staff on the site, and the affected public. The City of Schenectady does not have the authority to enforce OSHA regulations, but the City of Schenectady does have the authority to enforce the contract.

Pursuant to 29 CFR 1926 Subpart C, contractors entering a contract with the City of Schenectady are expected to provide the City of Schenectady with a safety and health plan that incorporates the following safety elements, when applicable to the scope of work:

- a. High Visibility Apparel/ Personal Protective Equipment (PPE) per 29 CFR 1926 Subpart E.
- b. Accident Reporting per 29 CFR 1926 Subpart C
- c. Imminent Danger Situations and Emergency Actions per 29 CFR 1926 Subpart P
- d. Fall Protection per 29 CFR 1926 Subpart M
- e. Working Over Water per 29 CFR 1926 Subpart O
- f. Electrical Safety per 29 CFR 1926 Subpart K
- g. Open Excavations and Trenches per 29 CFR 1926 Subpart P
- h. Hazardous Materials per 29 CFR 1926 Subpart Z
- i. Equipment Involving Radioactive Materials per 1926 CFR Subpart D/12 NYCRR 38
- j. Silica protection per 29 CFR 1926, 29 CFR 1926.55/ Subpart D.
- k. Demolition of Buildings and Structures 29 CFR 1926, Subpart T
- l. Drilling and Blasting per 29 CFR 1926, Subpart U
- m. Equipment Safety Procedures per 29 CFR 1926, Subpart O
- n. Lifting per 29 CFR 1926, Subpart N
- o. Confined Spaces per 29 CFR 1910, Subpart J
- p. Fire and Explosion Prevention per 29 CFR 1926, Subpart F

**BIDDING SUBMISSION CHECKLIST**  
**FOR**  
**RFB #2023-01-ENG**  
**CENTRAL PARK POOL, SPRAY PAD, AND FACILITIES**

The City of Schenectady reserves the right to disqualify any bids that do not contain the mandatory items as specified for this Solicitation and the resulting Contract. Applicant's should use the following checklist when submitting bids and include all required documents with bid proposals:

Document Title	Description	Included with Bid Proposal
Bid Certification Sheet	Signed copy must be returned with bid proposal	<input type="checkbox"/>
Bid Form	Must be completed and signed copy returned with bid proposal	<input type="checkbox"/>
Non-Collusion Affidavit of Prime Bidder	Notarized copy must be returned with bid proposal	<input type="checkbox"/>
Certification Pursuant to Section 103-g of the New York State General Municipal Law Iranian Energy Sector Divestment	Signed copy must be returned with bid proposal	<input type="checkbox"/>
Certification Pursuant to Executive Order 14- Russian Divestment	Signed copy must be returned with bid proposal	<input type="checkbox"/>
MWBE Utilization Form (Form P)	Must be submitted with proposals greater than \$100,000	<input type="checkbox"/>
Proof of M/WBE Good Faith Efforts	Must be submitted with proposals	<input type="checkbox"/>
Certification of Apprenticeship Programs	Forms must be completed and signed copy returned with bid proposal <u>for any projects over \$300,000</u>	<input type="checkbox"/>
Statement of Vendor Qualifications	Completed form must be notarized and submitted with bid proposal.	<input type="checkbox"/>
Bid Security	Must be submitted with bid proposal as stated in Section 6 of the bid document.	<input type="checkbox"/>
Addenda acknowledgment Form(s)	Form(s) must be signed and submitted with bid proposal.	<input type="checkbox"/>
Labor Law Certificate of Compliance	Notarized copy must be returned with bid proposal	<input type="checkbox"/>
Certification of Non-Segregated Facilities	Signed copy must be returned with bid proposal	<input type="checkbox"/>
Sexual Harassment Certification Form	Signed copy must be returned with bid proposal	<input type="checkbox"/>
Bid Submission Checklist	Form must be filled out and submitted with bid proposal	<input type="checkbox"/>
Proof of Insurance	Sample may be provided. Proof of Insurance required before entering into contract with the City.	<input type="checkbox"/>
Health and Safety Plan Summary	Must be submitted with bid submission	<input type="checkbox"/>

## **SECTION 00 4110**

### **BID FORM - GENERAL CONSTRUCTION**

**TITLE:** RFB #2023-01-ENG, Central Park Pool, Spray Pad, and Facilities

**RECEIVING DATE AND TIME:** **10:30 AM WEDNESDAY, JANUARY 4, 2023**

**OPENING DATE AND TIME:** **11:00 AM WEDNESDAY, JANUARY 4, 2023**

**Owner:** City of Schenectady  
City Hall  
105 Jay Street  
Schenectady, NY 12305  
(518) 382-5274

**Date:** .....

**Submitted by:**

(full name) .....

(full address) .....

.....

**OFFER:**

#### **ITEM 1 – LUMP SUM BID AMOUNT**

Having examined the Place of The Work and all matters referred to in the Instructions to Bidders and the Contract Documents prepared by Saratoga Associates, Landscape Architects, Architects, Engineers and Planners, P.C. for the above-mentioned project, we, the undersigned, hereby propose to perform the Work as described in Section 01 1000 - Summary, for the bid amount of:

..... dollars (in words)

(\$.....) (in numbers) in lawful money of the United States of America.

All applicable federal and State of New York taxes are included in the Bid Amount.

The City has established participation goals for Minority Business Enterprise (MBE) and Women-Owned Businesses Enterprise (WBE) Contractors, Subcontractors, and Suppliers.

#### **ITEM 2 - PROPOSED EQUIVALENTS**

If the bidder proposes to use materials and equipment other than those specified, he shall list below any equivalents he proposes to use, for review by the Architect. If proposed items are not deemed to be equivalent, the bidder shall provide the specified items at no increase in cost.

Materials and equipment not listed on this sheet and not proposed as equivalents in the bid may not be considered, evaluated, or accepted as equivalents after the bids are received.

<u>SPEC. SECTION</u>	<u>SPECIFIED ITEM</u>	<u>PROPOSED EQUIVALENT</u>
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### **ITEM 3 - ACKNOWLEDGMENTS**

Acknowledgment is hereby made of the receipt of the following Addenda:

Addendum No. \_\_\_\_\_ dated: \_\_\_\_\_

The foregoing proposal includes all supervision, taxes (if applicable), overhead (including bond and insurance costs), profit and other considerations included in construction contract costs.  
This offer shall be open to acceptance for forty-five (45) days from the bid closing date.

If the Owner accepts this bid within the time period stated above, we will execute the Agreement within fourteen days of receipt of Notice of Award.

If this Bid is accepted, we will achieve substantial completion of the Project by September 30, 2023.  
The following documents shall be submitted within seventy-two (72) hours of bid opening and made a condition of the Bid:

1. Bidder Qualifications.
2. List of Subcontractors: Include names of all Subcontractors and portions of the Work each Subcontractor will perform.
3. Proof of insurance.
4. Proof of workers compensation insurance for all employees.

### **ITEM 4 - BID FORM SIGNATURES**

Sign Bid Form, as follows:

- Sole Proprietorship: Signature of sole proprietor in the presence of a witness who will also sign. Insert the words "Sole Proprietor" under the signature. Notarize signature.

- Partnership: Signature of all partners in the presence of a witness who will also sign. Insert the word "Partner" under each signature. Notarize signature.

- Corporation: Signature of a duly authorized signing officer in their normal signatures. Insert the officer's capacity in which the signing officer acts, under each signature. Affix the corporate seal. If the Bid is signed by officials other than the president and secretary of the company, or the president/secretary/treasurer of the company, submit a copy of the by-law resolution of their board of directors authorizing them to do so, with the Bid Form in the bid envelope.

- Joint Venture: Signature of each party of the joint venture under their respective seals in a manner appropriate to such party as described above, similar to requirements for Partnerships.

BIDDER:

.....

(full name of firm)

.....

BY / TITLE:

.....

BY / TITLE:

.....

BY / TITLE:

.....

was hereunto affixed in the presence of:

.....

(Authorized signing officer)

(Seal)

#### **ITEM 5 - CORPORATE RESOLUTION**

RESOLVED that \_\_\_\_\_ be  
(individual)

authorized to sign and submit the bid proposal of this corporation for the following project:

RFB #2023-01-ENG, Central Park Pool, Spray Pad, and Facilities

and to include in such bid proposal the certificate as to non-collusion required by section One Hundred Three-D (103-D) of the General Municipal Law as the act and deed of such corporation, and for any inaccuracies or misstatements in such certificate this corporate bidder shall be liable under the penalties of perjury.

The foregoing is a true and correct copy of the resolution adopted by

\_\_\_\_\_  
\_\_\_\_\_

corporation at a meeting of its Board of Directors held on the \_\_\_\_\_ day of \_\_\_\_\_, 202\_\_\_,

and is still in full force and effect on this \_\_\_\_\_ day of \_\_\_\_\_, 202\_\_\_.

(SEAL OF THE CORPORATION)

\_\_\_\_\_  
Secretary

**END OF BID FORM**

## **SECTION 00 4111**

### **BID FORM - ELECTRICAL CONSTRUCTION**

**TITLE:** RFB #2023-01-ENG, Central Park Pool, Spray Pad, and Facilities

**RECEIVING DATE AND TIME: 10:30 AM WEDNESDAY, JANUARY 4, 2023**

**OPENING DATE AND TIME: 11:00 AM WEDNESDAY, JANUARY 4, 2023**

**Owner:** City of Schenectady  
City Hall  
105 Jay Street  
Schenectady, NY 12305  
(518) 382-5274

**Date:** .....

**Submitted by:**

(full name) .....

(full address) .....

.....

**OFFER:**

#### **ITEM 1 – LUMP SUM BID AMOUNT**

Having examined the Place of The Work and all matters referred to in the Instructions to Bidders and the Contract Documents prepared by Saratoga Associates, Landscape Architects, Architects, Engineers and Planners, P.C. for the above-mentioned project, we, the undersigned, hereby propose to perform the Work as described in Section 01 1000 - Summary, for the bid amount of:

..... dollars (in words)

(\$.....) (in numbers) in lawful money of the United States of America.

All applicable federal and State of New York taxes are included in the Bid Amount.

The City has established participation goals for Minority Business Enterprise (MBE) and Women-Owned Businesses Enterprise (WBE) Contractors, Subcontractors, and Suppliers.

#### **ITEM 2 - PROPOSED EQUIVALENTS**

If the bidder proposes to use materials and equipment other than those specified, he shall list below any equivalents he proposes to use, for review by the Architect. If proposed items are not deemed to be equivalent, the bidder shall provide the specified items at no increase in cost.

Materials and equipment not listed on this sheet and not proposed as equivalents in the bid may not be considered, evaluated, or accepted as equivalents after the bids are received.

<u>SPEC. SECTION</u>	<u>SPECIFIED ITEM</u>	<u>PROPOSED EQUIVALENT</u>
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### **ITEM 3 - ACKNOWLEDGMENTS**

Acknowledgment is hereby made of the receipt of the following Addenda:

Addendum No. \_\_\_\_\_ dated: \_\_\_\_\_

The foregoing proposal includes all supervision, taxes (if applicable), overhead (including bond and insurance costs), profit and other considerations included in construction contract costs.

This offer shall be open to acceptance for forty-five (45) days from the bid closing date.

If the Owner accepts this bid within the time period stated above, we will execute the Agreement within fourteen days of receipt of Notice of Award.

If this Bid is accepted, we will achieve substantial completion of the Project by September 30, 2023. The following documents shall be submitted within seventy-two (72) hours of bid opening and made a condition of the Bid:

1. Bidder Qualifications.
2. List of Subcontractors: Include names of all Subcontractors and portions of the Work each Subcontractor will perform.
3. Proof of insurance.
4. Proof of workers compensation insurance for all employees.

### **ITEM 4 - BID FORM SIGNATURES**

Sign Bid Form, as follows:

- Sole Proprietorship: Signature of sole proprietor in the presence of a witness who will also sign. Insert the words "Sole Proprietor" under the signature. Notarize signature.

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- Joint Venture: Signature of each party of the joint venture under their respective seals in a manner appropriate to such party as described above, similar to requirements for Partnerships.

BIDDER:

.....

(full name of firm)

.....

BY / TITLE:

.....

BY / TITLE:

.....

BY / TITLE:

was hereunto affixed in the presence of:

.....

(Authorized signing officer)

(Seal)

#### **ITEM 5 - CORPORATE RESOLUTION**

RESOLVED that \_\_\_\_\_ be  
(individual)

authorized to sign and submit the bid proposal of this corporation for the following project:

RFB #2023-01-ENG, Central Park Pool, Spray Pad, and Facilities

and to include in such bid proposal the certificate as to non-collusion required by section One Hundred Three-D (103-D) of the General Municipal Law as the act and deed of such corporation, and for any inaccuracies or misstatements in such certificate this corporate bidder shall be liable under the penalties of perjury.

The foregoing is a true and correct copy of the resolution adopted by

\_\_\_\_\_

corporation at a meeting of its Board of Directors held on the \_\_\_\_\_ day of \_\_\_\_\_, 202\_\_\_\_,

and is still in full force and effect on this \_\_\_\_\_ day of \_\_\_\_\_, 202\_\_\_\_.

(SEAL OF THE CORPORATION)

Secretary

**END OF BID FORM**

## **SECTION 00 4112**

### **BID FORM - PLUMBING CONSTRUCTION**

**TITLE:** RFB #2023-01-ENG, Central Park Pool, Spray Pad, and Facilities

**RECEIVING DATE AND TIME:** **10:30 AM WEDNESDAY, JANUARY 4, 2023**

**OPENING DATE AND TIME:** **11:00 AM WEDNESDAY, JANUARY 4, 2023**

**Owner:** City of Schenectady  
City Hall  
105 Jay Street  
Schenectady, NY 12305  
(518) 382-5274

**Date:** .....

**Submitted by:**

(full name) .....

(full address) .....

.....

**OFFER:**

#### **ITEM 1 – LUMP SUM BID AMOUNT**

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Materials and equipment not listed on this sheet and not proposed as equivalents in the bid may not be considered, evaluated, or accepted as equivalents after the bids are received.

<u>SPEC. SECTION</u>	<u>SPECIFIED ITEM</u>	<u>PROPOSED EQUIVALENT</u>
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Addendum No. \_\_\_\_\_ dated: \_\_\_\_\_

Addendum No. \_\_\_\_\_ dated: \_\_\_\_\_

Addendum No. \_\_\_\_\_ dated: \_\_\_\_\_

The foregoing proposal includes all supervision, taxes (if applicable), overhead (including bond and insurance costs), profit and other considerations included in construction contract costs.  
This offer shall be open to acceptance for forty-five (45) days from the bid closing date.

If the Owner accepts this bid within the time period stated above, we will execute the Agreement within fourteen days of receipt of Notice of Award.

If this Bid is accepted, we will achieve substantial completion of the Project by September 30, 2023.  
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- Joint Venture: Signature of each party of the joint venture under their respective seals in a manner appropriate to such party as described above, similar to requirements for Partnerships.

BIDDER:

.....

(full name of firm)

.....

BY / TITLE:

.....

BY / TITLE:

.....

BY / TITLE:

.....

was hereunto affixed in the presence of:

.....

(Authorized signing officer)

(Seal)

**ITEM 8 - CORPORATE RESOLUTION**

RESOLVED that \_\_\_\_\_ be  
(individual)

authorized to sign and submit the bid proposal of this corporation for the following project:

RFB #2023-01-ENG, Central Park Pool, Spray Pad, and Facilities

and to include in such bid proposal the certificate as to non-collusion required by section One Hundred Three-D (103-D) of the General Municipal Law as the act and deed of such corporation, and for any inaccuracies or misstatements in such certificate this corporate bidder shall be liable under the penalties of perjury.

The foregoing is a true and correct copy of the resolution adopted by

\_\_\_\_\_  
\_\_\_\_\_

corporation at a meeting of its Board of Directors held on the \_\_\_\_\_ day of \_\_\_\_\_, 202\_\_\_,

and is still in full force and effect on this \_\_\_\_\_ day of \_\_\_\_\_, 202\_\_\_.

(SEAL OF THE CORPORATION)

\_\_\_\_\_  
Secretary

**END OF BID FORM**

## **SECTION 00 4113**

### **BID FORM - MECHANICAL CONSTRUCTION (HVAC)**

**TITLE:** RFB #2023-01-ENG, Central Park Pool, Spray Pad, and Facilities

**RECEIVING DATE AND TIME: 10:30 AM WEDNESDAY, JANUARY 4, 2023**

**OPENING DATE AND TIME: 11:00 AM WEDNESDAY, JANUARY 4, 2023**

**Owner:** City of Schenectady  
City Hall  
105 Jay Street  
Schenectady, NY 12305  
(518) 382-5274

**Date:** .....

**Submitted by:**

(full name) .....

(full address) .....

.....

**OFFER:**

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(full name of firm)

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BY / TITLE:

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(Authorized signing officer)

(Seal)

**ITEM 8 - CORPORATE RESOLUTION**

RESOLVED that \_\_\_\_\_ be  
(individual)

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RFB #2023-01-ENG, Central Park Pool, Spray Pad, and Facilities

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(SEAL OF THE CORPORATION)

Secretary

**END OF BID FORM**

**BID CERTIFICATION SHEET**  
**Central Park Pool, Spray Pad, and Facilities**  
**RFB #2023-01-ENG**

I HEREBY CERTIFY THAT I HAVE READ THE NOTICE TO BIDDERS, GENERAL INFORMATION, SPECIFICATIONS, ADDENDUM (IF ANY ATTACHED), BIDDING SHEET AS WELL AS ANY OTHER INFORMATION PERTINENT TO THIS BID. FAILING TO COMPLY WITH THE ABOVE SHALL CAUSE THE BID TO BE REJECTED AS INFORMAL AND CONSIDERATION WILL NOT BE GIVEN BY THE CITY OF SCHENECTADY.

---

SIGNED

---

TITLE

**(SIGNED COPY MUST BE RETURNED WITH BID)**



## CITY OF SCHENECTADY

### STATEMENT OF VENDOR QUALIFICATIONS

#### **BUSINESS ENTITY INFORMATION**

<u>Legal Business Name</u>	<u>EIN</u>			
Address of the <u>Principal Place of Business</u> (street, city, state, ZIP)	<u>New York State Vendor Identification Number</u>			
	Telephone ext.	Fax		
	Website			
Authorized Contact for this Questionnaire				
Name	Telephone ext.	Fax		
Title	Email			
<b>Please note:</b> Persons or firms submitting bids must be engaged in the lines of work required in these specifications, or shall be able to refer to work of similar character performed by them. Proposers must present satisfactory evidence of experience, ability, and financial standing, and also a statement as to their plant and machinery.				
<i>Additional <u>Business Entity Identities</u>: If applicable, list any other <u>DBA</u>, <u>Trade Name</u>, <u>Former Name</u>, <u>Other Identity</u>, or <u>EIN</u> used in the last five (5) years, the state and county where filed, and the status (active or inactive).</i>				
Type	Name	EIN	State or County where filed	Status

**(Continued from previous page)**

*Additional Business Entity Identities: If applicable, list any other DBA, Trade Name, Former Name, Other Identity, or EIN used in the last five (5) years, the state and county where filed, and the status (active or inactive).*

Type	Name	EIN	State or County where filed	Status

**I. BUSINESS CHARACTERISTICS**

1.0 Business Entity Type – Check appropriate box and provide additional information:

a) <input type="checkbox"/> Corporation	Date of incorporation
b) <input type="checkbox"/> Public Corporation	Date of incorporation
c) <input type="checkbox"/> Sub-chapter "S" Corporation	Date of incorporation
d) <input type="checkbox"/> Limited Liability Company (LLC or PLLC)	Date Organized
e) <input type="checkbox"/> Limited Liability Partnership	Date of Registration
f) <input type="checkbox"/> Limited Partnership	Date Established
g) <input type="checkbox"/> General Partnership	Date Established
h) <input type="checkbox"/> Sole Proprietor	How many years in business?
i) <input type="checkbox"/> Other	Date Established

If Other, explain:

The Contractor's federal employer identification number is: \_\_\_\_\_

DUNS Number: \_\_\_\_\_

1.1 Was the <u>Business Entity</u> formed in New York State?	<input type="checkbox"/> Yes <input type="checkbox"/> No
If "No," indicate jurisdiction where the <u>Business Entity</u> was formed:	
<input type="checkbox"/> United States	State _____
<input type="checkbox"/> Other	Country _____
1.2 If the <u>Legal Business Entity's Principal Place of Business</u> is not in New York State, does the <u>Legal Business Entity</u> maintain an office in New York State? (Select N/A if <u>Principal Place of Business</u> is in New York State.)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A

If "Yes," provide the address and telephone number for one office located in New York State.																				
<p>1.3 Is the <u>Legal Business Entity</u> a New York State certified <u>Minority-Owned Business Enterprise</u> (MBE), <u>Women-Owned Business Enterprise</u> (WBE), <u>New York State Small Business</u> (SB), or a federally certified <u>Disadvantaged Business Enterprise</u> (DBE)?</p> <p>If "Yes," check all that apply:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> New York State certified <u>Minority-Owned Business</u> (MBE)</li> <li><input type="checkbox"/> New York State certified <u>Women-Owned Business Enterprise</u> (WBE)</li> <li><input type="checkbox"/> <u>New York State Small Business</u> (SB)</li> <li><input type="checkbox"/> Federally certified <u>Disadvantaged Business Enterprise</u> (DBE)</li> </ul>	<input type="checkbox"/> Yes <input type="checkbox"/> No																			
<p>1.4 Identify <u>Officials</u> and <u>Principal Owners</u>, if applicable. For each person, include name, title, and percentage of ownership. Attach additional pages if necessary. If applicable, reference to relevant SEC filing(s) containing the required information is optional.</p> <table border="1"> <thead> <tr> <th>Name</th> <th>Title</th> <th>Percentage of Ownership (Enter 0% if not applicable)</th> </tr> </thead> <tbody> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> </tbody> </table>			Name	Title	Percentage of Ownership (Enter 0% if not applicable)															
Name	Title	Percentage of Ownership (Enter 0% if not applicable)																		
<p><b>2. <u>LEADERSHIP INTEGRITY</u></b></p> <p><i>Within the past five (5) years, has any current or former reporting entity official or any individual currently or formerly having the authority to sign, execute, or approve bids, proposals, contracts, or supporting documentation on behalf of the reporting entity with any government entity been:</i></p>																				
2.0 <u>Sanctioned</u> relative to any business or professional permit and or license?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Other																			
2.1 <u>Suspended, debarred, or disqualified</u> from any government-contracting process?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Other																			

2.2 The subject of an <u>investigation</u> , whether open or closed, by any <u>government entity</u> that resulted in findings of civil or criminal violation for any business-related conduct?	[ ] Yes [ ] No [ ] Other
2.3 Indicted, granted immunity, or convicted of a felony or misdemeanor crime, or subject to a judgment for:	[ ] Yes [ ] No [ ] Other

For each “Yes” or “Other” explain:

### **3. INTEGRITY – CONTRACT BIDDING**

***Within the past five (5) years, has the reporting entity:***

<p>3.0 Been <u>suspended</u> or <u>debarred</u> from any <u>government-contracting process</u> or been <u>disqualified</u> on any government procurement, permit, license, concession, franchise or lease, including but not limited to, <u>debarment</u> for violation of New York State Workers' Compensation or Prevailing Wage laws, or New York State Procurement Lobbying Law?</p>	<p>[ ] Yes [ ] No</p>
<p>3.1 Been subject to a denial or revocation of a government prequalification?</p>	<p>[ ] Yes [ ] No</p>

3.2 Been denied a contract award or had a bid rejected based upon a <u>non-responsibility finding by a government entity</u> ?	<input type="checkbox"/> Yes <input type="checkbox"/> No
3.3 Had a low bid rejected on a <u>government contract</u> for failure to <u>make good-faith efforts on any Minority-Owned Business Enterprise, Women-Owned Business Enterprise, or Disadvantaged Business Enterprise goal or statutory affirmative-action requirements</u> on a previously held contract?	<input type="checkbox"/> Yes <input type="checkbox"/> No
3.4 Agreed to a voluntary exclusion from bidding/contracting with a <u>government entity</u> ?	<input type="checkbox"/> Yes <input type="checkbox"/> No
3.5 Initiated a request to withdraw a bid submitted to a <u>government entity</u> in lieu of responding to an information request or subsequent to a formal request to appear before the <u>government entity</u> ?	<input type="checkbox"/> Yes <input type="checkbox"/> No
For each "Yes" explain:	
<b>4. INTEGRITY – CONTRACT AWARD</b>	
<i>Within the past five (5) years, has the reporting entity:</i>	
4.0 Been <u>suspended or terminated for cause</u> on any <u>government contract</u> including, but not limited to, a <u>non-responsibility finding</u> ?	<input type="checkbox"/> Yes <input type="checkbox"/> No
4.1 Been subject to an <u>administration proceeding</u> or civil action seeking specific performance or restitution in connection with any <u>government entity</u> ?	<input type="checkbox"/> Yes <input type="checkbox"/> No
4.2 Entered into a formal monitoring agreement as a condition of a contract award from a <u>government entity</u> ?	
For each "Yes," explain:	

## **5. CERTIFICATIONS/LICENSES**

*Within the past five (5) years, has the reporting entity:*

5.0 Had a revocation, <u>suspension</u> , or <u>disbarment</u> of any business or professional permit and/or license?	[ ] Yes [ ] No
5.1 Had a denial, decertification, revocation, or forfeiture of New York State certification of <u>Minority-Owned Business Enterprise</u> , <u>Women-Owned Business Enterprise</u> , or federal certification of <u>Disadvantaged Business Enterprise</u> status for other than change of ownership?	[ ] Yes [ ] No

For each “Yes,” explain and be sure to attach all relevant licenses and certifications related to this bid, regardless of whether or not there has a problem:

5.2 Does the Reporting Entity carry the following insurances:

- Workers Compensation [ ] Yes [ ] No
- Disability Benefits Insurance [ ] Yes [ ] No
- General Liability [ ] Yes [ ] No
- Comprehensive Automobile Liability [ ] Yes [ ] No

5.3 Attach any and all related insurance certificates appropriate to the services offered (i.e.: professional malpractice, workers compensation, property coverage, general liability, data breach, etc.) and/or as requested by the purchasing office.

## **6. LEGAL PROCEEDINGS**

*Within the past five (5) years, has the reporting entity:*

6.0 Been the subject of an <u>investigation</u> , whether open or closed, by any <u>government entity</u> for a civil or criminal violation?	[ ] Yes [ ] No
6.1 Been the subject of an indictment, grant of immunity, <u>judgment</u> , or conviction (including entering into a plea bargain) for conduct constituting a crime?	[ ] Yes [ ] No

6.2 Received an OSHA citation and Notification of Penalty containing a violation classified as <u>serious or willful</u> ?	<input type="checkbox"/> Yes <input type="checkbox"/> No
6.3 Had a <u>government entity</u> find a willful prevailing-wage or supplemental-payment violation or any other willful violation of New York State Labor Law?	<input type="checkbox"/> Yes <input type="checkbox"/> No
6.4 Entered into a consent order with the New York State Department of Environmental Conservation, or received an enforcement determination by any <u>government entity</u> involving a violation of federal, state, or local environmental laws?	<input type="checkbox"/> Yes <input type="checkbox"/> No
6.5 Other than previously disclosed: a) Been subject to fines or penalties imposed by <u>government entities</u> , which in the aggregate total \$25,000 or more, or; b) Been convicted of a criminal offense pursuant to any administrative and/or regulatory action taken by any <u>governmental entity</u> ?	<input type="checkbox"/> Yes <input type="checkbox"/> No

For each "Yes," explain:

## 7. FINANCIAL AND ORGANIZATIONAL CAPACITY

7.0 Within the past five (5) years has the <u>Reporting Entity</u> received any <u>formal unsatisfactory-performance assessment(s)</u> from any <u>government entity</u> on any contract?	<input type="checkbox"/> Yes <input type="checkbox"/> No
If "Yes," provide an explanation of the issue(s), relevant dates, the <u>government entity</u> involved, any remedial or corrective action(s) taken and the current status of the issue(s). Provide answer below or attach additional sheets with numbered responses.	

7.1 Within the past five (5) years, has the <u>Reporting Entity</u> had any liquidated damages assessed over \$25,000?	[ <input type="checkbox"/> ] Yes [ <input type="checkbox"/> ] No
<p>If "Yes," provide an explanation of the issue(s), relevant dates, contracting party involved, the amount assessed, and the current state of the issue(s). Provide answer below or attach additional sheets with numbered responses.</p>	
7.2 Within the past five (5) years, have any <u>liens</u> or <u>judgments</u> (not including UCC filings) over \$25,000 been filed against the <u>Reporting Entity</u> that remain undischarged?	[ <input type="checkbox"/> ] Yes [ <input type="checkbox"/> ] No
<p>If "Yes," provide and explanation of the issue(s), relevant dates, the Lien Holder or Claimant's names(s), the amount of the lien(s), and the current status of the issue(s). Provide answer below or attach additional sheets with numbered responses.</p>	
7.3 In the last seven (7) years, has the <u>Reporting Entity</u> initiated or been the subject of any bankruptcy proceedings, whether or not closed, or is any bankruptcy proceeding pending?	[ <input type="checkbox"/> ] Yes [ <input type="checkbox"/> ] No
<p>If "Yes," provide the bankruptcy chapter number, the court name, and the docket number. Indicate the current status of the proceedings as "Initiated," "Pending," or "Closed." Provide answer below or attach additional sheets with numbered responses.</p>	
7.4 During the past three (3) years, has the <u>Reporting Entity</u> failed to file any tax returns required by federal, state, or local laws?	[ <input type="checkbox"/> ] Yes [ <input type="checkbox"/> ] No
<p>If "Yes," provide the taxing jurisdiction, the type of tax, the liability year(s), the tax liability amount the <u>Reporting Entity</u> failed to file/pay and the current status of the tax liability. Provide answer below or attach additional sheets with numbered responses.</p>	
7.5 During the past three (3) years, has the <u>Reporting Entity</u> failed to file any New York State unemployment insurance returns?	[ <input type="checkbox"/> ] Yes [ <input type="checkbox"/> ] No

If "Yes," provide the years the Reporting Entity failed to file/pay the insurance, explain the situation and any remedial or corrective action(s) taken, and the current status of the issue(s). Provide answer below or attach additional sheets with numbered responses.

<p>7.6 During the past three (3) years, has the <u>Reporting Entity</u> had any <u>government audit(s)</u> completed?</p> <p>a) If "Yes," did any audit of the <u>Reporting Entity</u> identify any reported significant deficiencies in internal control, fraud, illegal acts, significant violations of provisions of contracts or grant agreements, significant abuse, or any <u>material disallowance</u>?</p> <p>If "Yes," to 7.6 a), provide an explanation of the issue(s), relevant dates, the <u>government entity</u> involved, any remedial or corrective action(s) taken, and the current status of the issue(s). Provide answer below or attach additional sheets with numbered responses.</p>		<input type="checkbox"/> Yes <input type="checkbox"/> No
---	--	--

## **8. ASSOCIATED ENTITIES**

*This section pertains to any entity(ies) that either control, or is controlled by, the reporting entity.*

<p>8.0 Does the <u>Reporting Entity</u> have any <u>Associated Entities</u>?</p> <p>Note: All questions in this section must be answered if the <u>Reporting Entity</u> is either:</p> <ul style="list-style-type: none"> <li>- An <u>Organizational Unit</u>; or</li> <li>- The entire <u>Legal Business Entity</u> that controls, or is controlled by, any other entity(ies).</li> </ul> <p>If "No," SKIP THE REMAINDER OF SECTION 8.</p>	<input type="checkbox"/> Yes <input type="checkbox"/> No
<p>8.1 Within the past five (5) years, has any <u>Associated Entity Official</u> or <u>Principal Owner</u> been charged with a misdemeanor or felony, been indicted, granted immunity, convicted of a crime, or subject to a <u>judgment</u> for:</p> <ol style="list-style-type: none"> <li>a) Any business-related activity; or</li> <li>b) Any crime, whether or not business related, the underlying conduct of which was related to truthfulness?</li> </ol>	<input type="checkbox"/> Yes <input type="checkbox"/> No

If "Yes," provide an explanation of the issue(s), the individual involved, his/her role in the Associated Entity, his/her relationship to the Reporting Entity, relevant dates, the government entity involved, any remedial or corrective action(s) taken, and the current status of the issue(s). Provide answer below or attach additional sheets with numbered responses.

<p>8.2 Does any <u>Associated Entity</u> have any currently undischarged <u>Federal</u>, New York State, New York City, or other New York local government <u>liens or judgments</u> (not including UCC filings) over \$50,000?</p> <p>If "Yes," provide an explanation of the issue(s), identify the <u>Associated Entity</u>'s name(s), EIN(s), primary business activity, relationship to the <u>Reporting Entity</u>, relevant dates, the Lien holder or Claimant's name(s), the amount of the lien(s) and the current status of the issue(s). Provide answer below or attach additional sheets with numbered responses.</p>	<input type="checkbox"/> Yes <input type="checkbox"/> No
<p>8.3 Within the past five (5) years, has any Associated Entity:</p>	
<p>a) Been <u>disqualified, suspended, or debarred</u> from any <u>federal, New York State, New York City, or other New York local government- contracting process</u>?</p>	
<p>b) Been denied a contract award, or had a bid rejected, based upon a <u>non-responsibility finding</u> by any <u>federal, New York State, New York City, or other New York local government entity</u>?</p>	
<p>c) Been <u>suspended, cancelled, or terminated for cause</u> (including <u>non-responsibility</u>) on any <u>federal, New York State, New York City, or New York local government contract</u>?</p>	
<p>d) Been the subject of an investigation, whether open or closed, by any <u>federal, New York State, New York City, or New York local government entity</u> for a civil or criminal violation with a penalty in excess of \$500,000?</p>	
<p>e) Been the subject of an indictment, grant of immunity, <u>judgment</u>, or conviction (including entering into a plea bargain) for conduct constituting a crime?</p>	

<p>f) Been convicted of a criminal offense pursuant to any administrative and/or regulatory action taken by any <u>federal</u>, New York State, New York City, or other New York local <u>government entity</u>?</p>	<input type="checkbox"/> Yes <input type="checkbox"/> No
<p>g) Initiated, or been subject of, any bankruptcy proceedings, whether or not closed, or is any bankruptcy proceeding pending?</p>	<input type="checkbox"/> Yes <input type="checkbox"/> No
<p>For each "Yes," provide an explanation of the issue(s), identify the <u>Associated Entity's</u> name(s), EIN(s), primary business activity, relationship to the <u>Reporting Entity</u>, relevant date(s), the <u>government entity</u> involved, any remedial or corrective action(s) taken, and the current status of the issue(s). Provide answer below or attach additional sheets with numbered responses.</p>	

## **9. REFERENCES AND PROFESSIONAL MEMBERSHIPS**

### 9.0 Bank References

- A. \_\_\_\_\_
- B. \_\_\_\_\_
- C. \_\_\_\_\_
- D. \_\_\_\_\_
- E. \_\_\_\_\_
- F. \_\_\_\_\_
- G. \_\_\_\_\_

### 9.1 Trade Association Memberships

- A. \_\_\_\_\_
- B. \_\_\_\_\_
- C. \_\_\_\_\_
- D. \_\_\_\_\_

## **10. CERTIFICATION**

10.0 Attach state of financial conditions, including vendor's latest regulated dated financial statement or balance sheet.

Date of current statement or balance sheet: \_\_\_\_\_

Name and address of firm preparing statement: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Dated at \_\_\_\_\_ This \_\_\_\_\_ Day of \_\_\_\_\_ 20 \_\_\_\_\_

Name of Organization: \_\_\_\_\_

By:

Title:

State of: )

:ss

County of: )

M \_\_\_\_\_ being duly sworn deposes and says that  
he/she is the \_\_\_\_\_ of \_\_\_\_\_ contractor and that  
answers to the forgoing questions and all statements therein contained are true and correct.

Sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_ 20 \_\_\_\_\_

Notary Public: \_\_\_\_\_

My Commission expires: \_\_\_\_\_

Notary Seal/Stamp

**NON-COLLUSION AFFIDAVIT OF PRIME BIDDER**

State of New York \_\_\_\_\_) )SS.  
County of \_\_\_\_\_)

\_\_\_\_\_, being first duly sworn, deposes and says that:

(1) He is \_\_\_\_\_ of \_\_\_\_\_ the Bidder that has submitted the attached bid:

(2) He is fully informed respecting the preparation and contents of the attached Bid and of all pertinent circumstances in relation to such Bid:

(3) Such bid is genuine and is not a collusive or sham Bid;

(4) Neither the said Bidder nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this affiant, has in any way colluded, conspired, conceived or agreed, directly or indirectly with any other Bidder, firm or person to submit a collusive or sham Bid in connection with the Contract for which the attached Bid has been submitted or to refrain from bidding in connection with such Contract, or has in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other Bidder, firm or person to fix the price or prices in the attached Bid or of any other Bidder, or to fix any overhead, profit or cost element of the Bid price or the Bid price of any other Bidder, or to secure through any collusion, conspiracy, connivance or unlawful agreement any advantage against \_\_\_\_\_ (Local Public Agency) or any person interested in the proposed Contract; and

(5) The price or prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the bidder or any of its agents, representatives, owners, employees, or parties in interest, including this affiant.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Subscribed and sworn to before me  
this \_\_\_\_\_ day of \_\_\_\_\_, 20

\_\_\_\_\_

My commission expires:

## **CERTIFICATION OF NONSEGREGATED FACILITIES**

The Bidder certifies that he does not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The Bidder certifies further that he will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he will not permit his employees to perform their services at any location under his control where segregated facilities are maintained. The Bidder agrees that a breach of this certification will be a violation of the Equal Opportunity clause in any contract resulting from acceptance of this bid. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms and washrooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on habit, local custom, or otherwise. The bidder agrees that (except where he has obtained identical certification from proposed subcontractors for specific time periods) he will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity clause, and the he will retain such certifications in his files.

NOTE: The penalty for making false statements in offers is prescribed in 18.U.S.C. Section 1001.

Date \_\_\_\_\_, 20\_\_\_\_\_  
(Name of Bidder)

By:

Title

Official Address  
(including Zip Code):

**Certification Pursuant to Section 103-g  
of the New York State  
General Municipal Law  
Iranian Energy Sector Divestment**

- A. By submission of this bid/proposal, each bidder/proposer and each person signing on behalf of any bidder/proposer certifies, and in the case of a joint bid, each party thereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and belief that each bidder is not on the list created pursuant to paragraph (b) of subdivision 3 of Section 165-a of the New York State Finance Law.
- B. A Bid/Proposal shall not be considered for award, nor shall any award be made where the condition set forth in Paragraph A above has not been complied with; provided, however, that in any case the bidder/proposer cannot make the foregoing certification set forth in Paragraph A above, the bidder/proposer shall so state and shall furnish with the bid a signed statement which sets forth in detail the reasons therefor. Where Paragraph A above cannot be complied with, the Purchasing Unit to the political subdivision, public department, agency or official thereof to which the bid/proposal is made, or his designee, may award a bid/proposal, on a case by case business under the following circumstances:
  1. The investment activities in Iran were made before April 12, 2012, the investment activities in Iran have not been expanded or renewed after April 12, 2012, and the Bidder/Proposer has adopted, publicized and is implementing a formal plan to cease the investment activities in Iran and to refrain from engaging in any new investments in Iran; or
  2. The political subdivision makes a determination that the goods or services are necessary for the political subdivision to perform its functions and that, absent such an exemption, the political subdivision would be unable to obtain the goods or services for which the contract is offered. Such determination shall be made in writing and shall be a public document.

Signature \_\_\_\_\_

Name Printed: \_\_\_\_\_

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

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

Date: \_\_\_\_\_



FILED  
STATE RECORDS  
FEB 27 2022

DEPARTMENT OF STATE

State of New York  
Executive Chamber

No. 14

EXECUTIVE ORDER

**Directing State Agencies and Authorities to Divest Public Funds Supporting Russia**

WHEREAS, Russia has engaged in an unjustified and unprovoked attack on the sovereign nation of Ukraine;

WHEREAS, the State of New York is home to the largest Ukrainian population in the United States and is proud of the special relationship it has with the nation of Ukraine;

WHEREAS, New York stands firmly with Ukraine and strongly condemns Russia's actions against Ukraine;

WHEREAS, the State will not permit its own investment activity, whether directly or indirectly, to aid Russia, or any other entity, as it commits these human rights violations and atrocities in violation of the rights of the Ukrainian people;

WHEREAS, this Order is a testament to the values and economic strength of the State of New York, which has the 10<sup>th</sup> highest Gross Domestic Product in the world, an amount higher than that of Russia;

WHEREAS, protecting New York from financing discrimination against the Ukrainian people is a compelling State interest;

NOW, THEREFORE, I, Kathy Hochul, Governor of the State of New York do hereby order, effective until such time as the sanctions imposed by the federal government are no longer in effect, as follows:

1. Definitions:

- a. "Affected State Entities" means (i) all agencies and departments over which the Governor has executive authority, and (ii) all public-benefit corporations, public authorities, boards, and commissions, for which the Governor appoints the Chair, the Chief Executive, or the majority of Board Members, except for the Port Authority of New York and New Jersey.
  - b. "Russian entity" means an institution or company that is headquartered in Russia or has its principal place of business in Russia.
  - c. "Supporting entity" means any institution or company providing assistance to the Russian government in its campaign to invade the sovereign country of Ukraine, either through in-kind support or for-profit.
2. All Affected State Entities shall review all investments and all contracts for commodities, services, technology and construction to determine if the Affected State Entity has any investments in or contracts with Russian and supporting entities.

FILED  
STATE RECORDS  
FEB 27 2022

DEPARTMENT OF STATE

3. All Affected State Entities are directed, to the extent practicable:

- a. to divest their money and assets from any investment in any institution or company that is determined to be a Russian or supporting entity and to refrain from making any investments in such entities in the future; and
  - b. to terminate any contracts with an institution or company that is determined to be a Russian or supporting entity and to refrain from entering into any new contracts with such entities in the future.
4. Notwithstanding the foregoing, an Affected State Entity may invest in or contract with a Russian or supporting entity provided that the head of the Affected State Entity makes a determination in writing that the investment or contract is necessary for the Affected State Entity to perform its functions and that no suitable investment or contractual alternatives exist.



GIVEN under my hand and the Privy Seal of the State  
in the City of Albany this twenty-seventh  
day of February in the year two thousand  
twenty-two.

*Kathy Hochul*

BY THE GOVERNOR

A handwritten signature of Kathy Hochul in black ink.

Secretary to the Governor

## **BIDDER'S CERTIFICATION OF COMPLIANCE RUSSIAN DIVESTMENT**

Pursuant to New York State Executive Order No. 14 filed February 27, 2022, which generally prohibits the City of Schenectady from entering into contracts with persons engaged in investment activities with a “Russian-entity” or a “Supporting-entity”, as defined in the Executive Order, the bidder/proposer submits the following certification:

### **BIDDER'S CERTIFICATION**

By submission of this bid or proposal, each bidder/proposer and each person signing on behalf of any bidder/proposer certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and belief, that each bidder/proposer is not a Russian-entity or a supporting entity pursuant to New York State Executive Order No. 14 filed February 27, 2022.

Date: \_\_\_\_\_, 20\_\_\_\_\_

\_\_\_\_\_  
(Name of Bidder/Contractor)

BY: \_\_\_\_\_

\_\_\_\_\_  
(Title)

Subscribed and sworn to before me  
This \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_

\_\_\_\_\_  
Notary Public/Commissioner of Deeds

## **CERTIFICATION OF APPRENTICESHIP PROGRAMS**

In accordance with the provisions of the New York Labor Law §816-b, the Bidder/Contractor hereby certifies that it (or any subcontractors and/or affiliates) has entered into apprenticeship agreements appropriate for the type and scope of work to be performed, and specified below, that the same have been registered with and approved by the Commissioner of Labor of the State of New York. Any bid submitted by a contractor intending to rely upon the services of an affiliate company or sub-contractor must identify the affiliate or sub-contractor and identify those aspects of the bid that will be performed by that affiliate or subcontractor. The award of any contract will be premised and specifically conditioned upon the Contractor's representation that it could not perform all elements of the contract itself and that the use of an affiliate or subcontractor was required to perform all services required by the contract.

In accordance with Section 816-b of the New York State Labor Law, contractors and subcontractors of City construction projects with an aggregate value (which shall mean the total cost of all contracts of the project) in excess of \$300,000 or more shall have in place agreements providing appropriate apprenticeship training programs approved by the Commissioner of the Department of Labor for the type and scope of work to be performed, at the time of bid date and prior to entering into a contract with the City of Schenectady.

A bidder who submits a bid for a City construction contract for which the contract amount is \$300,000 or more shall submit with the bid package the following documents for each apprentice agreement:

- (a). A copy of the current New York State Department of Labor (NYS DOL) "Apprentice Training Program Registration Agreement" (NYS DOL Agreement) issued to the bidder as a sponsor –or- issued to a NYS DOL apprenticeship sponsor with whom the bidder has an apprenticeship training agreement; AND
- (b). If the bidder is not the named sponsor on the NYS DOL Agreement described in (a), a copy of the apprenticeship training agreement between the bidder and the named sponsor.

The Bidder/Contractor by executing this certification represents, acknowledges and agrees that all work required to be performed in the execution and completion of the contract shall be performed by the Contractor or by its affiliate or subcontractor and that all aspects of the contract will be performed by the company possessing the NY State Labor Department apprenticeship program certificate of compliance for the trade required to perform that aspect of the contract and utilizing the labor and equipment of that company as specified below. Bidder/Contractor further warrants, represents and agrees that it will at all time ensure compliance with this requirement of the contract and that the applicable apprenticeship programs will remain in full force and effect through the completion of the contract.

The Bidder/Contractor shall provide proof of all applicable approvals to the City Engineer for projects

\$300,000.00 or more appropriate for the scope of the work as determined by the City Engineer. Such approvals shall be filed as a requisite component of the bid. See requirements below:

Apprentice Programs required for this project:

1. Laborers \_\_\_\_\_
2. Operating Engineers \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

(Complete where applicable, continued next page)

Affiliates/Subcontractors

Work to be performed

- |          |       |
|----------|-------|
| 1. _____ | _____ |
| 2. _____ | _____ |
| 3. _____ | _____ |
| 4. _____ | _____ |

Date: \_\_\_\_\_, 20\_\_\_\_\_

(Name of Bidder/Contractor)

BY: \_\_\_\_\_

(Title)

Subscribed and sworn to before me

This \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_

\_\_\_\_\_  
Notary Public/Commissioner of Deeds



**Form (A) MWBE Participation Plan      DUE WITH BID**

**CITY OF SCHENECTADY**

**MWBE Participation Plan**  
**(FINAL PLAN WILL BE INCORPORATED INTO CONTRACT, IF AWARDED.)**

Provide a written Plan describing the process and steps that will be taken to ensure that the requirements relative to contracting with Minority and Women Business Enterprises will be met. Include in the description what specific actions will be taken to ensure that subcontractors comply with the requirements. The description must outline specific steps to be taken and detail the program or strategy to be employed to achieve the requirements.

| Provide an outline of the specific contracts that will be awarded to Section 3 MBE/WBE businesses, if known. Use additional sheets of paper, if necessary. Please Note The MWBE Goals.

Current Goals MBE 15% and WBE 15%

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NOTE: This plan shall incorporate actions to be taken by the bidder's/offeror's proposed subcontractors/suppliers.

Name: \_\_\_\_\_ Title: \_\_\_\_\_ Date: \_\_\_\_\_



# CITY OF SCHENECTADY FORM (B-1) Due prior to Contract

## CONTRACTING UTILIZATION PLAN

Contracting Schedules that do not reflect a level of participation that meets or exceeds the stated requirements may cause the bid to be deemed non-responsive. MBE / WBE firms not certified by NY Empire State Development (ESD) shall not be included on this schedule and shall not be counted towards the participation requirements. Duplicate form if additional space is needed.

ITEM #	DESCRIPTION OF WORK TO BE PERFORMED	NAME AND ADDRESS OF COMPANY TO BE USED TO PERFORM THE WORK	SCOPE OF WORK TO BE PERFORMED			TOTAL ESTIMATED AMOUNT OF WORK TO BE PERFORMED		
			LABOR	MATERIALS	BOTH	Prime	MBE	WBE
EXAMPLE	GC	John Doe, Prime Contracting			X	\$50,000		
1.								
2.								
3.								
4.								
5.								
6.								
7.								

### Summary:

- 1) Total Contract Value \$ \_\_\_\_\_ Percentage of Total Contract Amount \_\_\_\_\_ %
- 2) Total Amount to be Awarded to MBE \$ \_\_\_\_\_ Percentage of Total Contract Amount \_\_\_\_\_ %
- 2) Total Amount to be Awarded to WBE: \$ \_\_\_\_\_ Percentage of Total Contract Amount \_\_\_\_\_ %

Name: \_\_\_\_\_ Title: \_\_\_\_\_ Date: \_\_\_\_\_



**CITY OF SCHENECTADY FORM ( B-2 ) DUE PRIOR TO CONTRACT**

## **WORKFORCE EMPLOYMENT AND TRAINING SCHEDULE Project**

**Employment and Training Schedules that do not reflect a level of participation that meets or exceeds the stated requirements may cause the bid to be deemed non-responsive. Duplicate form if additional space is needed.**

**Name:** \_\_\_\_\_ **Title:** \_\_\_\_\_ **Date:** \_\_\_\_\_



**FORM (D) DUE MONTHLY**  
**CITY OF SCHENECTADY EEO Manhour Report**  
To be submitted monthly with certified payroll

Contractor: \_\_\_\_\_ Contract No.: \_\_\_\_\_

Contract Start Date: \_\_\_\_\_ Contract Completion Date: \_\_\_\_\_

Report for month of: \_\_\_\_\_ 20\_\_\_\_\_

**Identify all WORKERS who have performed work in connection with this project to date. All employees must appear on the Certified Payroll Form. List all employees who work on this Project.**

Trade	Minority - Male	Minority - Female	White - Male	White - Female	Others	Total Number Man-hours
LABORERS						
CARPENTERS						
MASON						
PAINTERS						
ELECTRICIANS						
OTHERS						
TOTALS						

For the period of this report, indicate:

Total Number of Manhours Worked by all Employees: \_\_\_\_\_

Total Number of Manhours Worked by Minority Employees: \_\_\_\_\_

Total Percentage of Manhours Worked by Female Employees: \_\_\_\_\_

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

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

Date: \_\_\_\_\_



## CITY OF SCHENECTADY FORM ( C ) DUE MONTHLY Contracting Compliance Report

Contractor: \_\_\_\_\_ Contract No.: \_\_\_\_\_

Contract Start Date: \_\_\_\_\_ Contract Completion Date: \_\_\_\_\_

Original Contract Amount: \$\_\_\_\_\_

Current Contract Amount (Including Change Orders): \$\_\_\_\_\_

Report for month of: \_\_\_\_\_ 20\_\_\_\_\_

**List all MBE/WBE Subcontractors and Suppliers utilized on this contract to date. Copies of all subcontract/supplier agreements executed during this reporting period must be submitted with report. Make copies of form if additional space is needed.**

Name of Subcontractor/Supplier	Indicate Certification (MBE/WBE/)	Scope of Work Performed	Total Subcontract Amount Including Change Orders	Amount Paid this Period	Amount Paid To Date	Balance Due

Total Amount Paid to Contractor by The City of Schenectady:

This Period: \$\_\_\_\_\_ To Date: \$\_\_\_\_\_

Total Amount Paid by Contractor to all Business Concerns:

This Period: \$\_\_\_\_\_ To Date: \$\_\_\_\_\_

Total Amount Paid by Contractor to MBE'S:

This Period: \$\_\_\_\_\_ To Date: \$\_\_\_\_\_

Total Amount Paid by Contractor to WBE'S:

This Period: \$\_\_\_\_\_ To Date: \$\_\_\_\_\_

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

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

Date: \_\_\_\_\_



**CITY OF SCHENECTADY FORM ( B-3 ) DUE Prior to Contract  
MWBE Waiver Request**

<b>Contractor :</b>	<b>Federal Identification No.:</b>
<b>Address:</b>	<b>Solicitation/Contract No.:</b>
<b>City, State, Zip Code:</b>	<b>M/WBE Goals over life of Contract: MBE 15% WBE 15%</b>

**Contractor is requesting the following waiver of the procurement goal: (check one)**

- Total MBE Waiver**       **Partial MBE Waiver**       **Total M/WBE Waiver**  
 **Total WBE Waiver**       **Partial WBE Waiver**  
 **Waiver Pending ESD Certification** – (Subcontractor/Supplier not currently certified M/WBE & application has been filed with Empire State Development to become a certified M/WBE)

**Date of such filing with Empire State Development:** [Click here to enter a date.](#)

If a total or partial waiver is requested, appropriate supporting documentation as outlined in the [Detailed MWBE Form Instructions](#) is required.

By submitting this form and the required information, the officer or/contractor certifies that every Good Faith Effort has been taken to promote M/WBE participation pursuant to the M/WBE requirements set forth under the contract. When requesting a waiver, it should be clear that no MWBE exists or can be used to meet the established goal.

Submission of this form constitutes the Offeror/Contractor's acknowledgement and agreement to comply with the M/WBE requirements set forth under NYS Executive Laws, Article 15-A and 5 NYCRR Part 143. Failure to submit complete and accurate information may result in a finding of noncompliance and/or termination of the contract.

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**PREPARED BY (Signature)**

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**Date:**

<b>Name and Title of Preparer (Printed or Typed):</b>	<b>Telephone Number:</b>	<b>Email Address:</b>
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Submit with the bid or proposal or if submitting after award submit to: [Rgardner@schenectadyny.gov](mailto:Rgardner@schenectadyny.gov)

\*\*\*\*\* FOR OAA USE ONLY \*\*\*\*\*      **Reviewed By:** \_\_\_\_\_ **Date:** \_\_\_\_\_

<b>Waiver Granted:</b> <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b>	<input type="checkbox"/> <b>Total MBE Waiver</b> <input type="checkbox"/> <b>Partial MBE Waiver</b> <input type="checkbox"/> <b>Total M/WBE Waiver</b> <input type="checkbox"/> <b>*Conditional</b>	<input type="checkbox"/> <b>Total WBE Waiver</b> <input type="checkbox"/> <b>Partial WBE Waiver</b> <input type="checkbox"/> <b>ESD Certification Waiver</b>
<input type="checkbox"/> <b>Notice of Deficiency Issued</b> _____		

# CITY OF SCHENECTADY OFFICE OF AFFIRMATIVE ACTION COMPLIANCE FORMS

## CITY OF SCHENECTADY SCHEDULE OF M/W/DBE AND LABOR PERFORMANCE

The affirmative Action office monitors subcontracting and labor participation for contracts let by the City Of The schedule of M/W/DBE and labor performance must be completed and submitted within fifteen days of receiving the Notice of Award.

### INSTRUCTION SHEET

All Forms are to be submitted by General Contractors only. I cannot accept submissions from Sub-contractors. Thank you for your cooperation.

**Forms A1, A2, and A3** are to be submitted only once, at the start of project. You may amend at any time.

**A1-** Submit only once to certify that you meet the workforce utilization goals of 7% Minority and 5% Female working on the project.

**A2-** Submit only once to certify that you meet the project goal of 11.5% Minority Owned Business Enterprise (MBE) and 11.5% Women Owned Business Enterprise (WBE).

~~**A3-** Submit only once, this form is to be completed and signed by each MWBE Subcontractor listed on Form A2.~~

**Forms B1 and B3** are to be submitted Monthly

**B1-** report the number of employees worked on site

**B3-** report payment made to MWBEs

-Must report even if there were no activities for the month. At the completion of the project please state: **FINAL REPORT.**

**ü** If you are claiming workforce utilization goals (5% Minority, 5% Female) through your sub-contractor, please contact my office directly before you fill out **Form B2**.

**Complete a separate form for each City of Schenectady project that you have been awarded.** Please note that the City of Schenectady reserves the right to conduct office and field inspections and record audits. Should you have any questions or need assistance in completing the forms, please contact, Ron Gardner at 518-382-5199 Ext 5374, Email rgardner@schenectadyny.gov

## City Of Schenectady

### Prime Contractor Workforce Utilization Report

Compliance with minority group employment levels shall mean hiring and maintaining a minimum of 7% minority workforce on City Of Schenectady construction projects; and compliance with women group employment levels shall mean hiring and maintaining a minimum of 5% female workforce on City of Schenectady construction projects. Failure to include MWBE Participation Report will render the entire proposal not reasonably susceptible of being selected for award and cause the City Of Schenectady to withhold further consideration.

Prime Contractor:	Contact Person:	
Sub Contractor:	Contact Person:	
Address:	E-Mail:	
City/State/Zip		
Telephone:	Fax Number:	
Project Name:		
Contract #:	Contract Name:	
Contact Person:	E-mail:	
Report Date:		

\*\*\*Workforce to be utilized on the approved contract

Trade or Job Category	Overall Totals (Sum of A thru E)		White (A) Not of Hispanic Origin		Black (B) Not of Hispanic Origin		Hispanic (C)		Asian (D) Pacific Islander		Amer. Indian or (E) Alaskan Native	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Professionals												
Technicians												
Workers:												
Administrative Support Workers												
Craft Workers												
Operators												
Laborers and Helpers												
Service Workers												
<b>Total</b>												

I certify that the information submitted on this report is in fact true and correct to the best of my knowledge.

Information Provided By:	Signature:	Title:	Date:
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**PRIME CONTRACTOR PROJECT DETAIL**  
**MWBE Utilization Report**

COMPANY NAME:					PROJECT #	
ADDRESS:			TOTAL DOLLAR AMOUNT AWARDED TO YOUR FIRM			
EMAIL ADDRESS:			PHONE:	FAX:		
PROJECT NAME:	Contract #:			CERTIFICATION STATUS	MBE WBE	
	Contact Name:					
DESCRIPTION OF THE SCOPE OF SERVICES AND/OR TYPE OF MATERIALS TO BE SUPPLIED BY MWBE FIRM ON THIS PROJECT						
M/WBE Firm(s) Participating on the Project (Name, Address, Phone)	Date	Amount	Description of Work	Anticipated Start Date	End Date	% of Contract
<p>I _____, representative of _____ declare that the information provided is true and represents accurately my firm's efforts to comply with the Affirmative Action Policy. We shall continue to make every effort to ensure that M/WBE firms have the maximum opportunity to compete for, and perform contracts let by the City of Schenectady.</p>						
SIGNATURE	TITLE			DATE		
Notes:						

**Prime Contractor MWBE Compliance Report**  
**MWBE Subcontractor Participation Report**

**Prime Contractor :**

SUBCONTRACTOR:			PROJECT #	
ADDRESS:		TOTAL DOLLAR AMOUNT AWARDED TO YOUR FIRM		
EMAIL ADDRESS:		PHONE:	FAX:	
PROJECT NAME:	Contract #:	CERTIFICATION STATUS		MBE
	Contact Name:			WBE

DESCRIPTION OF THE SCOPE OF SERVICES AND/OR TYPE OF MATERIALS TO BE SUPPLIED BY MWBE FIRM ON THIS PROJECT	
EST. START DATE	
EST. COMPLETION DATE	
AMOUNT OF CONTRACT	

I certify that the information submitted in this report is in fact true and correct to the best of my knowledge.

SIGNATURE:	TITLE:	DATE:
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Notes:

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# Monthly Workforce Utilization Report

## Prime Contractor Workforce Utilization Report

This report must be completed by each firm working on the site and submitted on a monthly basis. Report all permanent full-time or part-time employees, including apprentice and on-the-job trainees for this project. Attach copies of your firms monthly certified payroll reports. The General Contractor forwards all reports to the City of Schenectady, Affirmative Action Office, City Hall, 105 Jay Street, Room 207 Schenectady, NY 12305. Fax (518) 382-5272. For assistance call 518-382-5199 Ext 5374

Prime Contractor:	Contact Person:
Address:	
City/State/Zip	E-Mail:
Telephone:	Fax Number:
Federal ID No:	
Project Name:	
Contract #:	Contract Name:
Contact Person:	E-mail:
***Workforce to be utilized on the approved contract	

Trade or Job Category	Overall Totals (Sum of A thru E)		White (A) Not of Hispanic Origin		Black (B) Not of Hispanic Origin		Hispanic (C)		Asian (D) Pacific Islander		Amer. Indian or (E) Alaskan Native	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Total	0	0	0	0	0	0	0	0	0	0	0	0

I certify that the information submitted on this report is in fact true and correct to the best of my knowledge.

Information Provided By:	Signature:	Title:	Date:
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# Monthly Workforce Utilization Report

## SubContractor Workforce Utilization Report

This report must be completed by each firm working on the site and submitted to the General Contractor on a monthly basis. Report all permanent full-time or part-time employees, including apprentice and on-the-job trainees for this project. Attach copies of your firms monthly certified payroll reports. The General Contractor forwards all reports to the City of Schenectady, Affirmative Action Office, City Hall, 105 Jay Street, Room 207, Schenectady, NY 12305. Fax (518) 382-5272. For assistance call 518-382-5199 Ext 5374

Prime Contractor:	Contact Person:			
Address:	E-Mail:			
City/State/Zip				
Telephone:	Fax Number:			
Project Name:	Project Number:			
Sub-Contractor's Name:	Contact Person:			
Sub-Contractor's Federal ID No:	E-mail:			
Address:	Please Check:		MBE	WBE
City/State/Zip				
***Workforce to be utilized on the approved contract	Report Date:			

Trade or	Overall Totals		White (A)		Black (B)		Hispanic (C)		Asian (D)		Amer. Indian or (E)	
	(Sum of A thru E)		Not of Hispanic Origin		Not of Hispanic Origin				Pacific Islander		Alaskan Native	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Total	0	0	0	0	0	0	0	0	0	0	0	0

I certify that the information submitted on this report is in fact true and correct to the best of my knowledge.

Information Provided By:	Signature:	Title:	Date:
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**MWBE SUBCONTRACTOR PROJECT DETAIL REPORT**  
**MWBE Payment Report**

COMPANY NAME:				PROJECT #
ADDRESS:		TOTAL DOLLAR AMOUNT AWARDED TO YOUR FIRM		
EMAIL ADDRESS:		PHONE:	FAX:	
PROJECT NAME:	Contract #:	Contact Name:	CERTIFICATION STATUS	MBE
				WBE

DESCRIPTION OF THE SCOPE OF SERVICES AND/OR TYPE OF MATERIALS TO BE SUPPLIED BY MWBE FIRM ON THIS PROJECT			
M/WBE Firm(s) Participating on the Project	Payments made this Month	Payments made to Date	% of Contract

I certify that the information submitted in this report is in fact true and correct to the best of my knowledge.

SIGNATURE	TITLE	DATE
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**CONTRACTOR'S CERTIFICATE OF COMPLIANCE\***

NAME OF PROJECT \_\_\_\_\_ PROJECT NUMBER \_\_\_\_\_

LOCATION \_\_\_\_\_ DATE \_\_\_\_\_

CONTRACT FOR: \_\_\_\_\_

CONTRACT AWARDED: \_\_\_\_\_  
DATE

"I hereby certify that all of the contract requirements as  
specified under the Labor Standards, including applicable  
provisions of Sections 220, 220a thru to 220e and 222 of the  
Labor Laws of the State of New York, have either been complied  
with by \_\_\_\_\_

as Principal Contractor and by each Subcontractor employing  
mechanics or laborers at the site of the work or that there is  
an honest dispute with respect to the applicability of a  
provision."

\_\_\_\_\_ SIGNATURE

\_\_\_\_\_ TITLE

Subscribed and sworn to before me

this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_.

\_\_\_\_\_ SIGNATURE

\_\_\_\_\_ TITLE

MY COMMISSION EXPIRES \_\_\_\_\_

\*NOTE: Two copies of the certificate must be submitted by the contractor with the final  
payment estimate.

## **Sexual Harassment Prevention Certification Form**

By submission of this application, each applicant and each person signing on behalf of the applicant certifies, and in the case of a partnering application each party thereto certifies as to its own organization, under penalty of perjury, that the applicant has and has implemented a written policy addressing sexual harassment prevention in the workplace and provides annual sexual harassment prevention training to all of its employees. Such policy shall, at a minimum, meet the requirements of section two hundred one-g of the labor law.

**Bidder Name:** \_\_\_\_\_

**Signature:** \_\_\_\_\_

**Print Name and Title:** \_\_\_\_\_

**Date:** \_\_\_\_\_



# AIA® Document A132™ – 2019

## Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition

AGREEMENT made as of the \_\_\_\_\_ day of \_\_\_\_\_ in the year \_\_\_\_\_  
*(In words, indicate day, month and year.)*

BETWEEN the Owner:

*(Name, legal status, address, and other information)*

and the Contractor:

*(Name, legal status, address, and other information)*

for the following Project:

*(Name, location, and detailed description)*

The Construction Manager:

*(Name, legal status, address, and other information)*

The Architect:

*(Name, legal status, address, and other information)*

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

This document is intended to be used in conjunction with AIA Documents A232™–2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition; B132™–2019, Standard Form of Agreement Between Owner and Architect, Construction Manager as Adviser Edition; and C132™–2019, Standard Form of Agreement Between Owner and Construction Manager as Adviser.

AIA Document A232™–2019 is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

The Owner and Contractor agree as follows.

## TABLE OF ARTICLES

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

### EXHIBIT A INSURANCE AND BONDS

### EXHIBIT B DETERMINATION OF THE COST OF THE WORK

## ARTICLE 1 THE CONTRACT DOCUMENTS

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

## ARTICLE 2 THE WORK OF THIS CONTRACT

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

## ARTICLE 3 DATE OF COMMENCEMENT AND DATES OF SUBSTANTIAL COMPLETION

### § 3.1 The date of commencement of the Work shall be:

(Check one of the following boxes.)

- The date of this Agreement.
- A date set forth in a notice to proceed issued by the Owner.
- Established as follows:  
*(Insert a date or a means to determine the date of commencement of the Work.)*

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

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

**§ 3.3 Substantial Completion of the Project or Portions Thereof**

**§ 3.3.1** Subject to adjustments of the Contract Time as provided in the Contract Documents, the date of Substantial Completion of the Work of all of the Contractors for the Project will be:

*(Insert the date of Substantial Completion of the Work of all Contractors for the Project.)*

**§ 3.3.2** Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work of all of the Contractors for the Project are to be completed prior to Substantial Completion of the entire Work of all of the Contractors for the Project, the Contractors shall achieve Substantial Completion of such portions by the following dates:

Portion of Work	Substantial Completion Date
-----------------	-----------------------------

**§ 3.4 When the Work of this Contract, or any Portion Thereof, is Substantially Complete**

**§ 3.4.1** Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall substantially complete the entire Work of this Contract:

*(Check one of the following boxes and complete the necessary information.)*

- Not later than \_\_\_\_\_ ( \_\_\_ ) calendar days from the date of commencement of the Work.
- By the following date: \_\_\_\_\_

**§ 3.4.2** Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work of this Contract are to be substantially complete prior to when the entire Work of this Contract shall be substantially complete, the Contractor shall substantially complete such portions by the following dates:

Portion of Work	Date to be substantially complete
-----------------	-----------------------------------

**§ 3.4.3** If the Contractor fails to substantially complete the Work of this Contract, or portions thereof, as provided in this Section 3.4, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

**ARTICLE 4 CONTRACT SUM**

**§ 4.1** The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be one of the following:  
*(Check the appropriate box.)*

- Stipulated Sum, in accordance with Section 4.2 below
- Cost of the Work plus the Contractor's Fee, in accordance with Section 4.3 below
- Cost of the Work plus the Contractor's Fee with a Guaranteed Maximum Price, in accordance with Section 4.4 below

*(Based on the selection above, complete Section 4.2, 4.3, or 4.4 below.)*

**§ 4.2 Stipulated Sum**

§ 4.2.1 The Contract Sum shall be \_\_\_\_\_ (\$ \_\_ ), subject to additions and deductions as provided in the Contract Documents.

**§ 4.2.2 Alternates**

§ 4.2.2.1 Alternates, if any, included in the Contract Sum:

Item	Price
------	-------

§ 4.2.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.  
*(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)*

Item	Price	Conditions for Acceptance
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§ 4.2.3 Allowances, if any, included in the Contract Sum:  
*(Identify each allowance.)*

Item	Price
------	-------

§ 4.2.4 Unit prices, if any:  
*(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)*

Item	Units and Limitations	Price per Unit (\$0.00)
------	-----------------------	-------------------------

**§ 4.3 Cost of the Work Plus Contractor's Fee without a Guaranteed Maximum Price**

§ 4.3.1 The Cost of the Work is as defined in Exhibit B, Determination of the Cost of the Work.

**§ 4.3.2 The Contractor's Fee:**

*(State a lump sum, percentage of Cost of the Work or other provision for determining the Contractor's Fee.)*

**§ 4.3.3** The method of adjustment of the Contractor's Fee for changes in the Work:

**§ 4.3.4** Limitations, if any, on a Subcontractor's overhead and profit for increases in the cost of its portion of the Work:

**§ 4.3.5** Rental rates for Contractor-owned equipment shall not exceed \_\_\_\_\_ percent ( \_\_\_ %) of the standard rental rate paid at the place of the Project.

**§ 4.3.6** Unit prices, if any:

*(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)*

Item	Units and Limitations	Price per Unit (\$0.00)
------	-----------------------	-------------------------

**§ 4.3.7** The Contractor shall prepare and submit to the Construction Manager, within 14 days of executing this Agreement, a written Control Estimate for the Owner's review and approval. The Control Estimate shall include the items in Section B.1 of Exhibit B, Determination of the Cost of the Work.

**§ 4.4 Cost of the Work Plus Contractor's Fee with a Guaranteed Maximum Price**

**§ 4.4.1** The Cost of the Work is as defined in Exhibit B, Determination of the Cost of the Work.

**§ 4.4.2** The Contractor's Fee:

*(State a lump sum, percentage of Cost of the Work or other provision for determining the Contractor's Fee.)*

**§ 4.4.3** The method of adjustment of the Contractor's Fee for changes in the Work:

**§ 4.4.4** Limitations, if any, on a Subcontractor's overhead and profit for increases in the cost of its portion of the Work:

**§ 4.4.5** Rental rates for Contractor-owned equipment shall not exceed \_\_\_\_\_ percent ( \_\_\_ %) of the standard rental rate paid at the place of the Project.

**§ 4.4.6** Unit Prices, if any:

*(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)*

Item	Units and Limitations	Price per Unit (\$0.00)
------	-----------------------	-------------------------

**§ 4.4.7 Guaranteed Maximum Price**

§ 4.4.7.1 The Contract Sum is guaranteed by the Contractor not to exceed \_\_\_\_\_ (\$ \_\_ ), subject to additions and deductions by Change Order as provided in the Contract Documents. This maximum sum is referred to in the Contract Documents as the Guaranteed Maximum Price. Costs which would cause the Guaranteed Maximum Price to be exceeded shall be paid by the Contractor without reimbursement by the Owner.

**§ 4.4.7.2 Alternates**

§ 4.4.7.2.1 Alternates, if any, included in the Guaranteed Maximum Price:

Item	Price

§ 4.4.7.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.  
*(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)*

Item	Price	Conditions for Acceptance

§ 4.4.7.3 Allowances, if any, included in the Guaranteed Maximum Price:  
*(Identify each allowance.)*

Item	Price

§ 4.4.7.4 Assumptions, if any, upon which the Guaranteed Maximum Price is based:  
*(Identify each assumption.)*

§ 4.4.8 To the extent that the Contract Documents are anticipated to require further development, the Guaranteed Maximum Price includes the costs attributable to such further development consistent with the Contract Documents and reasonably inferable therefrom. Such further development does not include changes in scope, systems, kinds and quality of materials, finishes, or equipment, all of which, if required, shall be incorporated by Change Order.

§ 4.4.9 The Owner shall authorize preparation of revisions to the Contract Documents that incorporate the agreed-upon assumptions contained in Section 4.4.7.4. The Owner shall promptly furnish such revised Contract Documents to the Contractor. The Contractor shall notify the Owner and Architect of any inconsistencies between the agreed-upon assumptions contained in Section 4.4.7.4 and the revised Contract Documents.

**§ 4.5 Liquidated damages, if any:**

*(Insert terms and conditions for liquidated damages, if any, to be assessed in accordance with Section 3.4.)*

**§ 4.6 Other:**

*(Insert provisions for bonus, cost savings or other incentives, if any, that might result in a change to the Contract Sum.)*

## **ARTICLE 5 PAYMENTS**

### **§ 5.1 Progress Payments**

**§ 5.1.1** Based upon Applications for Payment submitted to the Construction Manager by the Contractor, and Certificates for Payment issued by the Construction Manager and Architect, the Owner shall make progress payments on account of the Contract Sum, to the Contractor, as provided below and elsewhere in the Contract Documents.

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

**§ 5.1.3** Provided that an Application for Payment is received by the Construction Manager not later than the \_\_\_\_\_ day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the \_\_\_\_\_ day of the \_\_\_\_\_ month. If an Application for Payment is received by the Construction Manager after the application date fixed above, payment of the amount certified shall be made by the Owner not later than \_\_\_\_\_ (\_\_\_\_) days after the Construction Manager receives the Application for Payment.

*(Federal, state or local laws may require payment within a certain period of time.)*

### **§ 5.1.4 Progress Payments Where the Contract Sum is Based on a Stipulated Sum**

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

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

**§ 5.1.4.3** In accordance with AIA Document A232™–2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

**§ 5.1.4.3.1** The amount of each progress payment shall first include:

- .1 That portion of the Contract Sum properly allocable to completed Work;
- .2 That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and
- .3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

**§ 5.1.4.3.2** The amount of each progress payment shall then be reduced by:

- .1 The aggregate of any amounts previously paid by the Owner;
- .2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A232–2019;
- .3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;

- .4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A232-2019; and
- .5 Retainage withheld pursuant to Section 5.1.7.

**§ 5.1.5 Progress Payments Where the Contract Sum is Based on the Cost of the Work without a Guaranteed Maximum Price**

§ 5.1.5.1 With each Application for Payment, the Contractor shall submit the cost control information required in Exhibit B, Determination of the Cost of the Work, along with payrolls, petty cash accounts, received invoices, or invoices with check vouchers attached, and any other evidence required by the Owner, Construction Manager or Architect to demonstrate that payments already made by the Contractor on account of the Cost of the Work equal or exceed progress payments already received by the Contractor, plus payrolls for the period covered by the present Application for Payment, less that portion of the payments attributable to the Contractor's Fee.

§ 5.1.5.2 Applications for Payment shall show the Cost of the Work actually incurred by the Contractor through the end of the period covered by the Application for Payment and for which the Contractor has made or intends to make actual payment prior to the next Application for Payment.

§ 5.1.5.3 In accordance with AIA Document A232-2019 and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.5.3.1 The amount of each progress payment shall first include:

- .1 The Cost of the Work as described in Exhibit B, Determination of the Cost of the Work;
- .2 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified; and
- .3 The Contractor's Fee computed upon the Cost of the Work described in the preceding Section 5.1.5.3.1 at the rate stated in Section 4.3.2; or if the Contractor's Fee is stated as a fixed sum in Section 4.3.2 an amount which bears the same ratio to that fixed-sum Fee as the Cost of the Work included in Section 5.1.5.3.1 bears to a reasonable estimate of the probable Cost of the Work upon its completion.

§ 5.1.5.3.2 The amount of each progress payment shall then be reduced by:

- .1 The aggregate of any amounts previously paid by the Owner;
- .2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A232-2019;
- .3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
- .4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A232-2019;
- .5 The shortfall, if any, indicated by the Contractor in the documentation required by Section 5.1.5.1 to substantiate prior Applications for Payment, or resulting from errors subsequently discovered by the Owner's auditors in such documentation; and
- .6 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.5.4 The Owner, Construction Manager and Contractor shall agree upon a mutually acceptable procedure for review and approval of payments to Subcontractors and the percentage of retainage held on Subcontracts, and the Contractor shall execute subcontracts in accordance with those agreements.

§ 5.1.5.5 In taking action on the Contractor's Applications for Payment, the Construction Manager and Architect shall be entitled to rely on the accuracy and completeness of the information furnished by the Contractor, and such action shall not be deemed to be a representation that (1) the Construction Manager and Architect have made a detailed examination, audit or arithmetic verification of the documentation submitted in accordance with Article 5 or other supporting data; (2) that the Construction Manager and Architect have made exhaustive or continuous on-site inspections; or (3) that the Construction Manager and Architect have made examinations to ascertain how or for what purposes the Contractor has used amounts previously paid on account of the Contract. Such examinations, audits and verifications, if required by the Owner, will be performed by the Owner's auditors acting in the sole interest of the Owner.

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

**§ 5.1.5.7** If final completion of the Work is materially delayed through no fault of the Contractor, then the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A232-2019.

**§ 5.1.6 Progress Payments Where the Contract Sum is Based on the Cost of the Work with a Guaranteed Maximum Price**

**§ 5.1.6.1** With each Application for Payment, the Contractor shall submit payrolls, petty cash accounts, receipted invoices or invoices with check vouchers attached, and any other evidence required by the Owner, Construction Manager or Architect to demonstrate that payments already made by the Contractor on account of the Cost of the Work equal or exceed progress payments already received by the Contractor plus payrolls for the period covered by the present Application for Payment, less that portion of the progress payments attributable to the Contractor's Fee.

**§ 5.1.6.2** Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Guaranteed Maximum Price among: (1) the various portions of the Work; (2) any contingency for costs that are included in the Guaranteed Maximum Price but not otherwise allocated to another line item or included in a Change Order; and (3) the Contractor's Fee.

**§ 5.1.6.2.1** The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Construction Manager and Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

**§ 5.1.6.2.2** The allocation of the Guaranteed Maximum Price under this Section 5.1.6.2 shall not constitute a separate guaranteed maximum price for the Cost of the Work of each individual line item in the schedule of values.

**§ 5.1.6.2.3** When the Contractor allocates costs from a contingency to another line item in the schedule of values, the Contractor shall submit supporting documentation to the Architect and Construction Manager.

**§ 5.1.6.3** Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment. The percentage of completion shall be the lesser of (1) the percentage of that portion of the Work which has actually been completed; or (2) the percentage obtained by dividing (a) the expense that has actually been incurred by the Contractor on account of that portion of the Work and for which the Contractor has made payment or intends to make payment prior to the next Application for Payment by (b) the share of the Guaranteed Maximum Price allocated to that portion of the Work in the schedule of values.

**§ 5.1.6.4** In accordance with AIA Document A232-2019, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

**§ 5.1.6.4.1** The amount of each progress payment shall first include:

- .1 That portion of the Guaranteed Maximum Price properly allocable to completed Work as determined by multiplying the percentage of completion of each portion of the Work by the share of the Guaranteed Maximum Price allocated to that portion of the Work in the most recent schedule of values;
- .2 That portion of the Guaranteed Maximum Price properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction or, if approved in writing in advance by the Owner, suitably stored off the site at a location agreed upon in writing;
- .3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified; and
- .4 The Contractor's Fee, computed upon the Cost of the Work described in the preceding Sections 5.1.6.4.1.1 and 5.1.6.4.1.2 at the rate stated in Section 4.4.2 or, if the Contractor's Fee is stated as a fixed sum in that Section, an amount that bears the same ratio to that fixed-sum fee as the Cost of the Work included in Sections 5.1.6.4.1.1 and 5.1.6.4.1.2 bears to a reasonable estimate of the probable Cost of the Work upon its completion.

**§ 5.1.6.4.2** The amount of each progress payment shall then be reduced by:

- .1 The aggregate of any amounts previously paid by the Owner;
- .2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A232-2019;
- .3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;

- .4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A232-2019;
- .5 The shortfall, if any, indicated by the Contractor in the documentation required by Section 5.1.6.1 to substantiate prior Applications for Payment, or resulting from errors subsequently discovered by the Owner's auditors in such documentation; and
- .6 Retainage withheld pursuant to Section 5.1.7.

**§ 5.1.6.5** The Owner and the Contractor shall agree upon a mutually acceptable procedure for review and approval of payments to Subcontractors and the percentage of retainage held on Subcontracts, and the Contractor shall execute subcontracts in accordance with those agreements.

**§ 5.1.6.6** In taking action on the Contractor's Applications for Payment, the Construction Manager and Architect shall be entitled to rely on the accuracy and completeness of the information furnished by the Contractor and such action shall not be deemed to be a representation that (1) the Construction Manager or Architect have made a detailed examination, audit, or arithmetic verification of the documentation submitted in accordance with Section 5.1.6.1 or other supporting data; (2) that the Construction Manager or Architect have made exhaustive or continuous on-site inspections; or (3) that the Construction Manager or Architect have made examinations to ascertain how or for what purposes the Contractor has used amounts previously paid on account of the Contract. Such examinations, audits, and verifications, if required by the Owner, will be performed by the Owner's auditors acting in the sole interest of the Owner.

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

**§ 5.1.6.8** If final completion of the Work is materially delayed through no fault of the Contractor, then the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A232-2019.

#### **§ 5.1.7 Retainage**

**§ 5.1.7.1** For each progress payment made prior to when the Work of this Contract is substantially complete, the Owner may withhold the following amount, as retainage, from the payment otherwise due:  
*(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)*

**§ 5.1.7.1.1** The following items are not subject to retainage:

*(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)*

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

*(If the retainage established in Section 5.1.7.1 is to be modified prior to when the entire Work of this Contract is substantially complete, including modifications for completion of portions of the Work as provided in Section 3.4.2, insert provisions for such modifications.)*

**§ 5.1.7.3** Except as set forth in this Section 5.1.7.3, when the Work of this Contract is substantially complete, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted when the Work of this Contract is substantially complete shall not include retainage as follows:

*(Insert any other conditions for release of retainage when the Work of this Contract is substantially complete, or upon Substantial Completion of the Work of all Contractors on the Project or portions thereof.)*

## § 5.2 Final Payment

### § 5.2.1 Final Payment Where the Contract Sum is Based on a Stipulated Sum

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

- .1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A232–2019, and to satisfy other requirements, if any, which extend beyond final payment; and
- .2 a final Certificate for Payment or Project Certificate for Payment has been issued by the Architect.

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

### § 5.2.2 Final Payment Where the Contract Sum is Based on the Cost of the Work with or without a Guaranteed Maximum Price

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

- .1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A232–2019, and to satisfy other requirements, if any, which extend beyond final payment;
- .2 the Contractor has submitted a final accounting for the Cost of the Work, pursuant to Exhibit B, Determination of the Cost of the Work and a final Application for Payment; and
- .3 a final Certificate for Payment or Project Certificate for Payment has been issued by the Architect in accordance with Exhibit B, Determination of the Cost of the Work.

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

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

\_\_\_\_\_ % \_\_\_\_\_

## ARTICLE 6 DISPUTE RESOLUTION

### § 6.1 Initial Decision Maker

The Architect will serve as Initial Decision Maker pursuant to Article 15 of AIA Document A232–2019, unless the parties appoint below another individual, not a party to this Agreement, to serve as Initial Decision Maker.

*(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)*

### § 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A232–2019, the method of binding dispute resolution shall be as follows:

*(Check the appropriate box.)*

- Arbitration pursuant to Article 15 of AIA Document A232–2019.
- Litigation in a court of competent jurisdiction.
- Other: *(Specify)*

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

## ARTICLE 7 TERMINATION OR SUSPENSION

### § 7.1 Where the Contract Sum is a Stipulated Sum

§ 7.1.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A232–2019.

§ 7.1.1.1 If the Contract is terminated for the Owner's convenience in accordance with Article 14 of AIA Document A232–2019, then the Owner shall pay the Contractor a termination fee as follows:

*(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)*

§ 7.1.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A232–2019.

### § 7.2 Where the Contract Sum is Based on the Cost of the Work with or without a Guaranteed Maximum Price

#### § 7.2.1 Termination

§ 7.2.1.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A232–2019.

#### § 7.2.1.2 Termination by the Owner for Cause

§ 7.2.1.2.1 If the Owner terminates the Contract for cause as provided in Article 14 of AIA Document A232–2019, the Owner shall then only pay the Contractor an amount as follows:

- .1 Take the Cost of the Work incurred by the Contractor to the date of termination;
- .2 Add the Contractor's Fee, computed upon the Cost of the Work to the date of termination at the rate stated in Section 4.3.2 or 4.4.2, as applicable, or, if the Contractor's Fee is stated as a fixed sum in that Section, an amount that bears the same ratio to that fixed-sum Fee as the Cost of the Work at the time of termination bears to a reasonable estimate of the probable Cost of the Work upon its completion;
- .3 Subtract the aggregate of previous payments made by the Owner; and
- .4 Subtract the costs and damages incurred, or to be incurred, by the Owner under Article 14 of AIA Document A232–2019.

§ 7.2.1.2.2 When the Contract Sum is based on the Cost of the Work with a Guaranteed Maximum Price, if the Owner terminates the Contract for cause as provided in Article 14 of AIA Document A232–2019, the amount, if any, to be paid to the Contractor under Article 14 of AIA Document A232–2019 shall not cause the Guaranteed Maximum Price to be exceeded, nor shall it exceed the amount calculated in Section 7.2.1.2.1.

§ 7.2.1.2.3 The Owner shall also pay the Contractor fair compensation, either by purchase or rental at the election of the Owner, for any equipment owned by the Contractor that the Owner elects to retain and that is not otherwise included in the Cost of the Work under Section 7.2.1.2.1.1. To the extent that the Owner elects to take legal assignment of subcontracts and purchase orders (including rental agreements), the Contractor shall, as a condition of receiving the payments referred to in this Article 7, execute and deliver all such papers and take all such steps, including the legal assignment of such subcontracts and other contractual rights of the Contractor, as the Owner may require for the purpose of fully vesting in the Owner the rights and benefits of the Contractor under such subcontracts or purchase orders. All Subcontracts, purchase orders and rental agreements entered into by the Contractor will contain provisions allowing for assignment to the Owner as described above.

#### § 7.2.1.3 Termination by the Owner for Convenience

If the Owner terminates the Contract for convenience in accordance with Article 14 of AIA Document A232–2019, then the Owner shall pay the Contractor a termination fee as follows:

*(Insert the amount of or method for determining the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)*

### **§ 7.3 Suspension**

The Work may be suspended by the Owner as provided in Article 14 of AIA Document A232–2019; in such case, the Contract Sum and Contract Time shall be increased as provided in Article 14 of AIA Document A232–2019, except that the term “profit” shall be understood to mean the Contractor’s Fee as described in Section 4.3.2 or 4.4.2, as applicable, of this Agreement.

## **ARTICLE 8 MISCELLANEOUS PROVISIONS**

**§ 8.1** Where reference is made in this Agreement to a provision of AIA Document A232–2019 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

**§ 8.2** The Owner’s representative:

(Name, address, email address, and other information)

**§ 8.3** The Contractor’s representative:

(Name, address, email address, and other information)

**§ 8.4** Neither the Owner’s nor the Contractor’s representative shall be changed without ten days’ prior notice to the other party.

**§ 8.5 Insurance and Bonds**

**§ 8.5.1** The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A132™–2019, Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

**§ 8.5.2** The Contractor shall provide bonds as set forth in AIA Document A132™–2019, Exhibit A, and elsewhere in the Contract Documents.

**§ 8.6** Notice in electronic format, pursuant to Article 1 of AIA Document A232–2019, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:

*(If other than in accordance with AIA Document E203–2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)*

**§ 8.7 Relationship of the Parties**

Where the Contract is based on the Cost of the Work plus the Contractor’s Fee, with or without a Guaranteed Maximum Price, the Contractor accepts the relationship of trust and confidence established by this Agreement and covenants with the Owner to cooperate with the Architect and exercise the Contractor’s skill and judgment in furthering the interests of the Owner; to furnish efficient business administration and supervision; to furnish at all times an adequate supply of workers and materials; and to perform the Work in an expeditious and economical manner consistent with the Owner’s interests. The Owner agrees to furnish and approve, in a timely manner, information required by the Contractor and to make payments to the Contractor in accordance with the requirements of the Contract Documents.

**§ 8.8 Other provisions:**

**ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS**

**§ 9.1** This Agreement is comprised of the following documents:

- .1 AIA Document A132™–2019, Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition
- .2 AIA Document A132™–2019, Exhibit A, Insurance and Bonds Exhibit
- .3 AIA Document A232™–2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition
- .4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:  
*(Insert the date of the E203-2013 incorporated into this Agreement.)*

.5 Drawings

Number	Title	Date
--------	-------	------

.6 Specifications

Section	Title	Date	Pages
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.7 Addenda, if any:

Number	Date	Pages
--------	------	-------

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

.8 Other Exhibits:

*(Check all boxes that apply and include appropriate information identifying the exhibit where required.)*

- AIA Document A132™–2019, Exhibit B, Determination of the Cost of the Work
- AIA Document E235™–2019, Sustainable Projects Exhibit, Construction Manager as Adviser Edition, dated as indicated below:  
*(Insert the date of the E235-2019 incorporated into this Agreement.)*

The Sustainability Plan:

Title	Date	Pages
-------	------	-------

Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages
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.9 Other documents, if any, listed below:

*(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A232–2019 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)*

This Agreement is entered into as of the day and year first written above.

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OWNER (Signature)

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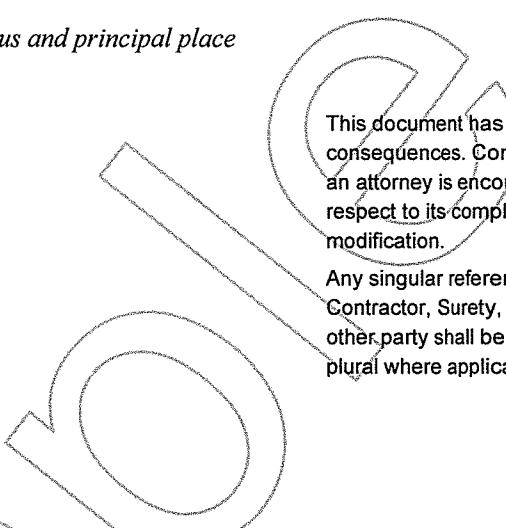
(Printed name and title)

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CONTRACTOR (Signature)

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(Printed name and title)

 AIA® Document A310™ – 2010**Bid Bond****CONTRACTOR:***(Name, legal status and address)***SURETY:***(Name, legal status and principal place of business)***OWNER:***(Name, legal status and address)***BOND AMOUNT:****PROJECT:***(Name, location or address, and Project number, if any)*

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

The Contractor and Surety are bound to the Owner in the amount set forth above, for the payment of which the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein. The conditions of this Bond are such that if the Owner accepts the bid of the Contractor within the time specified in the bid documents, or within such time period as may be agreed to by the Owner and Contractor, and the Contractor either (1) enters into a contract with the Owner in accordance with the terms of such bid, and gives such bond or bonds as may be specified in the bidding or Contract Documents, with a surety admitted in the jurisdiction of the Project and otherwise acceptable to the Owner, for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; or (2) pays to the Owner the difference, not to exceed the amount of this Bond, between the amount specified in said bid and such larger amount for which the Owner may in good faith contract with another party to perform the work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect. The Surety hereby waives any notice of an agreement between the Owner and Contractor to extend the time in which the Owner may accept the bid. Waiver of notice by the Surety shall not apply to any extension exceeding sixty (60) days in the aggregate beyond the time for acceptance of bids specified in the bid documents, and the Owner and Contractor shall obtain the Surety's consent for an extension beyond sixty (60) days.

If this Bond is issued in connection with a subcontractor's bid to a Contractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

When this Bond has been furnished to comply with a statutory or other legal requirement in the location of the Project, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

Signed and sealed this

day of

---

*(Witness)**(Contractor as Principal)**(Seal)*

---

*(Title)*

---

*(Witness)**(Surety)**(Seal)*

---

*(Title)*

**CAUTION:** You should sign an original AIA Contract Document, on which this text appears in RED. An original assures that changes will not be obscured.

Init.

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ACD43070810



# AIA® Document A312™ – 2010

## Payment Bond

**CONTRACTOR:**

(Name, legal status and address)

**SURETY:**

(Name, legal status and principal place  
of business)

**OWNER:**

(Name, legal status and address)

**CONSTRUCTION CONTRACT**

Date:

Amount:

**Description:**

(Name and location)

**BOND**

Date:

(Not earlier than Construction Contract Date)

Amount:

Modifications to this Bond:

None

See Section 18

**CONTRACTOR AS PRINCIPAL**

Company:

(Corporate Seal)

**SURETY**

(Corporate Seal)

Signature:

Name Nam  
and Title:

Signature:

Name e  
and Title:

(Any additional signatures appear on the last page of this Payment Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)

**AGENT or BROKER:**

**OWNER'S REPRESENTATIVE:**

(Architect, Engineer or other party.)

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

AIA Document A312–2010 combines two separate bonds, a Performance Bond and a Payment Bond, into one form. This is not a single combined Performance and Payment Bond.

**§ 1** The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

**§ 2** If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

**§ 3** If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Section 13) of claims, demands, liens or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety.

**§ 4** When the Owner has satisfied the conditions in Section 3, the Surety shall promptly and at the Surety's expense defend, indemnify and hold harmless the Owner against a duly tendered claim, demand, lien or suit.

**§ 5** The Surety's obligations to a Claimant under this Bond shall arise after the following:

**§ 5.1** Claimants, who do not have a direct contract with the Contractor,

- .1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
- .2 have sent a Claim to the Surety (at the address described in Section 13).

**§ 5.2** Claimants, who are employed by or have a direct contract with the Contractor, have sent a Claim to the Surety (at the address described in Section 13).

**§ 6** If a notice of non-payment required by Section 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Section 5.1.1.

**§ 7** When a Claimant has satisfied the conditions of Sections 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

**§ 7.1** Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

**§ 7.2** Pay or arrange for payment of any undisputed amounts.

**§ 7.3** The Surety's failure to discharge its obligations under Section 7.1 or Section 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Section 7.1 or Section 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

**§ 8** The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Section 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

**§ 9** Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

**§ 10** The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to, or give notice on behalf of, Claimants or otherwise have any obligations to Claimants under this Bond.

**§ 11** The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

**§ 12** No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Section 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

**§ 13** Notice and Claims to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

**§ 14** When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

**§ 15** Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

## **§ 16 Definitions**

**§ 16.1 Claim.** A written statement by the Claimant including at a minimum:

- .1 the name of the Claimant;
- .2 the name of the person for whom the labor was done, or materials or equipment furnished;
- .3 a copy of the agreement or purchase order pursuant to which labor, materials or equipment was furnished for use in the performance of the Construction Contract;
- .4 a brief description of the labor, materials or equipment furnished;
- .5 the date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
- .6 the total amount earned by the Claimant for labor, materials or equipment furnished as of the date of the Claim;
- .7 the total amount of previous payments received by the Claimant; and
- .8 the total amount due and unpaid to the Claimant for labor, materials or equipment furnished as of the date of the Claim.

**§ 16.2 Claimant.** An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

**§ 16.3 Construction Contract.** The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

**§ 16.4 Owner Default.** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

**§ 16.5 Contract Documents.** All the documents that comprise the agreement between the Owner and Contractor.

**§ 17** If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

**§ 18** Modifications to this bond are as follows:



*(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)*

**CONTRACTOR AS PRINCIPAL**

Company:

**SURETY**

(Corporate Seal)

Company: (Corporate Seal)

Signature:

Name and Title:

Address

Signature:

Name and Title:

Address

**CAUTION:** You should sign an original AIA Contract Document, on which this text appears in RED. An original assures that changes will not be obscured.



# AIA® Document A312™ – 2010

## Performance Bond

**CONTRACTOR:**

(Name, legal status and address)

**SURETY:**

(Name, legal status and principal place  
of business)

**OWNER:**

(Name, legal status and address)

**CONSTRUCTION CONTRACT**

Date:

Amount:

**Description:**

(Name and location)

**BOND**

Date:

(Not earlier than Construction Contract Date)

Amount:

Modifications to this Bond:

None

See Section 16

**CONTRACTOR AS PRINCIPAL**

Company:

(Corporate Seal)

**SURETY**

(Corporate Seal)

Signature:

Name Nam  
and Title:

Signature:

Name e  
and Title:

(Any additional signatures appear on the last page of this Performance Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)

**AGENT or BROKER:**

**OWNER'S REPRESENTATIVE:**

(Architect, Engineer or other party.)

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

AIA Document A312–2010 combines two separate bonds, a Performance Bond and a Payment Bond, into one form. This is not a single combined Performance and Payment Bond.

**§ 1** The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

**§ 2** If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Section 3.

**§ 3** If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after

- .1 the Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Section 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;
- .2 the Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and
- .3 the Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

**§ 4** Failure on the part of the Owner to comply with the notice requirement in Section 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

**§ 5** When the Owner has satisfied the conditions of Section 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

**§ 5.1** Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

**§ 5.2** Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

**§ 5.3** Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Section 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

**§ 5.4** Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

- .1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or
- .2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

**§ 6** If the Surety does not proceed as provided in Section 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Section 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

**§ 7** If the Surety elects to act under Section 5.1, 5.2 or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication, for

- .1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
- .2 additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Section 5; and
- .3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

**§ 8** If the Surety elects to act under Section 5.1, 5.3 or 5.4, the Surety's liability is limited to the amount of this Bond.

**§ 9** The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors and assigns.

**§ 10** The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

**§ 11** Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

**§ 12** Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

**§ 13** When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

#### **§ 14 Definitions**

**§ 14.1 Balance of the Contract Price.** The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

**§ 14.2 Construction Contract.** The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

**§ 14.3 Contractor Default.** Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

**§ 14.4 Owner Default.** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

**§ 14.5 Contract Documents.** All the documents that comprise the agreement between the Owner and Contractor.

**§ 15** If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 16 Modifications to this bond are as follows:



(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

**CONTRACTOR AS PRINCIPAL**

Company:

**SURETY**

(Corporate Seal)

Company:

(Corporate Seal)

Signature:

Name and Title:

Address

Signature:

Name and Title:

Address

**CAUTION: You should sign an original AIA Contract Document, on which this text appears in RED. An original assures that changes will not be obscured.**



# AIA® Document A201® – 2017

## *General Conditions of the Contract for Construction*

for the following PROJECT:

(Name and location or address)

**THE OWNER:**

(Name, legal status and address)

**THE ARCHITECT:**

(Name, legal status and address)

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

For guidance in modifying this document to include supplementary conditions, see AIA Document A503™, Guide for Supplementary Conditions.

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2.1.2, 2.2, 2.5, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2, 5.2, 5.3, 5.4, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3, 9.4.1, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 12.2, 13.4, 14, 15.1.2, 15.1.3, 15.4	8.3, 15.1.6.2
<b>Time Limits on Claims</b>	<b>Work, Definition of</b>
3.7.4, 10.2.8, 15.1.2, 15.1.3	<b>1.1.3</b>
Title to Work	Written Consent
9.3.2, 9.3.3	1.5.2, 3.4.2, 3.7.4, 3.12.8, 3.14.2, 4.1.2, 9.3.2, 9.10.3, 13.2, 13.3.2, 15.4.4.2
	Written Interpretations
	4.2.11, 4.2.12
	Written Orders
	1.1.1, 2.4, 3.9, 7, 8.2.2, 12.1, 12.2, 13.4.2, 14.3.1

## **ARTICLE 1 GENERAL PROVISIONS**

### **§ 1.1 Basic Definitions**

#### **§ 1.1.1 The Contract Documents**

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

#### **§ 1.1.2 The Contract**

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

#### **§ 1.1.3 The Work**

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

#### **§ 1.1.4 The Project**

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

#### **§ 1.1.5 The Drawings**

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

#### **§ 1.1.6 The Specifications**

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

#### **§ 1.1.7 Instruments of Service**

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

#### **§ 1.1.8 Initial Decision Maker**

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

### **§ 1.2 Correlation and Intent of the Contract Documents**

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

#### **§ 1.2.1.1** The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining

provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

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

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

#### **§ 1.3 Capitalization**

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

#### **§ 1.4 Interpretation**

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

#### **§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service**

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

**§ 1.5.2** The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

#### **§ 1.6 Notice**

**§ 1.6.1** Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

**§ 1.6.2** Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

#### **§ 1.7 Digital Data Use and Transmission**

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

#### **§ 1.8 Building Information Models Use and Reliance**

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building

information model, and each of their agents and employees.

## **ARTICLE 2 OWNER**

### **§ 2.1 General**

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

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

### **§ 2.2 Evidence of the Owner's Financial Arrangements**

**§ 2.2.1** Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

**§ 2.2.2** Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

**§ 2.2.3** After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

**§ 2.2.4** Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

### **§ 2.3 Information and Services Required of the Owner**

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

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

**§ 2.3.3** If the employment of the Architect terminates, the Owner shall employ a successor to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

**§ 2.3.4** The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the

site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

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

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

#### **§ 2.4 Owner's Right to Stop the Work**

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

#### **§ 2.5 Owner's Right to Carry Out the Work**

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

### **ARTICLE 3 CONTRACTOR**

#### **§ 3.1 General**

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

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

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

#### **§ 3.2 Review of Contract Documents and Field Conditions by Contractor**

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

**§ 3.2.2** Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's

capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

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

**§ 3.2.4** If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

### **§ 3.3 Supervision and Construction Procedures**

**§ 3.3.1** The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

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

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

### **§ 3.4 Labor and Materials**

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

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

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

### **§ 3.5 Warranty**

**§ 3.5.1** The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes

remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

**§ 3.5.2** All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

### **§ 3.6 Taxes**

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

### **§ 3.7 Permits, Fees, Notices and Compliance with Laws**

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

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

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

### **§ 3.7.4 Concealed or Unknown Conditions**

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

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

### **§ 3.8 Allowances**

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

**§ 3.8.2** Unless otherwise provided in the Contract Documents,

- .1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- .2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and

- .3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

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

**§ 3.9 Superintendent**

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

**§ 3.9.2** The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

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

**§ 3.10 Contractor's Construction and Submittal Schedules**

**§ 3.10.1** The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

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

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

**§ 3.11 Documents and Samples at the Site**

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

**§ 3.12 Shop Drawings, Product Data and Samples**

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

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

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

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

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

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

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

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

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

**§ 3.12.10** The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

**§ 3.12.10.1** If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

**§ 3.12.10.2** If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the

time and in the form specified by the Architect.

### **§ 3.13 Use of Site**

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

### **§ 3.14 Cutting and Patching**

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

**§ 3.14.2** The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

### **§ 3.15 Cleaning Up**

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

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

### **§ 3.16 Access to Work**

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

### **§ 3.17 Royalties, Patents and Copyrights**

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

### **§ 3.18 Indemnification**

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

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

## **ARTICLE 4 ARCHITECT**

### **§ 4.1 General**

**§ 4.1.1** The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

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

### **§ 4.2 Administration of the Contract**

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

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

**§ 4.2.3** On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

### **§ 4.2.4 Communications**

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

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

**§ 4.2.6** The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

**§ 4.2.7** The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under

Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

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

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

**§ 4.2.10** If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

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

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

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

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

## **ARTICLE 5 SUBCONTRACTORS**

### **§ 5.1 Definitions**

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

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

### **§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work**

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

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

**§ 5.2.3** If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the

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

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

### **§ 5.3 Subcontractual Relations**

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

### **§ 5.4 Contingent Assignment of Subcontracts**

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

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

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

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

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

## **ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS**

### **§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts**

**§ 6.1.1** The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

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

**§ 6.1.3** The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate

Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

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

## **§ 6.2 Mutual Responsibility**

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

**§ 6.2.2** If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

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

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

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

## **§ 6.3 Owner's Right to Clean Up**

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

# **ARTICLE 7 CHANGES IN THE WORK**

## **§ 7.1 General**

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

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

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

## **§ 7.2 Change Orders**

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

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

### **§ 7.3 Construction Change Directives**

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

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

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

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon;
- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- .4 As provided in Section 7.3.4.

**§ 7.3.4** If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

- .1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;
- .2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and
- .5 Costs of supervision and field office personnel directly attributable to the change.

**§ 7.3.5** If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

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

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

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

**§ 7.3.9** Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The

Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

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

#### **§ 7.4 Minor Changes in the Work**

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

### **ARTICLE 8 TIME**

#### **§ 8.1 Definitions**

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

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

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

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

#### **§ 8.2 Progress and Completion**

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

**§ 8.2.2** The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

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

#### **§ 8.3 Delays and Extensions of Time**

**§ 8.3.1** If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

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

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

### **ARTICLE 9 PAYMENTS AND COMPLETION**

#### **§ 9.1 Contract Sum**

**§ 9.1.1** The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable

by the Owner to the Contractor for performance of the Work under the Contract Documents.

**§ 9.1.2** If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

### **§ 9.2 Schedule of Values**

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

### **§ 9.3 Applications for Payment**

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

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

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

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

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

### **§ 9.4 Certificates for Payment**

**§ 9.4.1** The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

**§ 9.4.2** The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The

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

### **§ 9.5 Decisions to Withhold Certification**

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

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

**§ 9.5.2** When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

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

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

### **§ 9.6 Progress Payments**

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

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

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

**§ 9.6.4** The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers

to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

**§ 9.6.5** The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

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

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

**§ 9.6.8** Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

### **§ 9.7 Failure of Payment**

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

### **§ 9.8 Substantial Completion**

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

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

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

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

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

**§ 9.9 Partial Occupancy or Use**

**§ 9.9.1** The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

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

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

**§ 9.10 Final Completion and Final Payment**

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

**§ 9.10.2** Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

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

constitute a waiver of Claims.

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

- .1 liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents;
- .3 terms of special warranties required by the Contract Documents; or
- .4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.

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

## **ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY**

### **§ 10.1 Safety Precautions and Programs**

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

### **§ 10.2 Safety of Persons and Property**

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

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

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

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

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

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

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

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

### **§ 10.2.8 Injury or Damage to Person or Property**

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

### **§ 10.3 Hazardous Materials and Substances**

**§ 10.3.1** The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition.

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

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

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

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

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

### **§ 10.4 Emergencies**

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

## **ARTICLE 11 INSURANCE AND BONDS**

### **§ 11.1 Contractor's Insurance and Bonds**

**§ 11.1.1** The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the

endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

**§ 11.1.2** The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

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

**§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance.** Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

## **§ 11.2 Owner's Insurance**

**§ 11.2.1** The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

**§ 11.2.2 Failure to Purchase Required Property Insurance.** If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

**§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance.** Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

## **§ 11.3 Waivers of Subrogation**

**§ 11.3.1** The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The

Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

**§ 11.3.2** If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

#### **§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance**

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

#### **§11.5 Adjustment and Settlement of Insured Loss**

**§ 11.5.1** A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

**§ 11.5.2** Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

### **ARTICLE 12 UNCOVERING AND CORRECTION OF WORK**

#### **§ 12.1 Uncovering of Work**

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

**§ 12.1.2** If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

#### **§ 12.2 Correction of Work**

##### **§ 12.2.1 Before Substantial Completion**

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

Contractor's expense.

#### **§ 12.2.2 After Substantial Completion**

**§ 12.2.2.1** In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

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

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

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

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

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

#### **§ 12.3 Acceptance of Nonconforming Work**

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

### **ARTICLE 13 MISCELLANEOUS PROVISIONS**

#### **§ 13.1 Governing Law**

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

#### **§ 13.2 Successors and Assigns**

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

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

### **§ 13.3 Rights and Remedies**

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

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

### **§ 13.4 Tests and Inspections**

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

**§ 13.4.2** If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

**§ 13.4.3** If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

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

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

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

### **§ 13.5 Interest**

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

## **ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT**

### **§ 14.1 Termination by the Contractor**

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

- .1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- .2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- .3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- .4 The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

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

**§ 14.1.3** If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

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

## **§ 14.2 Termination by the Owner for Cause**

**§ 14.2.1** The Owner may terminate the Contract if the Contractor

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

**§ 14.2.2** When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

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

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

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

## **§ 14.3 Suspension by the Owner for Convenience**

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

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

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

#### **§ 14.4 Termination by the Owner for Convenience**

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

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

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

**§ 14.4.3** In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

### **ARTICLE 15 CLAIMS AND DISPUTES**

#### **§ 15.1 Claims**

##### **§ 15.1.1 Definition**

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

##### **§ 15.1.2 Time Limits on Claims**

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

##### **§ 15.1.3 Notice of Claims**

**§ 15.1.3.1** Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

**§ 15.1.3.2** Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

##### **§ 15.1.4 Continuing Contract Performance**

**§ 15.1.4.1** Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

**§ 15.1.4.2** The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

##### **§ 15.1.5 Claims for Additional Cost**

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

##### **§ 15.1.6 Claims for Additional Time**

**§ 15.1.6.1** If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section

15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

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

#### **§ 15.1.7 Waiver of Claims for Consequential Damages**

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

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

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

#### **§ 15.2 Initial Decision**

**§ 15.2.1** Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

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

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

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

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

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

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

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

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

### **§ 15.3 Mediation**

**§ 15.3.1** Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

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

**§ 15.3.3** Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

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

### **§ 15.4 Arbitration**

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

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

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

**§ 15.4.3** The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly

consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

**§ 15.4.4 Consolidation or Joinder**

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

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

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

Sample

## **SECTION 00 8110**

### **SUPPLEMENTARY CONDITIONS**

#### **GENERAL**

The following supplements add to, delete from or change the General Conditions of the Contract for Construction as set forth in AIA Document A201 – 2017 (Electronic Format). Where any article, paragraph, sub-paragraph, sentence, or word contained in the General Conditions is added to, deleted or changed, the remaining unaltered provisions of that article, paragraph, subparagraph or sentence shall remain in effect. The following supplements take precedence over the General Conditions. In the event of conflict, the terms of the Owner/ Contractor Agreement shall prevail.

#### **ARTICLE 1 GENERAL PROVISIONS**

##### **1.2 EXECUTION, CORRELATION AND INTENT**

ADD the following subparagraphs 1.2.4, through 1.2.10 reading:

- 1.2.4 Any work included by reference in any section to another specification section shall be included as work under the contract, whether or not it is called for under the section referred to. Failure to cross-reference such items shall not relieve the Contractor from the obligations to provide such work.
- 1.2.5 Should any conflict be found in or between the drawings and specifications, the Contractor shall be deemed to have estimated on the basis of performing the work by the most expensive way. The Architect/Engineer, in case of such conflict, may interpret or construe the drawings and specifications so as to secure the most substantial and complete performance of the work as is most consistent with its needs and requirements, and in that manner the Architect/Engineer shall be the sole judge.
- 1.2.6 All work shall be installed so as to be readily accessible for operation, maintenance, inspection, and repair. Minor deviations from the drawings may be made to accomplish this, but changes of magnitude or changes involving increased cost shall not be made without authorization as provided under the contract.
- 1.2.7 The drawings and specifications determine the general arrangement and locations of equipment and work. The Contractor shall, with approval of the Architect/Engineer and without extra charge, make reasonable modifications in layout needed to prevent conflicts with the work of other trades or for proper execution of the work.
- 1.2.8 Dimensions of work shall not be determined by scale or rule from the drawings; figured dimensions shall be followed unless modifications are needed.
- 1.2.9 Follow drawings in laying out work and check drawings of other trades relating to work to verify spaces in which work will be installed. Maintain maximum space conditions at all points.
- 1.2.10 Where work of Contractor will be installed in close proximity to work of other trades, or where there is evidence that work of Contractor will interfere with work of other trades, he shall assist in working out space conditions to make satisfactory adjustment. If Contractor installs work before coordinating or so as to cause interference with work of other trades, he shall make changes necessary to correct condition without extra charge.

#### **ARTICLE 2 OWNER**

##### **2.1 DEFINITION**

ADD the following subparagraph 2.1.3 reading:

- 2.1.3 The term Owner as used in the context of this contract is

City of Schenectady  
City Hall  
105 Jay Street  
Schenectady, NY 12305

whom is contracting and paying for the contracted work.

2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

DELETE entire subparagraph 2.2.1

ADD the following subparagraph 2.2.5 reading:

- 2.2.5 The Owner will retain a consultant throughout the construction phase of the project. In summary, and for the Owner's benefit, the consultant, or its sub-consultants, will perform the following duties:

- inspect construction activities on a full time basis throughout the construction project to verify the quality and quantity of work performed;
- advise the Owner of concerns and provide notice of any contract work which does not comply with the contract documents;
- review shop drawings and review and certify Contractor applications for payments, change order cost quotations and claims.

The specific duties, responsibilities and limitations of authority of the consultant shall be as set forth in the Owner/Architect Agreement, and will be provided upon request by the Contractor.

**ARTICLE 3 CONTRACTOR**

3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

ADD the following subparagraph 3.2.5 reading:

- 3.2.5 Where existing conditions are obscured or concealed from the Owner or Architect's/Engineer's view prior to the start of this project's construction activities, portrayal of such conditions in the documents is based on reasonable implications and assumptions. The Owner and Architect/Engineer do not imply or guarantee to the Contractor in any way that such portrayals in the documents are accurate or true.

3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

ADD the following subparagraphs 3.3.4, 3.3.5 and 3.3.6 reading:

- 3.3.4 During periods of active construction, consult daily and cooperate with the Owner, for coordination of work being performed by the Owner's own forces.

- 3.3.5 The Contractor shall promote coordination of their work with the work of Sub-contractors. Check daily or more often if required, regarding Sub-contractors whose work cannot proceed until

completion of preceding work.

- 3.3.6 Each Contractor shall initiate and obtain all actions required of others in connection with the work of this contract such as that required of utility companies, municipal agencies, and his own subcontractors.

3.4 LABOR AND MATERIALS

ADD the following subparagraphs 3.4.4 through 3.4.15 reading:

- 3.4.4 The Contractor shall comply with the Prevailing Wage Rates Schedules as published by the Bureau of Public Works, State of New York, Department of Labor, included herein.
- 3.4.5 No materials or supplies for the work shall be purchased by the Contractor or by any Sub-Contractor subject to any chattel mortgage or under a conditional sale or other agreement by which an interest is retained by the seller. The Contractor warrants that he has good title to all materials and supplies used by him in the work, or re-sold to the Owner pursuant to this contract document, free from all liens, claims or encumbrances.
- 3.4.6 All materials used permanently in the work shall be new unless otherwise specified. The apparent silence of the specifications as to any detail or the apparent omission from them of a detailed description concerning any work to be done and materials to be furnished shall be regarded as meaning that only the best general practice is to prevail and that only material and workmanship of first quality are to be used, and all interpretations of this specification shall be made upon this basis.
- 3.4.7 Manufacturer's identification shall be inconspicuous, but where nameplates contain information relative to characteristics or maintenance, they shall be clearly visible and located for easy access.
- 3.4.8 Equipment intended for permanent installation shall not be operated for temporary purposes without the written permission of the Architect/Engineer.
- 3.4.9 Materials shall be delivered in manufacturer's original sealed containers with complete identification of contents and manufacturer, and kept sealed in original containers until used. Labels shall not be removed until materials have been installed and inspected.
- 3.4.10 Whenever the contract documents require delivery by the Contractor of any materials, equipment, or other items, the term delivery shall be deemed to include unloading and storing with proper protection where directed.
- 3.4.11 All work shall be executed in a thorough, substantial, and workmanlike manner, and in complete accordance with the manufacturers most recent recommendations unless otherwise specified or permitted by the Architect/Engineer. Sufficient competent workmen, foremen, and superintendents shall be employed at all times to permit the work to be pursued with diligence until completion.
- 3.4.12 Each Contractor shall perform all necessary labor to install his work within the terms of his contract. The Owner assumes no responsibility for any additional expense due to so called "overtime" work.
- 3.4.13 Materials shall be applied or installed under proper climatic conditions when they may be affected by temperature, moisture, humidity, or dust.
- 3.4.14 All work shall be installed so as to be readily accessible for operation, maintenance, inspection, and repair. Minor deviations from the drawings may be made to accomplish this, but changes of

magnitude or changes involving increased cost, shall not be made without authorization as provided under the contract.

- 3.4.15 As defined by federal and state laws, no materials incorporated into the project work shall contain asbestos. The Contractor shall submit written certifications stating compliance with this requirement, from each primary supplier and manufacturer.

3.5 WARRANTY

ADD the following subparagraph 3.5.3 reading:

The contractor shall provide and execute the general one year warranty.

3.6 TAXES

ADD the following subparagraphs 3.6.2 through 3.6.7 reading:

- 3.6.2 The Owner represents that it is a tax exempt entity.

- 3.6.4 If, as a result of such sale of materials to the Owner (1) any claim is made against the Contractor by the State of New York or any of its subdivisions for sales or compensating use taxes on the aforementioned materials, or (2) any claim is made against the Contractor by a material man or a Subcontractor on account of a claim against such material man or Subcontractor by the State of New York or any of its subdivisions for sales or compensating use taxes on the aforementioned materials, then if the Contractor and Subcontractors have complied with the provisions of this contract relating thereto, the Owner will reimburse the Contractor for an amount equal to the amount of such tax required to be paid by the State of New York, provided that:

1. (a) The subcontract agreements in connection with this contract provide for the resale of such materials prior to and separate and apart from the incorporation of such materials into the permanent construction; (b) such subcontract agreements are in a form similar to this contract with respect to the separation of the sale of materials from the other work and labor to be provided; and (c) such separation is actually followed in practice, including the separation of payments for materials from the payments of other work; and
2. The Contractor and his Subcontractors and material men obtain any and all necessary and available resale exemption certificates and furnish a resale certificate to all persons, firms or corporations from which they purchase supplies and materials for the performance of the work covered by this contract; and
3. The Owner is afforded the opportunity, before any payment of tax is made, to contest said claim in the manner and to the extent that the Owner may choose and to settle or satisfy said claims, and such attorney as the Owner may designate is authorized to act for the purpose of contesting, settling and satisfying said claim; and
4. The Contractor and Subcontractor give immediate notice to the Owner of any such claim, cooperate with the Owner and its designated attorney contesting said claim, and furnish promptly to the Owner and said attorney all information and documents necessary to convenient for contesting said claim, said information and documents to be preserved for six years after the date of final payment for this sale or longer if such a claim is pending or threatened at the end of six years. If the Owner elects to contest any such claim, it will bear the expense of such contest.

- 3.6.5 When requested by the Owner, the Contractor shall pay any alleged sales or compensating use tax on any of the aforesaid materials claimed by the State of New York or any subdivision thereof

to be due and owing and the Owner shall reimburse the Contractor therefore.

3.6.6 Nothing in this article is intended or shall be construed as relieving the Contractor from his obligations under any other provisions of the contract documents, and the Contractor shall have the full and continuing responsibility to install the materials and supplies purchased in accordance with the provisions of this contract, to protect the same, to maintain them in proper condition and to forthwith repair, replace and make good any damage thereto without cost to the Owner until such time as the work covered by the contract is fully accepted by the Owner. Nothing herein shall be deemed to affect the Contractor's responsibility under any guarantee provision of the contract documents or any duty or responsibility under any statute or the common law.

3.6.7 The Contractor and his Subcontractors shall submit identification of Federal Identification Number.

### 3.11 DOCUMENTS AND SAMPLES AT THE SITE

CHANGE entire subparagraph 3.11 to read:

3.11 The Contractor shall maintain one record set of drawings, specifications, addenda, change orders, allowance adjustments, approved shop drawings, product data, samples, construction and submittal schedules, and similar required submittals at the project site, in good order and condition. He shall mark these documents on a daily basis to record all approved changes, and to record the dimensional locations of his installed work if it deviates from that shown on contract and/or shop drawings.

Particular attention shall be given to site utilities, the location of valves, equipment, and major electrical conduits.

ADD the following subparagraphs 3.11.1 and 3.11.2, reading:

3.11.1 The Owner's Project Representative will provide and store one set of record drawings in his site office.

3.11.2 Prior to submitting his final Application for Payment, the Contractor shall confirm that all changes and deviations have been recorded on the reproducible drawings, and indicate such by marking each drawing "Record Document" and applying his signature and the date. At the same time, the Contractor shall submit revised shop drawings which reflect any changes or deviations in the installed work. These shall be delivered to the Architect/Engineer.

### 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

ADD one sentence to end of subparagraph 3.12.6 reading:

Submittals not exhibiting the Architect's/Engineer's review stamp and which are not marked "No Exceptions Taken" or "Make Corrections Noted" shall not be used at the project.

ADD the following subparagraphs 3.12.11 through 3.12.17:

3.12.11 The Contractor shall not duplicate the Architect's/ Engineer's documents for preparation of any submittals.

3.12.12 Clearly identify all submittals by indicating project name, specification division, or section number name, and names of the Contractor, sub-contractor and manufacturer.

3.12.13 Provide one digital PDF file of each submittal. After the Architect's/Engineer's review is finished, distribute sufficient copies for the proper execution of the work to Sub-contractors and suppliers.

3.12.14 The Contractor shall check, mark up if required, and indicate his approval and date of approval before submitting to Architect/Engineer. The Architect/Engineer may return submittals not so marked by the Contractor.

3.12.15 Submittals which show items not applicable to the project shall be clearly marked to show which item is being submitted for approval.

3.12.16 For the Owner's records, submit duplicate copies of permits, licenses, certifications, tests, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence and records established for compliance with standards and regulations.

3.12.17 Provide certificates from all primary suppliers and manufacturers stating that all materials are asbestos free as defined by current state and federal laws and regulations.

### **3.13 USE OF SITE**

ADD the following subparagraphs 3.13.2, 3.13.3 and 3.13.4 reading:

3.13.2 Prior to start of work, meet with the Owner, and/or the Owner's Representative to determine acceptable staging areas, storage, equipment and parking areas for the Contractor's employees.

3.13.3 The Contractor shall coordinate with the Owner to determine acceptable construction staging areas in the vicinity of the project. The Contractor must coordinate with the Owner on the use of these staging areas.

3.13.4 Maintain all building and site exits in safe and operable condition. Provide and maintain warning signs, lights, barricades, fencing, and other devices to protect people and property.

### **3.14 CUTTING AND PATCHING**

ADD the following subparagraphs 3.14.3 through 3.14.5 reading:

3.14.3 The Contractor shall provide all excavation, backfill and compaction of backfill for its own work as required to properly accommodate its work, unless specifically stated to the contrary. This does not relieve the Contractor from responsibilities stated in Article 6 of the General Conditions.

3.14.4 Cutting of rough work shall be done by the Contractor requiring the work to be cut. Cutting of finish work shall be done by the Contractor installing the finish work to be cut. All cutting and/or patching shall be done by the Contractor who installed the work which is to be cut and/or patched, and paid for by the Contractor who failed to give advance notice or who made the cutting necessary.

3.14.5 Cutting and patching of existing work which is to remain shall be done by the trade who normally installs such work as is to be cut or patched, and paid for by the Contractor who made the cutting necessary.

ADD the following paragraphs 3.19 and 3.20 reading:

### **3.19 NONDISCRIMINATION**

During the performance of the work, the Contractor agrees to conduct his operations in accordance with the attached federal labor standards and requirements of Title VI of the Civil

Rights Act of 1964 and or the Rehabilitation Act of 1973, as amended. The Contractor further agrees as follows:

The Contractor will not discriminate against employees or applicants for employment because of race, creed, color, national origin, sex, age, disability or marital status and will undertake programs or affirmative action to insure that they are afforded equal employment opportunities without discrimination. Such action shall be taken with reference, but not be limited to: recruitment, employment, job assignment, promotion, upgrading, demotion, transfer, or termination, rates of pay or other forms of compensation and selection for training or retraining, including apprenticeship and on-the-job training.

If the Contractor is directed to do so by the contracting agency or the Owner, the Contractor shall request each employment agency, labor union, or authorized representative of workers with which he has a collective bargaining or other agreement or understanding, to furnish him with a written statement that such employment agency, labor union or representative will not discriminate because of race, color, creed, 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 hereunder.

The Contractor will state, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, that all qualified applicants will be afforded equal employment opportunities without discrimination because of race, color, creed, national origin, sex, age, disability or marital status. The Contractor will comply with all the applicable provisions of Title VI of the Civil Rights Act of 1964 and Rehabilitation Act of 1973 as amended, and of rules, regulations and orders issued pursuant thereto and will furnish all information and reports required by said acts of such rules, regulations and orders, and will permit access to its books, records and accounts and to its premises by the Owner for the purpose of ascertaining compliance with said acts and such rules, regulations and orders.

If the Contractor does not comply with the equal opportunity provisions of this Agreement, with the applicable provisions of said acts, or with such rules, regulations or orders, this Agreement or any portion thereof, may be canceled, terminated, or suspended or payments thereon withheld, in accordance with the applicable provisions authorized in said acts, and such other sanctions may be imposed and remedies invoked as are provided in said acts or by rule, regulation or order issued pursuant thereto, or as otherwise provided by law.

The Contractor will include the provisions of the above clauses and all applicable contract provisions promulgated pursuant to Title VI of the Civil Rights Act of 1964 and Rehabilitation Act of 1973, as amended in every non-exempt subcontract or purchase order in such a manner that such provisions will be binding upon each Subcontractor or vendor as to its work force. The Contractor will take such action in enforcing such provisions of such subcontract or purchase order as the Owner may direct, including sanctions or remedies for non-compliance. If the Contractor becomes involved in or is threatened with litigation with a Subcontractor or vendor as a result of such direction, the Contractor shall promptly so notify the Attorney General, requesting him to intervene.

### 3.20 AFFIRMATIVE ACTION

The Contractor agrees, in addition to any other non- discrimination provisions of the contract that the Contractor shall comply fully with and shall cooperate in the implementation of any Affirmative Action Requirements for Equal Employment Opportunity required by the Owner, at no additional cost to the Owner. Any such provisions of the Contract shall be incorporated in their entirety in all subcontracts of any tier.

The Affirmative Action programs referred to in this contract shall apply to the entire work force of the Contractor during the performance of this Contract.

These provisions shall be deemed supplementary to, and not in lieu of, the nondiscrimination provisions required by applicable Federal, State or local laws.

The Contractor shall file, and to cause each of its sub- Contractors to file, such periodic compliance reports as the Commissioner of Human Rights may prescribe by rule or regulation or as required by the Owner. The Contractor shall keep and maintain such records pertaining to its employment practices as the Commissioner of Human Rights may prescribe by rule or regulation or as required by the Owner and shall cause its Subcontractors to keep and maintain such records.

## **ARTICLE 4 ADMINISTRATION OF THE CONTRACT**

### **4.1 ARCHITECT**

ADD the following subparagraph 4.1.3 reading:

4.1.3 The Architect is: Saratoga Associates, Landscape Architects, Architects, Engineers and Planners, P.C. 21 Congress Street, Suite 201, Saratoga Springs, NY 12866 or its authorized representative, herein referred to as Architect, Architect/Engineer, Architect or Engineer, Project Representative, Owner's project representative or Owner's Representative.

### **4.2 ARCHITECT'S ADMINISTRATION OF THE CONTRACT**

4.2.1 DELETE words in first sentence reading "... and (3) with the Owner's concurrence, from time to time during the one year period for correction of work described in Paragraph 12.2."

CHANGE entire subparagraph 4.2.2 to read:

4.2.2 A consultant or its sub-consultants, will provide periodic on-site inspection during the construction project to ensure that work is completed in accordance with the contract documents. The consultant shall keep the Owner informed of the progress of the work, and shall attempt to guard the Owner against defects and deficiencies in the work.

## **ARTICLE 7 CHANGES IN THE WORK**

### **7.1 CHANGES**

ADD the following subparagraphs 7.1.4 through 7.1.7 reading:

7.1.4 Throughout article seven (7), the allowance for overhead and profit combined, included in the total cost to the Owner, shall be based on the following schedules:

- .1 For the Contractor, for any work performed by the Contractor's own forces, fifteen percent (15%) of the cost.
- .2 For the Contractor, for work performed by his Sub-contractor, ten percent (10%) of the amount due the Subcontractor
- .3 For each Subcontractor, or Subcontractor involved, for any work performed by that Contractor's own forces, fifteen percent (15%) of the cost.
- .4 For each Subcontractor, for work performed by his Sub-subcontractors, five percent (5%) of the amount due the Sub-subcontractor.
- .5 Cost to which overhead and profit is to be applied shall be determined in accordance with

sub-subparagraphs 7.3.6.1, 7.3.6.2, 7.3.6.3, and 7.3.6.5

- 7.1.5 The Contractor shall prepare and submit to the Architect/ Engineer quotations for all claims, extra work, or credits, which would result in an adjustment to the contract sum, and preparation of related Change Orders and Construction Change Directives. All quotations shall be accompanied by a complete itemization of costs, including labor (type, quantity and unit cost per hour), materials (type, quantity and unit cost) and copies of written quotations from Subcontractors itemized in the same manner.
- 7.1.6 For work performed under a time and material directive, the Contractor shall furnish to the Owner's Project Representative, at the end of each day, the number of hours of labor expended each day; use, if any, of all equipment; and invoices and delivery slips for any materials received for the work and which will become a permanent part of the work.
- 7.1.7 For Change Order and Change Directive work, overhead shall be deemed to include the cost of insurance, bonds, and similar contract requirements.

### 7.3 CONSTRUCTION CHANGE DIRECTIVES

- 7.3.6 In the first sentence, DELETE the words, "a reasonable allowance for overhead and profit" and SUBSTITUTE "an allowance for overhead and profit in accordance with the schedule set forth in new subparagraph 7.1.4, above."

## **ARTICLE 9 PAYMENTS AND COMPLETIONS**

### 9.2 SCHEDULE OF VALUES

CHANGE entire subparagraph 9.2.1 to read:

- 9.2.1 The Contractor shall furnish, at least 21 days in advance of submission of their first monthly application for payment, a detailed schedule of values showing prices of all material and labor items included in the contract, the total of which shall aggregate the contract sum and as a breakdown by funding source in the amount not to exceed the total grant received from each funding source. The project representative will provide a breakdown of the amount by funding source for the purpose of complying with these requirements. This estimate shall be submitted using AIA Document G703 (1983 edition only), supported by such evidence of its correctness as the Architect/Engineer may direct. This evidence may include certified copies of subcontracts.

The Architect/Engineer shall have the right to revise the estimate as may be deemed necessary to make the various items conform to their true value.

The approved schedule shall be used as a base for all Applications for Payment and may be used for computing additions to and deductions from the contract price made necessary by change orders.

Profit and overhead shall not be listed as separate items, but their amounts shall be distributed pro-rata throughout the estimate.

The cost of General Conditions, bonds, insurance, and project clean-up shall each be listed separately from overhead costs.

### 9.3 APPLICATIONS FOR PAYMENT

CHANGE entire subparagraph 9.3.1 to read:

9.3.1 At least ten (10) days before the date established for each progress payment, the Contractor shall submit to the Owner's Project Representative an itemized Application for Payment for operations completed in accordance with the approved schedule of values. Such application shall be notarized and supported by such data substantiating the Contractor's right to payment as the Owner or Architect/Engineer may require, such as copies of requisitions from Subcontractors and material suppliers, and reflecting retainage provided for elsewhere in the Contract Documents.

Contractor shall submit certified payroll with all payment applications.

ADD sub subparagraph 9.3.1.3 reading:

9.3.1.3 Payments will be made equaling, in the opinion of the Owner and the Architect/Engineer, 95% of the value of work completed. Retainage will be 5%. The Contractor must submit two (2) copies of Contractors and subcontractors certified payroll with the application for payment. Payment requests approved by the Architect/Engineer will be forwarded to Hudson Valley Community College for payment.

#### 9.4 CERTIFICATES FOR PAYMENT

CHANGE the first sentence in subparagraph 9.4.2 to read:

9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect/Engineer to the Owner, based on the Architect's/Engineer's observations at the site and the data comprising the Application for Payment, that the work has progressed to the point indicated and that, to the best of the Architect's/Engineer's knowledge, information and belief, the work appears to be in accordance with the contract documents.

### **ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY**

#### 10.2 SAFETY OF PERSONS AND PROPERTY

ADD the following sentences to subparagraph 10.2.2, reading:

Such laws and regulations will be deemed to be included in the Contract Documents the same as though herein written out in full. Notwithstanding any reference to said laws, orders, rules and regulations, the Architect/Engineer and the Owner will not be responsible for supervision and construction methods or procedures, or protection of persons and property.

#### 10.3 HAZARDOUS MATERIALS

CHANGE the phrase "...from a material or substance, including..." in the first and second line of sub-paragraph 10.3.1 to read "...from a material or substance previously not identified under the remedial investigation work for this project, including...".

CHANGE the phrase "...a material or substance reported by the Contractor..." in the first and second line of sub-paragraph 10.3.2 to read "from a material or substance, previously not identified under the remedial investigation work for this project, reported by the Contractor...".

### **ARTICLE 11 INSURANCE AND BONDS**

#### **SEE SECTION 00 8300 FOR INSURANCE REQUIREMENTS**

##### 11.4.1 CHANGE paragraph 11.4.1 to read:

Performance, Labor and Material Bond: The Owner, prior to the execution of the contract,

requires the successful bidder to furnish bonds covering the faithful performance of the contract and payment of all obligations arising thereunder in such form and amount as the Owner may prescribe and with such sureties underwritten by a surety company licensed to do business in New York State. The premiums shall be paid by the Contractor. The required bonds shall be delivered to the Owner not later than the date of the execution of the contract. The dollar value of such bonds shall equal one hundred percent (100%) of the sum of the actual amount of the Owner\Contractor Agreement executed. The value of the bonds shall be adjusted upward or downward if and as the contract value is affected by contract amount changes during the course of the contract.

## **ARTICLE 13 MISCELLANEOUS PROVISIONS**

ADD the following paragraph title:

- 13.6 CONTRACTOR'S PROJECT RECORDS AND DOCUMENTS

ADD subparagraph 13.8.1 reading:

- 13.6.1 The Owner and Architect/ Engineer reserve all rights to inspect and obtain copies, at any time, of all the Contractor's original internal records and documents which relate in any way to this project.

## **ARTICLE 15 CLAIM AND DISPUTES**

- 15.3 MEDIATION

DELETE paragraph 15.3 in its entirety.

- 15.4 ARBITRATION

DELETE paragraph 15.4 in its entirety.

## **ADD THE FOLLOWING ARTICLES:**

### **ARTICLE 16 FORMS TO BE USED FOR THIS PROJECT**

- 16.1 The forms listed here shall be used for the work of this project. Bidders and Contractors shall make themselves aware of the form and content of these documents. These forms shall be deemed to be included in the Contract Documents the same as though they were bound herein.

Contractor's Qualification Statement - AIA Document A305 - 2007  
Bid Bond, AIA Document A310 - 2010  
Performance Bond, Labor and Material Payment Bond, AIA Document A312 -2010  
Owner/Contractor Agreement - AIA Document 101 - 2017 (electronic format) as modified by  
Owner  
General Conditions of the Contract for Construction - AIA Document A201 - 2017 (electronic  
format)  
Application and Certificate for Payment - AIA Document G702 as modified, and AIA  
Document G703 - 2017  
Change Order - AIA Document G701 - 2017  
Contractor's Affidavit of Payment of Debts and Claims - AIA Document G706 - 1970  
Contractor's Affidavit of Release of Liens - AIA Document G706A - 1970  
Consent of Surety Company to Final Payment - AIA Document G707 - 1970

- 16.2 The pre-printed unmodified forms are available at most stationery supply retailers and the American Institute of Architects (AIA). A sample copy is included in the Project Manual.

## **ARTICLE 17 EQUIVALENTS**

The Contractor represents that his contract price is based on the materials and equipment described in the contract documents.

It is not the intention of the Owner to restrict or bar equal or superior products of other manufacturers by the specification of a particular name and model number. Specific reference in the project documents to any product, material, fixture, form, type of construction, equipment, appurtenances, furniture or any other item to be incorporated into the work or to be used in connection therewith by proprietary name, trade name, brand name, or name of manufacturer or catalogue number is made to establish a standard of required function, dimension, quality, performance, design appearance, workmanship and suitability for the purpose intended, and shall not be construed as limiting competition.

Where two or more are named, these are presumed by the Architect/ Engineer to be equal and the Contractor may select one of those items. If the Contractor had desired to use any kind, type, brand, or manufacturer of material other than that named in the specification, he shall have indicated in writing in his bid proposal form what other kind, type, brand, or manufacturer was included in the bid for the specific specified item and, when requested, have submitted information describing wherein it differs from the project specification in specific detail, and other information as required by the Architect/Engineer to perform a reasonable and fair evaluation of the proposal.

The Owner and Architect/Engineer shall be under no obligation to consider proposals for substitutions or changes to specified materials or equipment following receipt of bids or execution of the Owner/Contractor Agreements.

Should the Architect/Engineer elect to consider and/or evaluate a proposed equivalent after submission of bids, the proposer shall provide drawings, design data, performance and test data and other information deemed necessary by the Architect/Engineer for the evaluation. A statement setting forth any changes in other materials or equipment that incorporation of the equivalent would require shall be included. The burden of proof of the merit of the proposed equivalent is upon the proposer.

Where any article or thing in the Contract Documents is specified by a proprietary name, a trade name, or the name of a manufacturer, with the addition of the expression "or (approved) equal," it is understood: (1) that the Architect/Engineer, acting as the Owner's Representative, will use his sole judgment in determining whether or not any article proposed as an equivalent is an equal of any article specified herein; (2) that the decision of the Architect/Engineer on all such questions of equality shall be final; and (3) that in the event of any adverse decision by the Architect/Engineer, acting as the Owner's Representative, no claim of any sort shall be made or allowed against the Architect/Engineer or the Owner by the manufacturer, jobber, or other supplier of the articles involved.

## **END OF SUPPLEMENTARY CONDITIONS**

**DOCUMENT 00 8120**

**GENERAL ONE YEAR GUARANTEE**

**TITLE:** RFB #2023-01-ENG, Central Park Pool, Spray Pad, and Facilities

**RECEIVING DATE AND TIME:** 10:30 AM WEDNESDAY, JANUARY 4, 2023

**OPENING DATE AND TIME:** 11:00 AM WEDNESDAY, JANUARY 4, 2023

**Attn.** Samantha Mykoo, City Clerk  
City of Schenectady City Hall  
105 Jay Street, Room 107  
Schenectady, New York 12305

\_\_\_\_\_  
(typed name)

\_\_\_\_\_  
(title)

representing

\_\_\_\_\_  
(company name)

\_\_\_\_\_  
(address)

being duly sworn, says:

- That they know the terms, conditions and requirements of the Owner/Contractor Agreement and the Contract Documents.
- That under the terms of that Agreement and the Documents, they guarantee that all work has been accomplished in accordance with that Agreement and the Documents, and that such work is free of defective workmanship and materials.
- That under the terms of the Agreement and Documents, they guarantee to repair at their own cost all work covered by the Contract Documents that may be determined defective by the Owner's Representative or Owner within a period of one (1) year from the date of SUBSTANTIAL COMPLETION as established by the Owner's Representative's certificate of same.
- That during this period, they will pay the cost of repairs to other work damaged by the defects of their work, and also the cost of replacing other work that may be disturbed in making such repairs.
- That they agree to promptly repair all defects upon notice by the Owner, and at a time convenient to the Owner.

**END OF SECTION**

## **SECTION 00 83 00**

### **INSURANCE REQUIREMENTS**

#### **PROTECTION LIABILITY AND PROPERTY INSURANCES**

- A. The Contractor, at his own expense, shall procure and maintain until two years after the date of the Certificate of Completion or one year after the Contractor or any Sub-contractor last perform any work under the Contract if the Project is abandoned or deferred, insurance for liability for damages required by law of the kinds and in the amounts stated herein and as may be modified by provisions in the Information to Bidders, through insurance companies authorized to operate in the State. The insurance shall cover all operations necessary to complete the work, whether performed by the Contractor or Sub-contractors. Before starting work, the Contractor shall furnish the Owner Policy upon demand and one certificate of insurance for each and every type of insurance required. The policies and certificates shall in form and content be satisfactory to the Owner, shall show compliance by the Contractor with the provisions herein contained, and shall provide that the policies shall not be cancelled or altered until after 30 days written notice to the Owner. Property damage insurance shall in all cases include coverage for XCU hazards, (explosion, collapse and underground operations).
- B. All liability insurance required by this Contract shall be maintained in force during the term of this Contract and until two years after the date of the Certificate of Completion or two years after the Contractor or any Sub-contractor last performs any work under the Contract if the Project is abandoned or deferred.

#### **SECTION 7: INSURANCE AND SECURITY REQUIREMENTS**

7.1 The selected proposer will be required to procure and maintain at its own expense the following insurance coverage:

- (a) Workers' Compensation and Employer's Liability Insurance: A policy or policies providing protection for employees in the event of job-related injuries.
- (b) General Liability Insurance: A policy or policies of comprehensive general liability insurance with limits of not less than one million dollars (\$1,000,000) per occurrence.
- (c) Automobile Liability Insurance: A policy or policies with limits of not less than one million dollars (\$1,000,000) for each accident because of bodily injury, sickness, or disease, including death at any time, resulting there from, sustained by any person caused by accident; and a policy or policies with limits of not less than one million dollars (\$1,000,000) for damage because of injury to or destruction of property, including the loss of use thereof, caused by accident and arising out of the ownership, maintenance, or use of any automobiles.

7.2 Each policy of insurance required shall be in form and content satisfactory to the City of Schenectady and shall provide that: (a) The City of Schenectady is named as an additional named insured on a primary and non-contributing basis. (b) The insurance policies shall not be changed or cancelled until the expiration of thirty (30) days after written notice to the City. (c) The insurance policies shall be automatically renewed upon expiration and continued in force unless the City is given sixty (60) days written notice to the contrary.

7.3 No work shall commence under the contract until the selected proposer has delivered to the City or its designee proof of issuance of all policies of insurance required by the Contract to be procured by the selected proposer. If at any time, any of said policies shall be or become unsatisfactory to the City, the selected proposer shall promptly obtain a new policy and submit proof of insurance of the same to the City for approval. Upon failure of the selected proposer to furnish, deliver, and maintain such insurance as above provided, the contract may, at the election of the City, be declared suspended, discontinued or terminated. Failure of the selected proposer to procure and maintain any required insurance shall not relieve the selected proposer from any liability under the contract, nor shall the insurance requirements be construed to conflict with the

obligations of the selected proposer concerning indemnification.

Three certificates of insurance for each policy shall be submitted to the Architect/Engineer, and construction activities shall not commence before the Owner is free of possible loss. If the Owner is damaged or subject to loss due to the failure of the Contractor to obtain and maintain such insurance, then the Contractor shall bear all costs and responsibilities attributable thereto.

Certificates shall be accompanied by a statement of any exclusions in the policy.

The Contractor must provide to the Architect 30 days written notice prior to change or cancellation of policies. The Contractor must give prompt written notice of an accident or claim to the Architect as well as to its insurer. Such notice must be given within the period established by the policy for giving notice. The insurance provider must be authorized to do business in New York State.

The Contractor shall exhibit any and all policies within three days of demand by Owner or Architect/Engineer.

A copy of the requirements for insurance set forth herein shall be forwarded to Contractor's insurance carrier to ensure that required coverage is provided.

Owner and Contractor intend that any policies provided in response to the insurance provisions shall protect all of the parties insured and provide primary coverage for all losses and damages caused by the perils covered thereby. Accordingly, all such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any of the parties named as insureds or additional insureds.

**END OF SECTION**

## Prevailing Wage

[Home](#) > Prevailing Wage

[Submit Notice Of Award](#) · [Submit Notice Of Project Completion](#)

Thank you for your submission. Your request has been assigned a 'Reference Number', and is being processed.

You will receive an email regarding your request within 24 to 48 hours

Reference Number: 1541563

Type of Contracting Agency: City

### Contracting Agency

City of Schenectady  
Christopher Wallin  
City Engineer  
105 Jay St  
Schenectady NY 12305  
  
(518) 382-5082  
(518) 382- 1050 Fax  
cwallin@schenectadyny.gov

### Send Reply To

Emily Gardner  
Dir. of Landscape Architecture  
21 Congress St Suite 201  
Saratoga Springs NY 12866  
  
(518) 831 -5784  
egardner@saratogaassociates.com

### Project Information

**Project Title** Central Park Pool & Spray Park

**Description of Work** Construction of swimming pool, bathhouse, pump house, splash pad, parking lot, and associated hardscape, landscaping, utilities, stormwater management, and furnishings.

**Contract Id No.**

**Project Locations(s)** Central Park

**Route No / Street Address** Fehr Ave at Ashmore Ave

**Village / City** Schenectady

**Town**

**State / Zip** NY 12305

**Nature of Project** Other New Construction (Explain)

**Approximate Bid Date** 01/04/2023

**Checked Occupation(s)** Construction (Building, Heavy & Highway, Sewer, Water, Tunnel)

### Applicable Counties

Schenectady

## Department of Labor

[Accessibility](#)

[Contact](#)

[Language Access](#)

[Privacy Policy](#)





Kathy Hochul, Governor

Roberta Reardon, Commissioner

City of Schenectady

Emily Gardner, Dir. of Landscape Architecture  
21 Congress St Suite 201  
Saratoga Springs NY 12866

Schedule Year 2022 through 2023  
Date Requested 11/18/2022  
PRC# 2022012941

Location Central Park

Project ID#

Project Type Construction of swimming pool, bathhouse, pump house, splash pad, parking lot, and associated hardscape, landscaping, utilities, stormwater management, and furnishings.

## 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 Wage Case Number (PRC#) has been assigned to the schedule(s) for your project.

The schedule is effective from July 2022 through June 2023. 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](http://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.

### **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.

There are very few exceptions to this rule. Complete information regarding these exceptions is available on the ["Request for a dispensation to work overtime" form \(PW30\)](#) and ["4 Day / 10 Hour Work Schedule" form \(PW 30.1\)](#).

### **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 12240; Fax to Bureau of Public Work (518) 485-1870; or electronically at the NYSDOL website [www.labor.ny.gov](http://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](http://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](http://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, 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.

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 or 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 12240 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

City of Schenectady

Emily Gardner, Dir. of Landscape Architecture  
21 Congress St Suite 201  
Saratoga Springs NY 12866

Schedule Year 2022 through 2023  
Date Requested 11/18/2022  
PRC# 2022012941

Location Central Park

Project ID#

Project Type Construction of swimming pool, bathhouse, pump house, splash pad, parking lot, and associated hardscape, landscaping, utilities, stormwater management, and furnishings.

### 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: \$ \_\_\_\_\_

Contract Type:

Approximate Starting Date: \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_

(01) General Construction

Approximate Completion Date: \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_

(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 12240



### **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](mailto: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](http://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 12240

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:

- |  |  |
|--|--|
| <ul style="list-style-type: none"><li>• <b>Civil Penalty</b></li><li>• <b>Criminal Penalty</b></li></ul> | <p>First offense: Up to \$2,500 per employee</p> <p>Subsequent offense(s): Up to \$5,000 per employee</p> <p>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.</p> <p>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.</p> |
|--|--|

**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](mailto:dol.misclassified@labor.ny.gov). All complaints of fraud and violations are taken seriously. You can remain anonymous.**

**Employer Name:**

IA 999 (09/16)



# 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.

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/public-work-and-prevailing-wage>**

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) 568-5156		

\* 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](http://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 or 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 requirements 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.

#### Payrolls and Payroll Records

Contractors and subcontractors are required to establish, maintain, and preserve for not less than six (6) years, contemporaneous, true, and accurate payroll records.

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.

#### 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. However, 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. 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](http://www.labor.ny.gov)) for current wage rate information.

#### 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 12240

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

## Schenectady County General Construction

### Boilermaker

11/01/2022

#### JOB DESCRIPTION Boilermaker

DISTRICT 1

#### ENTIRE COUNTIES

Albany, Broome, Chenango, Columbia, Delaware, Essex, Fulton, Greene, Hamilton, Herkimer, Montgomery, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Tioga, Warren, Washington

#### WAGES

Per hour

	07/01/2022	01/01/2023	01/01/2024
		Additional	Additional
Boilermaker	\$ 39.34	+ \$1.30	+ \$1.30

#### SUPPLEMENTAL BENEFITS

Per hour

	07/01/2022
Journeyperson	\$ 25.65 + 1.24*

\* This portion of the benefit is NOT subject to the SAME PREMIUM as shown for overtime.

#### OVERTIME PAY

See (B, E, Q, V) 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, and when Christmas Day and New Year's fall on Saturday, Friday will be observed as the holiday.

#### REGISTERED APPRENTICES

Wages per hour

(1/2 ) year terms at the following percentage of Journeyman's wage.

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

Supplemental Benefits per hour

1st	2nd	3rd	4th	5th	6th	7th	8th
19.15	19.15	20.08	21.00	21.93	22.87	23.79	24.72
+1.24*	+1.24*	+1.24*	+1.24*	+1.24*	+1.24*	+1.24*	+1.24*

\* This portion of the benefit is NOT subject to the SAME PREMIUM as shown for overtime.

1-197

### Carpenter - Building

11/01/2022

#### JOB DESCRIPTION Carpenter - Building

DISTRICT 2

#### ENTIRE COUNTIES

Albany, Fulton, Greene, Montgomery, Rensselaer, Saratoga, Schenectady, Schoharie

#### WAGES

Per hour:

	07/01/2022	07/01/2023	07/01/2024	07/01/2025
Carpenter	\$ 34.00	\$ 1.25	\$ 1.25	\$ 1.25
Floor Coverer	34.00	1.25	1.25	1.25
Carpet Layer	34.00	1.25	1.25	1.25
Dry-Wall	34.00	1.25	1.25	1.25
Diver-Wet Day	61.25	0.00	0.00	0.00
Diver-Dry Day	35.00	1.25	1.25	1.25
Diver Tender	35.00	1.25	1.25	1.25

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 journeyman's rate of pay when performing piledriving/dock building work.
- Certified welders shall receive \$1.00 per hour over the journeyman's rate of pay when the employee is required to be certified and performs DOT or ABS specified welding work



## 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, 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:	07/01/2022	07/01/2023	07/01/2024
Carpenter - ONLY for Artificial Turf/Synthetic Sport Surface		Additional	Additional
	\$ 33.08	\$ 2.25*	\$ 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:

Journeyman	\$ 25.45
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## OVERTIME PAY

See (B, E, Q, X) 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. When 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 Journeyman's wage):

1st	2nd	3rd	4th
65%	70%	75%	80%

Supplemental Benefits per hour:

1st term	\$ 16.97
2nd term	17.41
3rd term	19.40
4th term	19.84

2-42AtSS

## Carpenter - Heavy&Highway

11/01/2022

### JOB DESCRIPTION Carpenter - Heavy&Highway

### DISTRICT 2

## ENTIRE COUNTIES

Albany, Fulton, Greene, Montgomery, Rensselaer, Saratoga, Schenectady, Schoharie, Warren, Washington

## WAGES

Per hour	07/01/2022	07/01/2023	07/01/2024
Carpenter	\$ 37.52	\$ 3.75*	\$ 4.00*
Piledriver	37.52	3.75*	4.00*
Diver-Wet Day	62.52	3.75*	4.00*
Diver-Dry Day	38.52	3.75*	4.00*
Diver-Tender	38.52	3.75*	4.00*

\*To be allocated at a later date.

### NOTE ADDITIONAL AMOUNTS PAID FOR THE FOLLOWING WORK LISTED BELOW (per hour worked):

- When project owner mandates a single irregular work shift, the employee will receive an additional \$3.00 per hour. A single irregular work shift can start any time from 5:00 p.m. to 1:00 a.m.



Greene: Portion of the County North of a line following the South limits of the City of Catskill in a westerly direction from the Hudson River to State Highway 23A. Then continuing on 23A to the road following the Little West Kill and continuing along this road to Delaware County.  
Otsego: Only the Towns of Decatur and Worcester

## **WAGES**

Per hour

07/01/2022                    06/01/2023

Electrician	\$ 45.00	\$ 47.12
Audio/Sound	45.00	47.12
Video	45.00	47.12
Tele-Data	45.00	47.12
Solar/ Photovoltaic	45.00	47.12

Notes: An additional 5% above rate for work over 30' above floor and requires use of a safety harness when working on tooth picks, structural steel, temporary platforms, swing scaffolds & boatswain chairs. All OSHA approved lifts are excluded.

An additional 10% above rate on towers & smoke stacks over 100' high.

An additional 20% above rate in shafts over 25' deep or tunnels over 50' long that are under construction.

An additional 5% above rate when Journeymen are required to work as Lead(Pb) cable splicers.

An additional 10% above rate when Journeymen Welders are required to have ASME verification.

## **SUPPLEMENTAL BENEFITS**

Per hour

J Journeyman	\$ 29.24	\$ 29.29
	+3% of wage	+3% of wage

## **OVERTIME PAY**

See (B, \*E, Q) on OVERTIME PAGE

\* DOUBLE TIME AFTER 10 HOURS ON SATURDAY

For Projects Bid on or Prior to 05/31/2019

NOTE: THE FOLLOWING RATES WILL APPLY ON ALL CONTRACTING AGENCY MANDATED SHIFTS OF AT LEAST A FIVE (5) DAY 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 10%
3rd Shift	12:30 AM to 9:00 AM	REGULAR RATE PLUS 15%

For Projects Bid on or After 06/01/2019

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%

For Projects Bid on or After 09/01/2019

NOTE: THE FOLLOWING RATES WILL APPLY ON ALL CONTRACTING AGENCY MANDATED SINGLE IRREGULAR SHIFTS OF AT LEAST A FIVE (5) DAY 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%

## **HOLIDAY**

Paid:                          See (1) on HOLIDAY PAGE  
Overtime:                      See (5, 6) on HOLIDAY PAGE

Note: If the holiday falls on Saturday, it shall be celebrated on Friday. If the holiday falls on Sunday, it shall be celebrated on Monday.

## **REGISTERED APPRENTICES**

Wages per hour

Terms at the following percentage of Journeyman's wage.

0-6mo	6-12mo	2nd yr	3rd yr	4th yr	5th yr
40%	45%	50%	60%	70%	80%

Notes: An additional 5% above rate for work over 30' above floor and requires use of a safety harness when working on tooth picks, structural steel, temporary platforms, swing scaffolds & boatswain chairs. All OSHA approved lifts are excluded.

An additional 10% above rate on towers & smoke stacks over 100' high.

An additional 20% above rate in shafts over 25' deep or tunnels over 50' long that are under construction.

Supplemental Benefits per hour worked

Apprentices indentured on or before 12/31/2018

0-12 month term	\$ 14.66*
2-5th year term	29.24*

Apprentices indentured on or after 01/01/2019

0-12 month term	\$ 14.66*
2nd year term	23.52*
3rd year term	24.66*
4th year term	25.81*
5th year term	29.24*

\*Plus additional 3% of wage

1-236

## Elevator Constructor

11/01/2022

### JOB DESCRIPTION Elevator Constructor

### DISTRICT 1

#### ENTIRE COUNTIES

Albany, Clinton, Essex, Fulton, Hamilton, Herkimer, Montgomery, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Warren, Washington

#### PARTIAL COUNTIES

Madison: Madison Only the towns of: Brookfield, Hamilton, Lincoln, Madison, Smithfield, Stockbridge and the City of Oneida  
Oneida: Entire county except the towns of: Camden, Florence, and Vienna.

#### WAGES

Per hour

	07/01/2022	01/01/2023
Mechanic	\$ 50.78	\$ 53.02
Helper	70% of Mechanic Wage Rate	70% of Mechanic Wage Rate

Four (4), ten (10) hour days may be worked for New Construction and Modernization Work at straight time during a week, Monday thru Thursday or Tuesday thru Friday.

\*\*\*Four (4), ten (10) hour days are not permitted for Contract Work/Repair Work

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

#### SUPPLEMENTAL BENEFITS

Per hour

	07/01/2022	01/01/2023
Journeyperson/Helper	\$ 36.885*	\$ 37.335*

(\*)Plus 6% of hourly rate, if less than 5 years of service. Plus 8% of 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 paid holiday falls on Saturday, it shall be observed on Friday. When a paid holiday falls on Sunday, it shall be observed on Monday.

#### REGISTERED APPRENTICES

Wages per hour:

0-6 mo*	6-12 mo	2nd yr	3rd yr	4th yr
50%	55 %	65 %	70 %	80 %

(\*)Plus 6% of the hourly rate, no additional supplemental benefits.

Supplemental Benefits - per hour worked:

Same as Journeyperson/Helper

1-35

**Glazier**

**11/01/2022**

**JOB DESCRIPTION Glazier**

**DISTRICT 1**

**ENTIRE COUNTIES**

Albany, Clinton, Columbia, Essex, Franklin, Fulton, Greene, Hamilton, Montgomery, Rensselaer, Saratoga, Schenectady, Schoharie, Warren, Washington

**WAGES**

Per hour

	07/01/2022	05/01/2023	07/01/2023
Glazier Base Wage	\$ 31.86	Additional +\$1.80	Additional
	+ additional \$4.05 per hour for all hours worked, not subject to overtime/premium		
High Work Base Wage*	34.01		+\$1.55
	+ additional \$4.05 per hour for all hours worked, not subject to overtime/premium		

(\*)When working on Swing Stage or Lift 100 feet or more in height, measured from the ground level up.

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day. NOTE - In order to use the 4 Day/10 Hour Work schedule, as your normal schedule, you must submit an Employer Registration for Use of 4 Day/10 Hour Work Schedule, form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

**SUPPLEMENTAL BENEFITS**

Per hour

Journeyman	\$ 21.75
Journeyman High Work	27.65

**OVERTIME PAY**

See (B, E, E2, Q) on OVERTIME PAGE

Premium is applied to the respective base wage only.

THE FOLLOWING RATES WILL APPLY ON ALL CONTRACTING AGENCY MANDATED SHIFT WORK OR SINGLE IRREGULAR SHIFTS STARTING BETWEEN THE HOURS LISTED BELOW:

4:00pm to 6:30am:	ADDITIONAL 12.5% TO APPLICABLE WAGE RATE AND SUPPLEMENTAL BENEFIT
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**HOLIDAY**

Paid: See (1) on HOLIDAY PAGE  
Overtime: See (5, 6) on HOLIDAY PAGE

Note: If any of the holidays are designated by federal law to be celebrated on a day other than that on which they regularly fall, then the holiday shall be celebrated on the day set by said federal law as if the day on which the holiday is celebrated was actually the holiday date.

**REGISTERED APPRENTICES**

Wages per hour

Apprentice Glazier 1500 hr. terms at the following percentage of Journeymans base wage.

1st	2nd	3rd	4th
50%	65%	75%	90%

+ additional \$3.60 per hour for all hours worked for all terms

Apprentice Glazier Hi-Work 1500 hr. terms at the following percentage of Journeymans Hi-Work base wage.

1st	2nd	3rd	4th
50%	65%	75%	90%

+ additional \$4.05 per hour for all hours worked for all terms

Supplemental Benefits per hour worked

Apprentice	
1st term	\$ 18.08
2nd-4th term	21.75
Apprentice High Work	
1st term	21.28
2nd-4th term	27.65

## Insulator - Heat & Frost

11/01/2022

### JOB DESCRIPTION Insulator - Heat & Frost

DISTRICT 1

### ENTIRE COUNTIES

Albany, Columbia, Delaware, Essex, Fulton, Greene, Hamilton, Montgomery, Rensselaer, Saratoga, Schenectady, Schoharie, Sullivan, Ulster, Warren, Washington

### WAGES

Wages per hour	07/01/2022	05/01/2023	05/01/2024
Asbestos Worker*	\$ 38.40	Additional +\$2.50	Additional +\$2.00
Insulator*	38.40		
Firestopping Worker*	32.64		

(\*)On Mechanical Systems only.

On government mandated shift work additional 12% of wage for all shifts starting after 3:30 P.M.

### SUPPLEMENTAL BENEFITS

Per hour

Journeyperson	\$ 24.42
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### OVERTIME PAY

See (\*B1, \*\*Q) on OVERTIME PAGE

\*B1=Double time begins after 10 hours on Saturday

\*\*Q=Triple time on Labor Day if worked.

### HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6) on HOLIDAY PAGE

When a holiday falls on Sunday the following Monday shall be observed as the holiday.

### REGISTERED APPRENTICES

Wages per hour

one year terms at the following percentage of Journeyperson's wage.

1st	2nd	3rd	4th
60 %	70 %	80 %	90 %

Supplemental Benefits per hour worked:

Apprentices	\$ 24.42
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1-40

## Ironworker

11/01/2022

### JOB DESCRIPTION Ironworker

DISTRICT 1

### ENTIRE COUNTIES

Albany, Clinton, Columbia, Delaware, Essex, Greene, Rensselaer, Saratoga, Schenectady, Schoharie, Warren, Washington

### PARTIAL COUNTIES

Fulton: Only the Townships of Broadalbin, Mayfield, Northampton, Bleecker and Johnstown.

Hamilton: Only the Townships of Hope, Benson and Wells.

Montgomery: Only the Townships of Florida, Amsterdam, Charleston, Glen, Mohawk and Root.

Otsego: Only the Towns of Unadilla, Butternuts, Morris, Otego, Oneonta, Laurens, Millford, Maryland and Worcester.

### WAGES

Wages	07/01/2022
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Per hour

Ornamental	\$ 33.50
Reinforcing	33.50
Rodman	33.50
Structural & Precast	33.50
Mover/Rigger	33.50
Fence Erector	33.50
Stone Derrickman	33.50
Sheeter	33.75
Curtain Wall Installer	33.50
Metal Window Installer	33.50

## SUPPLEMENTAL BENEFITS

Per hour

JOURNEYPERSON \$ 31.14

## OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

THE FOLLOWING RATES WILL APPLY ON ALL CONTRACTING AGENCY MANDATED MULTIPLE SHIFTWORK:

1st Shift	6:00 AM to 4:30 PM	REGULAR RATE
2nd Shift	2:00 PM to 7:00 PM	REGULAR RATE PLUS 10%
3rd Shift	7:00 PM to 12:00 AM	REGULAR RATE PLUS 15%

THE FOLLOWING RATE WILL APPLY ON ALL CONTRACTING AGENCY MANDATED SINGLE IRREGULAR SHIFTS:

Shift Starting 4:30 PM to 12:00 AM REGULAR RATE PLUS 10%

## 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.

## REGISTERED APPRENTICES

Wages per hour

ONE YEAR TERMS AT THE FOLLOWING WAGE RATES:

07/01/2022

1st year	\$ 19.50
2nd year	21.50
3rd year	23.50
4th year	25.50

Supplemental Benefits per hour worked

1st year	\$ 11.78
2nd year	23.73
3rd year	25.42
4th year	27.13

1-12

## Laborer - Building

11/01/2022

### JOB DESCRIPTION

Laborer - Building

DISTRICT 1

### ENTIRE COUNTIES

Schenectady, Schoharie

### PARTIAL COUNTIES

Fulton: Only the Townships of Bleeker, Mayfield, Northampton, Johnstown, Broadalbin and Perth.

Montgomery: Only the Townships of Mohawk, Glen, Charleston, Amsterdam, and Florida.

Saratoga: Only the Townships of Day, Hadley, Edinburg, Corinth, Moreau, South Glens Falls, Providence, Greenfield, Wilton, Galway, Northumberland, Milton, Saratoga Springs, Charlton, Ballston, Malta and Clifton Park.

### WAGES

Per hour

07/01/2022 07/01/2023  
Additional

Group #1: All Classifications except as noted in Groups 2 & 3	\$ 34.54	+ \$2.35
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Group #2: Blaster, Drilling equipment only where a separate air compressor unit supplies power, Metal formsetter (sidewalk), Well pointing & Laser operator	\$ 35.04
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Group #3:

Handling of Asbestos  
or Toxic Materials \$ 35.89

### SUPPLEMENTAL BENEFITS

Per hour

Journeyman \$ 23.11

### 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

1000 Hour terms at the following percentage of Journeyman's basic hourly wage.

1st	2nd	3rd	4th
65 %	70 %	80 %	80 %

Supplemental Benefits per hour worked

Apprentices	07/01/2022	\$ 23.11
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1-157

## Laborer - Heavy&Highway

11/01/2022

**JOB DESCRIPTION** Laborer - Heavy&Highway

**DISTRICT 1**

### ENTIRE COUNTIES

Schenectady, Schoharie

### PARTIAL COUNTIES

Fulton: Only the Townships of Bleeker, Mayfield, Northampton, Johnstown, Broadalbin and Perth.

Montgomery: Only the Townships of Mohawk, Glen, Charleston, Amsterdam, and Florida.

Saratoga: Only the Townships of Day, Hadley, Edinburg, Corinth, Moreau, South Glens Falls, Providence, Greenfield, Wilton, Galaway, Northumberland, Milton, Saratoga Springs, Charlton, Ballston, Malta and Clifton Park

### WAGES

GROUP # A:

Basic, Drill Helper, Flagman, Outboard and Hand Boats.

GROUP # B:

Chain Saw, Concrete Aggregate Bin, Concrete Bootmen, Gin Buggy, Hand or Machine Vibrator, Jack Hammer, Mason Tender, Mortar Mixer, Pavement Breaker, Handlers of Steelmesh, Small Generators for Laborers, Tools Installation of Bridge Drainage Pipe, Pipe Layers, Vibrator Type Rollers, Tamper, Drill Doctor, Tail or Screw Operator on Asphalt Paver, Water Pump Operators(1-1/2" and Single Diaphragm) Nozzle (Asphalt, Gunite, Seeding, and Sand Blasting), Laborers on Chain Link Fence, Rock Splitter and Power Unit, Pusher Type Concrete Saw and all other Gas, Electric, Oil and Air Tool Operators, Wrecking Laborer.

GROUP # C:

Drilling Equipment Only Where a Separate Air Compressor Unit Supplies Power, Acetylene Torch Operators, Asphalt Paver/Raker and Powderman.

GROUP # D:

Blasters, Metal Form Setters (sidewalk), Stone or Granite Curb Setters.

GROUP # E:

Employees performing hazardous waste removal, lead abatement and removal, or asbestos abatement and removal on a State and/or Federally designated waste site & where relevant State or Federal regulations require employees to use or wear forms of personal protection.

WAGES per hour	07/01/2022	07/01/2023
		Additional
Group # A	\$ 36.60	\$ 3.50
Group # B	36.80	
Group # C	37.00	
Group # D	37.20	
Group # E	39.10	

All employees who work a single irregular work day that starts from 5:00 pm to 1:00 am on a governmental mandated night shift shall be paid an additional \$5.00 per hour.

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

## SUPPLEMENTAL BENEFITS

Per hour

Journeyman	\$ 25.99
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## 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. If the Holiday falls on a Saturday employer can choose to celebrate Saturday or give Friday off with pay.

## REGISTERED APPRENTICES

Wages per hour

1000 HOUR TERMS AT THE FOLLOWING PERCENTAGE OF JOURNEYMAN'S BASE WAGE

1ST	2ND	3RD	4TH
65 %	70 %	80 %	80 %

Supplemental Benefits per hour worked

	07/01/2022	
Apprentices	\$ 25.99	1-157h/h

## Laborer - Tunnel

**11/01/2022**

### JOB DESCRIPTION Laborer - Tunnel

**DISTRICT 1**

### ENTIRE COUNTIES

Albany, Fulton, Hamilton, Herkimer, Madison, Montgomery, Oneida, Rensselaer, Saratoga, Schenectady, Schoharie, Washington

### WAGES

Class 1: All support laborers/sandhogs working above the shaft or tunnel

Class 2: All laborers/sandhogs working in the shaft or tunnel

Class 4: Safety Miners

Class 5: Site work related to Shaft/Tunnel

Class A: Mole nipper, powder handler, changehouse attendant and top laborer, Air spade, jackhammer, pavement breaker, Top bell, Bottom bell, side or roofbelt driller, maintenance men, burners, block layers, rodmen, caulkers, miners helper, trackmen, nippers, derailmen, electrical cablemen, hosemen, groutmen, gravelmen, form workers, movers and shaftmen, conveyor men.

Class B: Powder monkey, Blasters, ironmen and cement worker, miner, welder, heading driller, steel erectors, piledriver, rigger

Per Hour

07/01/2022

\*For projects bid on or after May 1, 2019

Class 1	\$ 43.50
Class 2	45.50
Class 4	47.75
Class 5	38.25

Toxic and hazardous waste, lead abatement and asbestos abatement work will be paid an additional \$ 3.00 an hour.

\*For projects bid on or before April 30, 2019

Class A	\$ 40.80
Class B	41.80

Toxic and hazardous waste, lead abatement and asbestos abatement work will be paid an additional \$ 2.00 an hour.

## SUPPLEMENTAL BENEFITS

Per hour

\*For projects bid on or after May 1, 2019

Journeyman                    \$ 27.50

\*For projects bid on or before April 30, 2019

Journeyman                    \$ 26.75

## OVERTIME PAY

See (B, E, Q, V, X) on OVERTIME PAGE

## HOLIDAY

Paid:                            See (5, 6, 15, 25) on HOLIDAY PAGE

Overtime:                    See (5, 6, 15, 16, 25) on HOLIDAY PAGE

Note: If the holiday falls on a Sunday, it will be celebrated on Monday.

If the holiday falls on a Saturday, it will be celebrated on Friday.

## REGISTERED APPRENTICES

FOR APPRENTICE RATES, refer to the appropriate Laborer Heavy & Highway wage rate contained in the wage schedule for the County and Location where the work is to be performed.

1-190/157T

## Lineman Electrician

11/01/2022

### 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.

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. (Ref #14.01.01)

Per hour:	07/01/2022	05/01/2023	05/06/2024
Lineman, Technician	\$ 56.00	\$ 57.40	\$ 58.90
Crane, Crawler Backhoe	56.00	57.40	58.90
Welder, Cable Splicer	56.00	57.40	58.90
Digging Mach. Operator	50.40	51.66	53.01
Tractor Trailer Driver	47.60	48.79	50.07
Groundman, Truck Driver	44.80	45.92	47.12
Equipment Mechanic	44.80	45.92	47.12
Flagman	33.60	34.44	35.34

Additional \$1.00 per hour for entire crew when a helicopter is used.

Below rates applicable on all electrical sub-stations, switching structures, fiber optic cable and all other work not defined as "Utility outside electrical work". (Ref #14.02.01-A)

Lineman, Technician	\$ 56.00	\$ 57.40	\$ 58.90
Crane, Crawler Backhoe	56.00	57.40	58.90
Cable Splicer	61.60	63.14	64.79
Certified Welder -			
Pipe Type Cable	58.80	60.27	61.85
Digging Mach. Operator	50.40	51.66	53.01
Tractor Trailer Driver	47.60	48.79	50.07
Groundman, Truck Driver	44.80	45.92	47.12
Equipment Mechanic	44.80	45.92	47.12
Flagman	33.60	34.44	35.34

Additional \$1.00 per hour for entire crew when a helicopter is used.

Below rates apply on switching structures, maintenance projects, railroad catenary install/maintenance third rail installation, bonding of rails and pipe type cable and installation of fiber optic cable. (Ref #14.02.01-B)

Lineman, Tech, Welder	\$ 57.32	\$ 58.72	\$ 60.22
Crane, Crawler Backhoe	57.32	58.72	60.22
Cable Splicer	63.05	64.59	66.24
Certified Welder -			
Pipe Type Cable	60.19	61.66	63.23
Digging Mach. Operator	51.59	52.85	54.20
Tractor Trailer Driver	48.72	49.91	51.19
Groundman, Truck Driver	45.86	46.98	48.18
Equipment Mechanic	45.86	46.98	48.18
Flagman	34.39	35.23	36.13

Additional \$1.00 per hour for entire crew when a helicopter is used.

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. (Ref #14.03.01)

Lineman, Tech, Welder	\$ 58.51	\$ 59.91	\$ 61.41
Crane, Crawler Backhoe	58.51	59.91	61.41
Cable Splicer	58.51	59.91	61.41
Digging Mach. Operator	52.66	53.92	55.27
Tractor Trailer Driver	49.73	50.92	52.20
Groundman, Truck Driver	46.81	47.93	49.13
Equipment Mechanic	46.81	47.93	49.13
Flagman	35.11	35.95	36.85

Additional \$1.00 per hour for entire crew when a helicopter is used.

NOTE: 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 %

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day. Tuesday thru Friday may be worked with no make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

#### SUPPLEMENTAL BENEFITS

Per hour worked (but also required on non-worked holidays):

	07/01/2022	05/01/2023	05/06/2024
J Journeyman	\$ 25.90 *plus 7% of the hourly wage paid	\$ 26.40 *plus 7% of the hourly wage paid	\$ 26.90 *plus 7% of the hourly wage paid
J Journeyman Lineman or	\$ 27.90	\$ 29.40	\$ 30.90

Equipment Operators with Crane License	*plus 7% of the hourly wage paid	*plus 7% of the hourly wage paid	*plus 7% of the hourly wage paid
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\*The 7% is based on the hourly wage paid, straight time or premium time.

### OVERTIME PAY

See (B, E, Q.) on OVERTIME PAGE. \*Note\* Double time for all emergency work designated by the Dept. of Jurisdiction.

NOTE: 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, 13, 25) on HOLIDAY PAGE plus Governor of NYS Election Day.  
Overtime See (5, 6, 8, 13, 25) on HOLIDAY PAGE plus Governor of NYS Election Day.

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 Journeyman Lineman wage.

1st	2nd	3rd	4th	5th	6th	7th
60%	65%	70%	75%	80%	85%	90%

SUPPLEMENTAL BENEFITS per hour:

07/01/2022	05/01/2023	05/06/2024
\$ 25.90 *plus 7% of the hourly wage paid	\$ 26.40 *plus 7% of the hourly wage paid	\$ 26.90 *plus 7% of the hourly wage paid

\*The 7% is based on the hourly wage paid, straight time or premium time.

6-1249a

## Lineman Electrician - Teledata

11/01/2022

### 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

Per hour:

For outside work, stopping at first point of attachment (demarcation).

	07/01/2022	01/01/2023	01/01/2024	01/01/2025
Cable Splicer	\$ 36.28	\$ 37.73	\$ 39.24	\$ 40.81
Installer, Repairman	\$ 34.43	\$ 35.81	\$ 37.24	\$ 38.73
Teledata Lineman	\$ 34.43	\$ 35.81	\$ 37.24	\$ 38.73
Tech., Equip. Operator	\$ 34.43	\$ 35.81	\$ 37.24	\$ 38.73
Groundman	\$ 18.25	\$ 18.98	\$ 19.74	\$ 20.53

NOTE: EXCLUDES Teledata work within ten (10) feet of High Voltage (600 volts and over) transmission lines. For this work please see LINEMAN.

NOTE: THE FOLLOWING RATES WILL APPLY ON ALL CONTRACTING AGENCY MANDATED MULTIPLE SHIFTS OF AT LEAST FIVE (5) DAYS DURATION WORKED:

1ST SHIFT	REGULAR RATE
2ND SHIFT	REGULAR RATE PLUS 10%
3RD SHIFT	REGULAR RATE PLUS 15%

### SUPPLEMENTAL BENEFITS

Per hour:	07/01/2022	01/01/2023	01/01/2024	01/01/2025
Journeyman	\$ 5.14	\$ 5.14	\$ 5.14	\$ 5.14

*plus 3% of the hourly wage paid			
----------------------------------	----------------------------------	----------------------------------	----------------------------------

\*The 3% is based on the hourly wage paid, straight time rate or premium rate.

### OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

NOTE: 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:  
Overtime:

See (1) on HOLIDAY PAGE  
See (5, 6, 16) on HOLIDAY PAGE

6-1249LT - Teledata

## Lineman Electrician - Traffic Signal, Lighting

11/01/2022

### 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.

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.

(Ref #14.01.01)

Per hour:	07/01/2022	05/01/2023	05/06/2024
Lineman, Technician	\$ 48.19	\$ 49.32	\$ 50.54
Crane, Crawler Backhoe	48.19	49.32	50.54
Certified Welder	50.60	51.79	53.07
Digging Machine	43.37	44.39	45.49
Tractor Trailer Driver	40.96	41.92	42.96
Groundman, Truck Driver	38.55	39.46	40.43
Equipment Mechanic	38.55	39.46	40.43
Flagman	28.91	29.59	30.32

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.

NOTE: 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%

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day. Tuesday thru Friday may be worked with no make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

## SUPPLEMENTAL BENEFITS

Per hour worked (but also required on non-worked holidays):

	07/01/2022	05/01/2023	05/06/2024
J Journeyman	\$ 25.90 *plus 7% of the hourly wage paid	\$ 26.40 *plus 7% of the hourly wage paid	\$ 26.90 *plus 7% of the hourly wage paid
J Journeyman Lineman or Equipment Operators with Crane License	\$ 27.90 *plus 7% of the hourly wage paid	\$ 29.40 *plus 7% of the hourly wage paid	\$ 30.90 *plus 7% of the hourly wage paid

\*The 7% is based on the hourly wage paid, straight time or premium time.

## OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE. \*Note\* Double time for all emergency work designated by the Dept. of Jurisdiction.

NOTE: 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, 13, 25 ) on HOLIDAY PAGE plus Governor of NYS Election Day.

Overtime: See ( 5, 6, 8, 13, 25 ) on HOLIDAY PAGE plus Governor of NYS Election Day.

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 Journeyman Lineman wage.

1st	2nd	3rd	4th	5th	6th	7th
60%	65%	70%	75%	80%	85%	90%

SUPPLEMENTAL BENEFITS per hour:

	07/01/2022	05/01/2023	05/06/2024
	\$ 25.90 *plus 7% of the hourly wage paid	\$ 26.40 *plus 7% of the hourly wage paid	\$ 26.90 *plus 7% of the hourly wage paid

\*The 7% is based on the hourly wage paid, straight time or premium time.

6-1249a-LT

**Lineman Electrician - Tree Trimmer**

**11/01/2022**

**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 would include stump removal near underground energized electrical lines, including telephone and CATV lines.

Per hour:	07/01/2022	01/01/2023
Tree Trimmer	\$ 28.25	\$ 29.80
Equipment Operator	24.98	26.35
Equipment Mechanic	24.98	26.35
Truck Driver	20.80	21.94
Groundman	17.13	18.07
Flag person	13.20*	13.20*

\*NOTE: Subject to change due to any minimum wage increases.

## SUPPLEMENTAL BENEFITS

Per hour worked (but also required on non-worked holidays):

	07/01/2022	01/01/2023
J Journeyman	\$ 10.23 *plus 3% of the hourly wage paid	\$ 10.48 *plus 3% of the hourly wage paid

\* The 3% is based on the hourly wage paid, straight time rate or premium rate.

## OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

NOTE: 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) 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

11/01/2022

### JOB DESCRIPTION Mason - Building

DISTRICT 12

### ENTIRE COUNTIES

Albany, Clinton, Columbia, Essex, Franklin, Fulton, Greene, Hamilton, Montgomery, Rensselaer, Saratoga, Schenectady, Schoharie, Warren, Washington

### WAGES

Per hour 07/01/2022

Tile/Marble/Terrazzo

Setter	\$ 36.71
Finisher	28.61

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work Schedule,' as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

## SUPPLEMENTAL BENEFITS

Per hour worked

J Journeyman Setter	\$ 21.43
J Journeyman Finisher	18.52

## 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

Hour Terms at the following percentage of Journeyman's wage

Setter:	
1st term 0-500 hrs	60%
2nd term 501-1500 hrs	70%
3rd term 1501-2500 hrs	80%
4th term 2501-3500 hrs	85%
5th term 3501-4500 hrs	90%
6th term 4501-6000 hrs	95%

Finisher:

1st term 0-500 hrs	70%
2nd term 501-1500 hrs	80%
3rd term 1501-2500 hrs	90%
4th term 2501-3700 hrs	95%

Supplemental Benefits per hour worked  
07/01/2022

Setter:	
1st term 0-500 hrs	\$ 12.68
2nd term 501-1500 hrs	12.68
3rd term 1501-2500 hrs	17.05
4th term 2501-3500 hrs	17.05
5th term 3501-4500 hrs	19.24
6th term 4501-6000 hrs	21.43

Finisher:	
1st term 0-500 hrs	\$ 11.97
2nd term 501-1500 hrs	11.97
3rd term 1501-2500 hrs	15.24
4th term 2501-3700 hrs	15.24

12-2TS.1

## Mason - Building

11/01/2022

### JOB DESCRIPTION Mason - Building

DISTRICT 12

#### ENTIRE COUNTIES

Albany, Columbia, Fulton, Greene, Hamilton, Montgomery, Rensselaer, Saratoga, Schenectady, Schoharie, Washington

#### PARTIAL COUNTIES

Warren: Only the Townships of Bolton, Lake George, Lake Luzerne, Queensbury, Stony Creek, Thurman & Warrensburg.

#### WAGES

Per hour  
07/01/2022

Bricklayer	\$ 39.54
Cement Mason(Bldg)	39.54
Plasterer/Fireproofing*	39.54
Pointer/Caulker/Cleaner	39.54
Stone Mason	39.54
Acid Brick	40.04

(\*)Fireproofing of Structural only.

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work Schedule,' as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

#### SUPPLEMENTAL BENEFITS

Per hour worked

Journeyman  
\$ 22.63

#### 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.

#### REGISTERED APPRENTICES

Wages per hour

750 hour terms at the following percentage of Journey's wage

1st	2nd	3rd	4th	5th	6th	7th	8th
60%	60%	65%	70%	75%	80%	85%	90%

Supplemental Benefits per hour worked

All Terms	\$ 22.63	12-2b.1
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<b>Mason - Heavy&amp;Highway</b>	<b>11/01/2022</b>
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**JOB DESCRIPTION** Mason - Heavy&Highway**DISTRICT** 12**ENTIRE COUNTIES**

Albany, Cayuga, Clinton, Columbia, Essex, Franklin, Fulton, Greene, Hamilton, Herkimer, Jefferson, Lewis, Madison, Montgomery, Oneida, Oswego, Rensselaer, Saratoga, Schenectady, Schoharie, St. Lawrence, Warren, Washington

**PARTIAL COUNTIES**

Onondaga: For Heavy & Highway Cement Mason or Plaster Work in Onondaga County, refer to Mason-Heavy&Highway tag 1-2h/h on.

**WAGES**

Per hour

07/01/2022

Mason &  
Bricklayer

\$ 40.76

Additional \$1.00 per hour for work on any swing scaffold or staging suspended by means of ropes or cables.

**SUPPLEMENTAL BENEFITS**

Per hour worked

Journeyman

\$ 21.48

**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: If a holiday falls on Sunday, the Monday following shall constitute the day of the legal holiday.

**REGISTERED APPRENTICES**

Wages per hour

750 HR TERMS at the following percent of Journeyman's wage

1st	2nd	3rd	4th	5th	6th	7th	8th
60%	60%	65%	70%	75%	80%	85%	90%

Supplemental Benefits per hour worked

0 to 500 Hours	\$ 12.98
All Other	21.48

12-2hh.1

<b>Millwright</b>	<b>11/01/2022</b>
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**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: 07/01/2022

Millwright - Power Generation	\$ 41.23
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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 he/she is directed to perform certified welding.
- 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) are 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:

Journeyman	\$ 26.72*
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\*NOTE: Subject to OT premium

## OVERTIME PAY

See (B, E, \*E2, Q, V) on OVERTIME PAGE

\*NOTE - Saturday may be used as a make-up day and worked at the straight time rate of pay during a work week when conditions such as weather, power failure, fire, or natural disaster prevent the performance of work on a regular scheduled work day.

## 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 Journeyman'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	1.00
(500' and below)	

## SUPPLEMENTAL BENEFITS per hour:

Appr. 1st year	\$ 11.83
Appr. 2nd year	22.26
Appr. 3rd year	23.74
Appr. 4th year	25.24

6-1163Power

**Millwright**

**11/01/2022**

## JOB DESCRIPTION Millwright

## DISTRICT 2

### ENTIRE COUNTIES

Albany, Chenango, Delaware, Fulton, Montgomery, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie

### WAGES

Per hour: 07/01/2022

Building	\$ 35.84
Heavy & Highway	37.84

NOTE ADDITIONAL PREMIUMS PAID FOR THE FOLLOWING WORK LISTED BELOW (amount subject to any overtime premiums):

- Certified Welders shall receive \$1.75 per hour in addition to the current Millwrights rate provided he/she is directed to perform certified welding.
- For Building work 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) are required, then that employee shall receive a \$1.50 premium per hour for Building work.
- For Heavy & Highway work if the work is performed at a State or Federally designated hazardous waste site where employees are required to wear protective gear, the employees performing the work shall receive an additional \$2.00 per hour over the millwright heavy and highway wage rate for all hours worked on the day protective gear was worn.
- An employee performing the work of a machinist shall receive \$2.00 per hour in addition to the current Millwrights rate. 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.

## SUPPLEMENTAL BENEFITS

Per hour:

Journeyman \$ 25.41

## OVERTIME PAY

See (B, E, \*E2, Q) on OVERTIME PAGE

\*Note - Saturday may be used as a make-up day and worked at the straight time rate of pay during a work week when conditions such as weather, power failure, fire, or natural disaster prevent the performance of work on a regular scheduled work day.

## 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:

(1) year terms at the following percentage of Journeyman's rate.

1st	2nd	3rd	4th
65%	75%	80%	90%

Supplemental Benefits per hour:

Apprentices:

1st term	\$ 11.93
2nd term	21.37
3rd term	22.72
4th term	24.06

2-1163.1

## Operating Engineer - Building

11/01/2022

### JOB DESCRIPTION Operating Engineer - Building

DISTRICT 1

#### ENTIRE COUNTIES

Albany, Clinton, Columbia, Essex, Franklin, Fulton, Greene, Hamilton, Herkimer, Montgomery, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Warren, Washington

#### PARTIAL COUNTIES

Dutchess: Defined as north of the northern boundary line of 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 Route 343 then along Route 343 east to the northern boundary of Town of Dover Plains and east along the northern boundary of Town of Dover Plains to Connecticut.

#### WAGES

CLASS A1:

Crane, hydraulic cranes, tower crane, locomotive crane, piledriver, cableway, derricks, whirlies, dragline, boom trucks over 5 tons.

CLASS A:

Shovel, all Excavators (including rubber tire full swing), Gradalls, power road grader, all CMI equipment, front-end rubber tire loader, tractor-mounted drill (quarry master), mucking machine, concrete central mix plant, concrete pump, belcrete system, automated asphalt concrete plant, and tractor road paver, boom trucks 5 tons and under, maintenance engineer, self-contained crawler drill-hydraulic rock drill.

CLASS B:

Backhoes (rubber tired backhoe/loader combination), bulldozer, pushcat, tractor, traxcavator, scraper, LeTourneau grader, form fine grader, self-propelled soil compactor (fill roller), asphalt roller, blacktop spreader, power brooms, sweepers, trenching machine, Barber Green loader, side booms, hydro hammer, concrete spreader, concrete finishing machine, one drum hoist, power hoisting (single drum), hoist two drum or more, three drum engine, power hoisting (two drum and over), two drum and swinging engine, three drum swinging engine, hod hoist, A-L frame winches, core and well drillers (one drum), post hole digger, model CHB Vibro-Tamp or similar machine, batch bin and plant operator, dinky locomotive, skid steer loader, track excavator 5/8 cubic yard or smaller, front end rubber tired loader under four cubic yards, vacuum machine (mounted or towed).

CLASS C:

Fork lift, high lift, all terrain fork lift: or similar, oiler, fireman and heavy-duty greaser, boilers and steam generators, pump, vibrator, motor mixer, air compressor, dust collector, welding machine, well point, mechanical heater, generators, temporary light plants, electric submersible pumps 4" and over, murphy type diesel generator, conveyor, elevators, concrete mixer, beltcrete power pack (belcrete system), seeding, and mulching machines, pumps.

\* In the event that equipment listed above is operated by robotic control, the classification covering the operation will be the same as if manually operated.

**WAGES per hour**

	07/01/2022
Class # A1	\$ 47.81
Class # A	47.32
Class # B	46.30
Class # C	43.40

Additional \$0.50 per hr for Tower Cranes.

Additional \$1.25 per hr for Cranes with Boom length & jib 150ft. and over.

Additional \$2.25 per hr for Cranes with Boom length & jib 200ft. and over.

Additional \$2.50 per hr over B rate for Nuclear Leader work.

Additional \$0.40 per hr for tunnel or excavation of shaft 40' or more deep.

Additional \$2.50 per hour if work requires Personal Protective Equipment for hazardous waste site activities with a level C or over rating.

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

**NOTE** - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

**SUPPLEMENTAL BENEFITS**

Per hour

07/01/2022

J Journeyman	\$ 30.55
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**OVERTIME PAY**

See (B, E, Q) on OVERTIME PAGE

**HOLIDAY**

Paid:	See (1) on HOLIDAY PAGE
Overtime:	See (5, 6) on HOLIDAY PAGE

Note: If a holiday falls on Sunday, it will be celebrated on Monday. If the holiday falls on Saturday, it will be celebrated on Friday.

Employees who work a designated holiday shall be paid double time plus 8 hours of straight time.

**REGISTERED APPRENTICES**

Wages per hour

1000 hours terms at the following percentage of Journeyperson's wage Class B

1st	2nd	3rd	4th
60%	70%	80%	90%

Supplemental Benefits per hour worked

All terms	\$ 25.85
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1-158 Alb

**Operating Engineer - Heavy&Highway**

**11/01/2022**

**JOB DESCRIPTION** Operating Engineer - Heavy&Highway

**DISTRICT 1**

**ENTIRE COUNTIES**

Albany, Broome, Chenango, Clinton, Columbia, Essex, Franklin, Fulton, Greene, Hamilton, Herkimer, Montgomery, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Tioga, Warren, Washington

**PARTIAL COUNTIES**

Dutchess: Defined as north of the northern boundary line of 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 Route 343 then along Route 343 east to the northern boundary of Town of Dover Plains and east along the northern boundary of Town of Dover Plains to Connecticut.

**WAGES**

CLASSIFICATION 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), Boom truck, GPS operated Bull Dozer, Cableway, Caisson Auger, Central Mix Concrete Plant (Automated), Concrete Curb Machine (Self Propelled, Slipform), Concrete Pump, Crane, Cherry Picker, Derricks (steel erection), Dragline, Overhead Crane (Gantry or Straddle type), Pile Driver, Truck Crane, Directional Drilling Machine, Dredge, Dual Drum Paver, Excavator (All PurposeHydraulically Operated) (Gradall or Similar), Front End Loader (4 cu. yd. and Over), Head Tower (Sauerman or Equal), Hoist (Two or Three Drum), Holland Loader, Maintenance Engineer, Mine Hoist, Mucking Machine or Mole, Pavement Breaker(SP) Wertgen; PB-4 and similar type, Power Grader, Profiler (over 105 H.P.), Quad 9, Quarry Master (or equivalent), Scraper, Shovel, Side Boom, Slip Form Paver (If a second man is needed, he shall be an Oiler), Tractor Drawn BeltType Loader, Truck or Trailer Mounted Log Chipper (Self Feeder), Tug Operator (Manned Rented Equipment Excluded), Tunnel Shovel

**CLASSIFICATION B:**

Backhoe (Tractor Mounted, Rubber Tired), Bituminous Recycler Machine, Bituminous Spreader and Mixer, Blacktop Plant (NonAutomated), Blast or Rotary Drill (Truck or Tractor Mounted), Brokk, Boring Machine, Cage Hoist, Central Mix Plant [(NonAutomated) and All Concrete Batching Plants], Concrete Paver (Over 16S), Crawler Drill (Self-contained), Crusher, Diesel Power Unit, Drill Rigs, Tractor Mounted, Front End Loader (Under 4 cu. yd.), Greaseman/Lubrication Engineer, HiPressure Boiler (15 lbs. and over), Hoist (One Drum), Hydro-Axe, Kolman Plant Loader and Similar Type Loaders (If Employer requires another man to clean the screen or to maintain the equipment, he shall be an Oiler), L.C.M. Work Boat Operator, Locomotive, Material handling knuckle boom, Mini Excavator (under 18,000 lbs.), Mixer (for stabilized base self-propelled), Monorail Machine, Plant Engineer, Prentice Loader, Profiler (105 H.P. and under), Pug Mill, Pump Crete, Ready Mix Concrete Plant, Refrigeration Equipment (for soil stabilization), Road Widener, Roller (all above subgrade), Sea Mule, Self-contained Ride-on Rock Drill(Excluding Air-Track Type Drill), Skidder, Tractor with Dozer and/or Pusher, Trencher, Tugger Hoist, Vacum machine (mounted or towed), Vermeer saw (ride on, any size or type), Welder, Winch, Winch Cat

**CLASSIFICATION C:**

A Frame Winch Hoist on Truck, Articulated Heavy Hauler, Aggregate Plant, Asphalt or Concrete Grooving Machine (ride on), Ballast Regulator(Ride-on), Boiler (used in conjunction with production), Bituminous Heater (self-propelled), Boat (powered), Cement and Bin Operator, Concrete Pavement Spreader and Finisher Concrete Paver or Mixer (16' and under), Concrete Saw (self-propelled), Conveyor, Deck Hand, Directional Drill Machine Locator, Drill (Core and Well), Farm Tractor with accessories, Fine Grade Machine, Fireman, Fork Lift, Form Tamper, Grout Pump, Gunite Machine, Hammers (Hydraulic self-propelled), Hydra-Spiker (ride-on), Hydraulic Pump (jacking system), Hydro-Blaster (Water), Mulching Machine, Oiler, Parapet Concrete or Pavement Grinder, Post Hole Digger and Post Driver, Power Broom (towed), Power Heaterman, Power Sweeper, Revinius Widener, Roller (Grade and Fill), Scarifier (ride-on), Shell Winder, Skid steer loader (Bobcat or similar), Span-Saw (ride-on), Steam Cleaner, Tamper (ride-on), Tie Extractor (ride-on), Tie Handler (ride-on), Tie Inserter (ride-on), Tie Spacer (ride-on), Tire Repair, Track Liner (ride-on), Tractor, Tractor (with towed accessories), Vibratory Compactor, Vibro Tamp, Well Point, and the following hands-off equipment: Compressors, Dust Collectors, Generators, Pumps, Welding Machines, Light Plants and Heaters

- Note for all above classifications of Operating Engineer - In the event that equipment listed above is operated by robotic control, the classification covering the operation will be the same as if manually operated.

**WAGES per hour**

07/01/2022

Master Mechanic	\$ 51.03
Class A*	49.42
Class B	48.51
Class C	45.94

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.

Additional \$2.50 per hr. for hazardous waste removal work on State and/or Federally designated waste site which require employees to wear Level C or above forms of personal protection.

(\*) Premiums for CRANES is based upon Class A rates with the following premiums:

- Additional \$4.00 per hr for Tower Cranes, including self erecting.
- Additional \$3.00 per hr for Lattice Boom Cranes and all other cranes with a manufacturers rating of fifty (50) tons and over.
- Additional \$2.00 per hr for all Hydraulic Cranes and Derricks with a manufacturer's rating of 49 ton and below, including boom trucks.

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

**SUPPLEMENTAL BENEFITS**

Per hour

Journeyperson \$ 30.75

**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. If the Holiday falls on a Saturday employer can choose to celebrate Saturday or give Friday off with pay.

**REGISTERED APPRENTICES**

Wages per hour

1000 hours terms at the following percentage of Journeyperson's wage Class B

1st	2nd	3rd	4th
60%	70%	80%	90%

Supplemental Benefits per hour worked

All Terms	\$ 26.15
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1-158H/H Alb

**Operating Engineer - Survey Crew**

**11/01/2022**

**JOB DESCRIPTION** Operating Engineer - Survey Crew

**DISTRICT** 12

**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: The northern portion of the county from the northern boundary line of the City of Poughkeepsie, north.

Genesee: Only the portion of the county that lies east of a line down the center of Route 98 to include all area that lies within the City of Batavia.

**WAGES**

These rates apply to Building, Tunnel and Heavy Highway.

Per hour:

SURVEY CLASSIFICATIONS:

Party Chief - One who directs a survey party.

Instrument Person - One who operates the surveying instruments.

Rod Person - One who holds the rods and assists the Instrument Person.

07/01/2022

Party Chief	\$ 47.37
Instrument Person	43.51
Rod Person	32.26

Additional \$3.00/hr. for Tunnel Work

Additional \$2.50/hr. for Hazardous Work Site

**SUPPLEMENTAL BENEFITS**

Per hour worked:

Journeyman	\$ 28.05
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**OVERTIME PAY**

See (B, E, P, \*X) on OVERTIME PAGE

\*Note: \$24.10/Hr. Only for "ALL" premium hours paid when worked.

**HOLIDAY**

Paid: See (5, 6) on HOLIDAY PAGE  
Overtime: See (5, 6) on HOLIDAY PAGE

**REGISTERED APPRENTICES**

WAGES: 1000 hour terms based on the Percentage of Rod Persons Wage:

07/01/2022

0-1000	60%
1001-2000	70%
2001-3000	80%

SUPPLEMENTAL BENEFIT per hour worked:

0-1000	\$ 19.83 / PHP \$17.03
1001-2000	\$ 22.85 / " 19.45
2001-3000	\$ 25.88 / " 21.93

NOTE: PHP is premium hours paid when worked.

12-158-545 D.H.H.

**Operating Engineer - Survey Crew - Consulting Engineer**

**11/01/2022**

**JOB DESCRIPTION** Operating Engineer - Survey Crew - Consulting Engineer

**DISTRICT 12**

**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: The northern portion of the county from the northern boundary line of the City of Poughkeepsie, north.

Genesee: Only the portion of the county that lies east of a line down the center of Route 98 to include all area that lies within the City of Batavia.

**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.

Instrument Person - One who operates the surveying instruments.

Rod Person - One who holds the rods and assists the Instrument Person.

07/01/2022

Party Chief	\$ 47.37
Instrument Person	43.51
Rod Person	32.26

Additional \$3.00/hr. for Tunnel Work.

Additional \$2.50/hr. for EPA or DEC certified toxic or hazardous waste work.

**SUPPLEMENTAL BENEFITS**

Per hour worked:

J Journeyman	\$ 28.05
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**OVERTIME PAY**

See (B, E, Q, \*X) on OVERTIME PAGE

\*Note: \$24.10/Hr. Only for "ALL" premium hours paid when worked.

**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 Rod Persons Wage:

07/01/2022

0-1000	60%
1001-2000	70%
2001-3000	80%

SUPPLEMENTAL BENEFIT per hour worked:

0-1000	\$ 19.83 / PHP \$17.03
1001-2000	\$ 22.85 / " 19.45
2001-3000	\$ 25.88 / " 21.93

NOTE: PHP is premium hours paid when worked.

12-158-545 DCE

## Operating Engineer - Tunnel

11/01/2022

### 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 (topside); 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); Scarifer (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: 07/01/2022

Master Mechanic	\$ 52.60
CLASS A	50.19
CLASS B	48.97
CLASS C	46.18
CLASS D	43.17

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. Fringe benefits will be paid at the hourly wage premium.

#### CRANES:

Crane 1: All cranes, including self-erecting to be paid \$4.00 per hour over the Class A rate.

Crane 2: All Lattice Boom Cranes and all cranes with a manufacturer's rating of fifty (50) ton and over to be paid \$3.00 per hour over Class A rate.

Crane 3: All hydraulic cranes and derricks with a manufacturer's rating of forty nine (49) ton and below, including boom trucks, to be paid \$2.00 per hour over Class A rate.

Crane 1	\$ 54.19
Crane 2	53.19
Crane 3	52.19

#### SUPPLEMENTAL BENEFITS

Per hour:

\$ 23.70  
+ 9.35\*

\* This portion of benefits subject to same premium rate 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  
If a holiday falls on Sunday, it shall be observed on Monday.

#### REGISTERED APPRENTICES

WAGES:(1000) hours terms at the following percentage of Journeyman's Class B wage.

1st term	60%
2nd term	65%
3rd term	70%
4th term	75%

SUPPLEMENTAL BENEFITS per hour: Same as Journeyman

7-158-832TL.

## Painter

11/01/2022

#### JOB DESCRIPTION Painter

DISTRICT 1

#### ENTIRE COUNTIES

Albany, Clinton, Essex, Franklin, Fulton, Hamilton, Montgomery, Rensselaer, Saratoga, Schenectady, Schoharie, Warren, Washington

#### WAGES

Per hour

	07/01/2022	05/01/2023
Painter\Wallcovers	\$ 30.79**	Additional \$ 1.50
Drywall Finishers	30.79**	
Spray Rate	30.79**	
Structural Steel*	31.79**	
Lead Abatement	31.79**	
Lead Abatement on Structural Steel	32.79**	

(\*)Employees working on objects with the use of swing stage, boatswain chair, pick and cables only will be paid at Structural Steel rate.  
(\*\*) Plus Additional \$1.00 per hour not subject to Overtime/Premiums

#### Bridge Painter

See Bridge Painter rates for the following work:

All Bridges and Tanks

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

#### SUPPLEMENTAL BENEFITS

Per hour

Journeyperson	\$ 18.95
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#### OVERTIME PAY

See (B, E2, H) on OVERTIME PAGE



See (B, F, R) on OVERTIME PAGE

#### HOLIDAY

Paid: See (1) on HOLIDAY PAGE  
Overtime: See (4, 6) on HOLIDAY PAGE

#### REGISTERED APPRENTICES

Wage - Per hour:

Apprentices: (1) year terms

1st year	\$ 21.20 + 3.86	\$ 21.80 + 4.04
2nd year	\$ 31.80 + 5.78	\$ 32.70 + 6.06
3rd year	\$ 42.40 + 7.70	\$ 43.60 + 8.08

Supplemental Benefits - Per hour:

1st year	\$ .25 + 12.24	\$ .25 + 12.34
2nd year	\$ 10.90 + 18.36	\$ 10.90 + 18.51
3rd year	\$ 10.90 + 24.48	\$ 10.90 + 24.68

NOTE: All premium wages are to be calculated on base rate per hour only.

8-DC-9/806/155-BrSS

#### Painter - Line Striping

11/01/2022

#### JOB DESCRIPTION Painter - Line Striping

DISTRICT 8

#### ENTIRE COUNTIES

Albany, Clinton, Columbia, Dutchess, Essex, Franklin, Fulton, Greene, Hamilton, Montgomery, Nassau, Orange, Putnam, Rensselaer, Rockland, Saratoga, Schenectady, Schoharie, Suffolk, Sullivan, Ulster, Warren, Washington, Westchester

#### WAGES

Per hour:

Painter (Striping-Highway): 07/01/2022  
Striping-Machine Operator\* \$ 31.53

Lineman Thermoplastic 38.34

Note: \* Includes but is not limited to: Positioning of cones and directing of traffic using hand held devices. Excludes the Driver/Operator of equipment used in the maintenance and protection of traffic safety.

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work Schedule,' as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

#### SUPPLEMENTAL BENEFITS

Per hour paid:

Journeyworker:

Striping Machine Operator: \$ 10.03  
Lineman Thermoplastic: 10.03

#### OVERTIME PAY

See (B, B2, E2, F, S) on OVERTIME PAGE

#### HOLIDAY

Paid: See (5, 20) on HOLIDAY PAGE  
Overtime: See (5, 20) on HOLIDAY PAGE

#### REGISTERED APPRENTICES

One (1) year terms at the following wage rates:

1st Term:	\$ 15.00
2nd Term:	18.92
3rd Term:	25.22

Supplemental Benefits per hour:

1st term:	\$ 9.16
2nd Term:	10.03
3rd Term:	10.03

8-1456-LS

### **Painter - Metal Polisher**

**11/01/2022**

#### **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**

	07/01/2022
Metal Polisher	\$ 37.78
Metal Polisher*	38.80
Metal Polisher**	41.78

\*Note: Applies on New Construction & complete renovation

\*\* Note: Applies when working on scaffolds over 34 feet.

#### **SUPPLEMENTAL BENEFITS**

Per Hour:	07/01/2022
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Journeyworker:

All classification	\$ 11.24
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#### **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, 9, 11, 15, 16, 25, 26) on HOLIDAY PAGE

#### **REGISTERED APPRENTICES**

Wages per hour:

One (1) year term at the following wage rates:

07/01/2022

1st year	\$ 16.00
2nd year	17.00
3rd year	18.00
1st year*	\$ 16.39
2nd year*	17.44
3rd year*	18.54
1st year**	\$ 18.50
2nd year**	19.50
3rd year**	20.50

\*Note: Applies on New Construction & complete renovation

\*\* Note: Applies when working on scaffolds over 34 feet.

Supplemental benefits:

Per hour:

1st year	\$ 7.99
2nd year	7.99
3rd year	7.99

8-8A/28A-MP

**Plumber****11/01/2022****JOB DESCRIPTION** Plumber**DISTRICT 1****ENTIRE COUNTIES**

Albany, Columbia, Fulton, Greene, Montgomery, Rensselaer, Schenectady, Schoharie

**PARTIAL COUNTIES**

Hamilton: Only the Towns of Arietta, Benson, Hope, Inlet, Lake Pleasant, Morehouse and Wells.

Saratoga: Only the Towns of Charlton, Clifton Park, Galway, Halfmoon, Milton, Stillwater and Waterford and the city of Mechanicville.

**WAGES**

Per hour:

07/01/2022                    05/01/2023  
                                    Additional

Plumber:

Pipefitter, Steamfitter        \$ 48.30                    \$ 2.80

**SUPPLEMENTAL BENEFITS**

Per hour

Journeyman                    \$ 27.74

**OVERTIME PAY**

See (B1, Q) on OVERTIME PAGE

**HOLIDAY**Paid:                            See (1) on HOLIDAY PAGE  
Overtime:                     See (5, 6) on HOLIDAY PAGE

Note: Whenever a Holiday falls on Saturday, the preceding day, Friday, shall be observed as the Holiday. If a Holiday falls on a Sunday, the following day, Monday shall be observed as the Holiday.

**REGISTERED APPRENTICES**

Wages per hour

One year terms at the following percentage of Journeyperson's wage.

1st                            2nd                            3rd                            4th                            5th  
\$ 22.01                    \$ 26.79                    \$ 31.57                    \$ 36.35                    \$ 43.52

Supplemental Benefits per hour:

Apprentices Indentured on or before April 30, 2019

All Terms                    \$ 27.74

Apprentices Indentured on or after May 1st, 2019

Terms 1-4                    22.54  
Terms 5                            27.74

1-7-SF

**Roofing****11/01/2022****JOB DESCRIPTION** Roofing**DISTRICT 1****ENTIRE COUNTIES**

Albany, Clinton, Columbia, Essex, Fulton, Greene, Hamilton, Montgomery, Rensselaer, Saratoga, Schenectady, Warren, Washington

**WAGES**

Per hour

07/01/2022                    07/01/2023  
                                    Additional

Roofing/Waterproofer        \$ 33.55                    \$ 2.50

Asphalt Cold Process        34.05

Fluid Applied Roof            34.05

Pitch &amp; Asbestos            35.55

Shift Work:

On government mandated shift work starting after 12:00pm and before 4:00am workers shall be paid \$4.00 additional per hour

**SUPPLEMENTAL BENEFITS**

Per hour

Journeyman                    \$ 22.02

## 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 any Holiday falls on Saturday, the Friday before such Holiday shall be recognized as the legal Holiday. When a Holiday falls on Sunday, it shall be observed the following Monday.

## REGISTERED APPRENTICES

Wages per hour

Apprentice terms at the following per cent of the Roofer/Waterproofer rate. For Pitch & Asbestos work, an additional \$2.00 must be paid in wages. For Asphalt Cold Process work and Fluid Applied Roof coating, an additional \$0.50 must be paid in the wages.

1st Term 58% + \$3.00  
1500 hrs.

2nd Term 74% + \$3.00  
1 yr. and 1500 hrs. as 1st term.

3rd Term 90%  
1 yr. and 1500 hrs. as 2nd term.

3rd Term complete at 1 yr and 1050 hrs. as 3rd term

Supplemental Benefits per hour worked

1st Term	\$ 17.44
2nd Term	17.87
3rd Term	21.35

1-241

## Sheetmetal Worker

11/01/2022

### JOB DESCRIPTION Sheetmetal Worker

DISTRICT 1

### ENTIRE COUNTIES

Albany, Clinton, Columbia, Essex, Franklin, Fulton, Greene, Hamilton, Montgomery, Rensselaer, Saratoga, Schenectady, Schoharie, Warren, Washington

### WAGES

Per hour

	07/01/2022	06/01/2023
		Additional
Sheetmetal Worker	\$ 36.50	\$ 2.45

All work requiring HAZWOPER Training additional \$1.00 per hour

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.  
NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

### SUPPLEMENTAL BENEFITS

Per hour

Journeyman \$ 35.73

## OVERTIME PAY

See ( B,E,E5,Q ) on OVERTIME PAGE

## HOLIDAY

Paid: See (1) on HOLIDAY PAGE  
Overtime: See (5, 6) on HOLIDAY PAGE

When any holiday falls on Saturday, the Friday before such holiday shall be recognized as the legal holiday. Any holiday falling on Sunday, the following Monday shall be recognized as the legal holiday.

## REGISTERED APPRENTICES

Wages per hour

6 Month Terms at the following rate:

1st term	\$ 20.27
2nd term	21.97
3rd term	22.83
4th term	23.68
5th term	22.40
6th term	23.51
7th term	25.37
8th term	27.22
9th term	29.08
10th term	30.93

Supplemental Benefits per hour

1st term	\$ 22.06
2nd term	22.67
3rd term	22.98
4th term	23.42
5th term	30.01
6th term	30.46
7th term	31.21
8th term	31.97
9th term	32.72
10th term	33.47

1-83

## Sprinkler Fitter

11/01/2022

### JOB DESCRIPTION Sprinkler Fitter

DISTRICT 1

### ENTIRE COUNTIES

Albany, Rensselaer, Saratoga, Schenectady, Warren

### WAGES

Per hour 07/01/2022

Sprinkler \$ 40.81  
Fitter

### SUPPLEMENTAL BENEFITS

Per hour

Journeyperson \$ 25.91

### OVERTIME PAY

See (B, H) 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

Wages per hour

One Half Year terms at the following wage.

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
\$ 18.70	\$ 20.78	\$ 22.61	\$ 24.69	\$ 26.76	\$ 28.84	\$ 30.92	\$ 33.00	\$ 35.08	\$ 37.15

Supplemental Benefits per hour

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
\$ 8.37	\$ 8.37	\$ 19.76	\$ 19.76	\$ 20.01	\$ 20.01	\$ 20.01	\$ 20.01	\$ 20.01	\$ 20.01

1-669-3

## Teamster - Building

11/01/2022

### JOB DESCRIPTION Teamster - Building

DISTRICT 1

### ENTIRE COUNTIES

Albany, Columbia, Fulton, Greene, Montgomery, Rensselaer, Saratoga, Schenectady, Schoharie, Washington

## PARTIAL COUNTIES

Warren: Only the Townships of Bolton, Warrensburg, Thurman, Stony Creek, Lake George, Lake Luzerne and Queensbury.

## WAGES

### GROUP # A:

Straight trucks, winch, transit mix on the site, road oilers, dump trucks, pick-ups, panel, water trucks, fuel trucks on the site (including nozzle).

### GROUP # B:

Low boy or Low boy trailer, Euclids or similar equipment.

## WAGES per hour

07/01/2022

Group A	\$ 29.02
Group B	29.32

## SUPPLEMENTAL BENEFITS

Per hour 07/01/2022

Journeyperson	\$ 27.54
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## 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.

1-294

## Teamster - Heavy&Highway

11/01/2022

## JOB DESCRIPTION Teamster - Heavy&Highway

## DISTRICT 1

## ENTIRE COUNTIES

Albany, Columbia, Fulton, Greene, Hamilton, Herkimer, Montgomery, Oneida, Rensselaer, Saratoga, Schenectady, Schoharie, Washington

## PARTIAL COUNTIES

Chenango: Entire county except the Townships of Afton, Bainbridge, Coventry, Greene, Guilford, Oxford and Smithville.

Lewis: Only the Township of Grieg, Lewis, Leyden, Lowville, Lyonsdale, Martinsburg, Turin, West Turin and Watson.

Madison: Only the Townships of Brookfield, Eaton, Hamilton, Lebanon, Lincoln, Madison, Smithfield, Stockbridge and the City of Oneida

Otsego: Entire county EXCEPT Townships of Butternuts, Laurens, Maryland, Milford, Morris, Oneonta, Otego, Unidilla and Worcester.

Warren: Only the Townships of Bolton, Warrensburg, Thurman, Stony Creek, Luzerne, Caldwell (Lake George), and Queensbury.

## WAGES

### GROUP #1:

Warehousemen, Yardmen, Truck Helpers, Pickups, Panel Trucks, Flatboy Material Trucks(straight jobs), Single Axel Dump Trucks, Dumpsters, Material Checkers and Receivers, Greasers, Truck Tiremen, Mechanics Helpers and Parts Chasers.

### GROUP #2:

Tandems and Batch Trucks, Mechanics, Dispatcher.

### GROUP #3:

Semi-Trailers, Low-boy Trucks, Asphalt Distributor Trucks, and Agitator, Mixer Trucks and dumpcrete type vehicles, Truck Mechanic, Fuel Trucks.

### GROUP #4:

Specialized Earth Moving Equipment, Euclid type, or similar off-highway, where not self-loading, Straddle (Ross) Carrier, and self-contained concrete mobile truck.

### GROUP #5:

Off-highway Tandem Back-Dump, Twin Engine Equipment and Double-Hitched Equipment where not self-loading.

## WAGES per hour 07/01/2022 07/01/2023

Group #1	\$ 34.90	\$ 37.59
Group #2	34.96	37.65
Group #3	35.05	37.74
Group #4	35.18	37.87
Group #5	35.34	38.03

Hazardous waste projects that require a Level C or greater protection shall be paid an additional \$ 1.00 per hour.  
All employees who work a single irregular work shift starting between 5pm and 1 am on governmental mandated night shifts shall be paid an additional \$1.50 per hour.  
For work bid on or after April 1, 1995, there shall be a 12 month carryover of the last posted rate in effect at the time of the bid.

**\*\* IMPORTANT NOTICE - EFFECTIVE 04/01/2009 \*\***

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Friday.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

**SUPPLEMENTAL BENEFITS**

Per hour:

\$ 27.32	\$ 28.13
+\$1.00 per*	+\$1.00 per*
hour worked	hour worked

(\*) not applicable to paid holidays

**OVERTIME PAY**

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

**HOLIDAY**

Paid: See (5, 6) on HOLIDAY PAGE  
Overtime: See (5, 6) on HOLIDAY PAGE

1-294h/h

**Welder**

**11/01/2022**

**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 07/01/2022

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
- ( 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 ) Saturday and 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 Department of Labor - Bureau of Public Work  
State Office Building Campus  
Building 12 - Room 130  
Albany, New York 12240

**REQUEST FOR WAGE AND SUPPLEMENT INFORMATION**

As Required by Articles 8 and 9 of the NYS Labor Law

Fax (518) 485-1870 or mail this form for new schedules or for determination for additional occupations.

**This Form Must Be Typed**

Submitted By:

(Check Only One)

Contracting Agency

Architect or Engineering Firm

Public Work District Office

Date:

**A. Public Work Contract to be let by:** (Enter Data Pertaining to Contracting/Public Agency)

1. Name and complete address  (Check if new or change)

2. NY State Units (see Item 5)

- 01 DOT
- 02 OGS
- 03 Dormitory Authority
- 04 State University Construction Fund
- 05 Mental Hygiene Facilities Corp.
- 06 OTHER N.Y. STATE UNIT
- 07 City
- 08 Local School District
- 09 Special Local District, i.e., Fire, Sewer, Water District
- 10 Village
- 11 Town
- 12 County
- 13 Other Non-N.Y. State (Describe)

Telephone: ( )

Fax: ( )

E-Mail:

3. SEND REPLY TO  (check if new or change)

Name and complete address:

4. SERVICE REQUIRED. Check appropriate box and provide project information.

New Schedule of Wages and Supplements.

APPROXIMATE BID DATE :

Additional Occupation and/or Redetermination

Telephone: ( )

Fax: ( )

E-Mail:

PRC NUMBER ISSUED PREVIOUSLY FOR THIS PROJECT :

OFFICE USE ONLY

**B. PROJECT PARTICULARS**

5. Project Title \_\_\_\_\_

6. Location of Project:

Location on Site \_\_\_\_\_

Route No/Street Address \_\_\_\_\_

Village or City \_\_\_\_\_

Town \_\_\_\_\_

County \_\_\_\_\_

Description of Work \_\_\_\_\_

Contract Identification Number \_\_\_\_\_

Note: For NYS units, the OSC Contract No. \_\_\_\_\_

7. Nature of Project - Check One:

- 1. New Building
- 2. Addition to Existing Structure
- 3. Heavy and Highway Construction (New and Repair)
- 4. New Sewer or Waterline
- 5. Other New Construction (Explain) \_\_\_\_\_
- 6. Other Reconstruction, Maintenance, Repair or Alteration
- 7. Demolition
- 8. Building Service Contract

8. OCCUPATION FOR PROJECT :

- Construction (Building, Heavy Highway/Sewer/Water)
- Tunnel
- Residential
- Landscape Maintenance
- Elevator maintenance
- Exterminators, Fumigators
- Fire Safety Director, NYC Only
- Guards, Watchmen
- Janitors, Porters, Cleaners, Elevator Operators
- Moving furniture and equipment
- Trash and refuse removal
- Window cleaners
- Other (Describe) \_\_\_\_\_

9. Has this project been reviewed for compliance with the Wicks Law involving separate bidding? YES  NO

10. Name and Title of Requester

Signature





NEW YORK STATE DEPARTMENT OF LABOR  
Bureau of Public Work - Debarment List

**LIST OF EMPLOYERS INELIGIBLE TO BID ON OR BE  
AWARDED ANY PUBLIC WORK CONTRACT**

Under Article 8 and Article 9 of the NYS Labor Law, a contractor, sub-contractor and/or its successor shall be debarred and ineligible to submit a bid on or be awarded any public work or public building service contract/sub-contract with the state, any municipal corporation or public body for a period of five (5) years from the date of debarment when:

- Two (2) final determinations have been rendered within any consecutive six-year (6) period determining that such contractor, sub-contractor and/or its successor has **WILLFULLY** failed to pay the prevailing wage and/or supplements;
- One (1) final determination involves falsification of payroll records or the kickback of wages and/or supplements.

The agency issuing the determination and providing the information, is denoted under the heading 'Fiscal Officer'. DOL = New York State Department of Labor; NYC = New York City Comptroller's Office; AG = New York State Attorney General's Office; DA = County District Attorney's Office.

**Debarment Database:** To search for contractors, sub-contractors and/or their successors debarred from bidding or being awarded any public work contract or subcontract under NYS Labor Law Articles 8 and 9, or under NYS Workers' Compensation Law Section 141-b, access the database at this link: <https://applications.labor.ny.gov/EDList/searchPage.do>

**For inquiries where WCB is listed as the "Agency", please call 1-866-546-9322**



**NYSDOL Bureau of Public Work Debarment List    11/15/2022**

**Article 8**

AGENCY	Fiscal Officer	FEIN	EMPLOYER NAME	EMPLOYER DBA NAME	ADDRESS	DEBARMENT START DATE	DEBARMENT END DATE
DOL	DOL	*****5754	0369 CONTRACTORS, LLC		515 WEST AVE UNIT PH 13NORWALK CT 06850	05/12/2021	05/12/2026
DOL	DOL	*****4018	ADIRONDACK BUILDING RESTORATION INC.		4156 WILSON ROAD EAST TABERG NY 13471	03/26/2019	03/26/2024
DOL	AG	*****1812	ADVANCED BUILDERS & LAND DEVELOPMENT, INC.		400 OSER AVE #2300HAUPPAUGE NY 11788	09/11/2019	09/11/2024
DOL	DOL	*****1687	ADVANCED SAFETY SPRINKLER INC		261 MILL ROAD P.O BOX 296EAST AURORA NY 14052	05/29/2019	05/29/2024
DOL	NYC	*****6775	ADVENTURE MASONRY CORP.		1535 RICHMOND AVENUE STATEN ISLAND NY 10314	12/13/2017	12/13/2022
DOL	NYC		AGOSTINHO TOME		405 BARRETT ST BRONX NY 10474	05/31/2018	05/31/2023
DOL	NYC		AMJED PARVEZ		401 HANOVER AVENUE STATEN ISLAND NY 10304	01/11/2021	01/11/2026
DOL	DOL		ANGELO F COKER		2610 SOUTH SALINA STREET SUITE 14SYRACUSE NY 13205	09/17/2020	09/17/2025
DOL	DOL		ANGELO F COKER		2610 SOUTH SALINA STREET SUITE 14SYRACUSE NY 13205	12/04/2018	12/04/2023
DOL	DOL		ANGELO GARCIA		515 WEST AVE UNIT PH 13NORWALK CT 06850	05/12/2021	05/12/2026
DOL	DOL		ANGELO TONDO		449 WEST MOMBSHA ROAD MONROE NY 10950	06/06/2022	06/06/2027
DOL	DOL		ANITA SALERNO		158 SOLAR ST SYRACUSE NY 13204	01/07/2019	01/07/2024
DOL	DOL		ANTONIO ESTIVEZ		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	NYC		ARADCO CONSTRUCTION CORP		115-46 132RD ST SOUTH OZONE PARK NY 11420	09/17/2020	09/17/2025
DOL	DOL		ARNOLD A. PAOLINI		1250 BROADWAY ST BUFFALO NY 14212	02/03/2020	02/03/2025
DOL	NYC		ARSHAD MEHMOOD		168-42 88TH AVENUE JAMAICA NY 11432	11/20/2019	11/20/2024
DOL	NYC	*****2591	AVI 212 INC.		260 CROPSEY AVENUE APT 11GBROOKLYN NY 11214	10/30/2018	10/30/2023
DOL	NYC		AVM CONSTRUCTION CORP		117-72 123RD ST SOUTH OZONE PARK NY 11420	09/17/2020	09/17/2025
DOL	NYC		AZIDABEGUM		524 MCDONALD AVENUE BROOKLYN NY 11218	09/17/2020	09/17/2025
DOL	DOL	*****8421	B & B DRYWALL, INC		206 WARREN AVE APT 1WHITE PLAINS NY 10603	12/14/2021	12/14/2026
DOL	NYC		BALWINDER SINGH		421 HUDSON ST SUITE C5NEW YORK NY 10014	02/20/2019	02/20/2024
DOL	NYC	*****8416	BEAM CONSTRUCTION, INC.		50 MAIN ST WHITE PLAINS NY 10606	01/04/2019	01/04/2024
DOL	DOL		BERNARD BEGLEY		38 LONG RIDGE ROAD BEDFORD NY 10506	12/18/2019	12/18/2024
DOL	NYC	*****2113	BHW CONTRACTING, INC.		401 HANOVER AVENUE STATEN ISLAND NY 10304	01/11/2021	01/11/2026
DOL	DOL		BIAGIO CANTISANI			06/12/2018	06/12/2023
DOL	DOL	*****3627	BJB CONSTRUCTION CORP.		38 LONG RIDGE ROAD BEDFORD NY 10506	12/18/2019	12/18/2024
DOL	DOL	*****4512	BOB BRUNO EXCAVATING, INC		5 MORNINGSIDER DR AUBURN NY 13021	05/28/2019	05/28/2024
DOL	DOL		BOGDAN MARKOVSKI		370 W. PLEASANTVIEW AVE SUITE 2.329HACKENSACK NJ 07601	02/11/2019	02/11/2024
DOL	DOL		BRADLEY J SCHUKA		4 BROTHERS ROAD WAPPINGERS FALLS NY 12590	10/20/2020	10/20/2025
DOL	DOL		BRUCE P. NASH JR.		5841 BUTTERNUT ROAD EAST SYRACUSE NY 13057	09/12/2018	09/12/2023
DOL	DOL	*****0225	C&D LAFACE CONSTRUCTION, INC.		8531 OSWEGO RD BALDWINSVILLE NY 13027	02/03/2020	01/09/2023
DOL	DOL	*****9383	C.C. PAVING AND EXCAVATING, INC.		2610 SOUTH SALINA ST SUITE 12SYRACUSE NY 13205	09/17/2020	09/17/2025
DOL	DOL	*****9383	C.C. PAVING AND EXCAVATING, INC.		2610 SOUTH SALINA ST SUITE 12SYRACUSE NY 13205	12/04/2018	12/04/2023
DOL	DOL	*****4083	C.P.D. ENTERPRISES, INC		P.O BOX 281 WALDEN NY 12586	03/03/2020	03/03/2025

**NYSDOL Bureau of Public Work Debarment List 11/15/2022**

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DOL	DOL	*****5161	CALADRI DEVELOPMENT CORP.		1223 PARK ST. PEEKSKILL NY 10566	05/17/2021	05/17/2026
DOL	DOL	*****3391	CALI ENTERPRISES, INC.		1223 PARK STREET PEEKSKILL NY 10566	05/17/2021	05/17/2026
DOL	NYC		CALVIN WALTERS		465 EAST THIRD ST MT. VERNON NY 10550	09/09/2019	09/09/2024
DOL	DOL		CANTISANI & ASSOCIATES LTD		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		CANTISANI HOLDING LLC			06/12/2018	06/12/2023
DOL	DOL		CARMEN RACHETTA		8531 OSWEGO RD BALDWINSVILLE NY 13027	02/03/2020	02/03/2025
DOL	DOL		CARMENA RACHETTA		8531 OSWEGO ROAD BALDWINSVILLE NY 13027	02/03/2020	01/09/2023
DOL	DOL	*****3812	CARMODY "2" INC			06/12/2018	06/12/2023
DOL	DOL	*****1143	CARMODY BUILDING CORP	CARMODY CONTRACTING AND CARMODY CONTRACTING CORP.	442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		CARMODY CONCRETE CORPORATION			06/12/2018	06/12/2023
DOL	DOL		CARMODY ENTERPRISES, LTD.		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		CARMODY INC		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL	*****3812	CARMODY INDUSTRIES INC			06/12/2018	06/12/2023
DOL	DOL		CARMODY MAINTENANCE CORPORATION		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		CARMODY MASONRY CORP		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	AG	*****7247	CENTURY CONCRETE CORP		2375 RAYNOR ST RONKONKOMA NY 11779	08/04/2021	08/04/2026
DOL	AG		CESAR J. AGUDELO		81-06 34TH AVENUE APT. 6E JACKSON HEIGHTS NY 11372	02/07/2018	02/07/2023
DOL	DOL	*****0026	CHANTICLEER CONSTRUCTION LLC		4 BROTHERS ROAD WAPPINGERS FALLS NY 12590	10/20/2020	10/20/2025
DOL	NYC		CHARLES ZAHRADKA		863 WASHINGTON STREET FRANKLIN SQUARE NY 11010	03/10/2020	03/10/2025
DOL	DOL		CHRISTOPHER GRECO		26 NORTH MYRTLE AVENUE SPRING VALLEY NY 10956	02/18/2021	02/18/2026
DOL	DOL		CHRISTOPHER J MAINI		19 CAITLIN AVE JAMESTOWN NY 14701	09/17/2018	09/17/2023
DOL	DOL		CHRISTOPHER PAPASTEFANOU A/K/A CHRIS PAPASTEFANOU		1445 COMMERCE AVE BRONX NY 10461	05/30/2019	05/30/2024
DOL	DOL	*****1927	CONSTRUCTION PARTS WAREHOUSE, INC.	CPW	5841 BUTTERNUT ROAD EAST SYRACUSE NY 13057	09/12/2018	09/12/2023
DOL	DOL	*****3228	CROSS-COUNTY LANDSCAPING AND TREE SERVICE, INC.	ROCKLAND TREE SERVICE	26 NORTH MYRTLE AVENUE SPRING VALLEY NY 10956	02/18/2021	02/18/2026
DOL	DOL	*****2524	CSI ELECTRICAL & MECHANICAL INC		42-32 235TH ST DOUGLASTON NY 11363	01/14/2019	01/14/2024
DOL	DOL	*****7619	DANCO CONSTRUCTION UNLIMITED INC.		485 RAFT AVENUE HOLBROOK NY 11741	10/19/2021	10/19/2026
DOL	DOL		DARIAN L COKER		2610 SOUTH SALINA ST SUITE 2CSYRACUSE NY 13205	09/17/2020	09/17/2025
DOL	DOL		DARIAN L COKER		2610 SOUTH SALINA ST SUITE 2CSYRACUSE NY 13205	12/04/2018	12/04/2023
DOL	NYC		DAVID WEINER		14 NEW DROP LANE 2ND FLOORSTATEN ISLAND NY 10306	11/14/2019	11/14/2024
DOL	AG		DEBRA MARTINEZ		31 BAY ST BROOKLYN NY 11231	03/28/2018	03/28/2023
DOL	DOL		DELPHI PAINTING & DECORATING CO INC		1445 COMMERCE AVE BRONX NY 10461	05/30/2019	05/30/2024
DOL	DOL		DOMENICO LAFACE		8531 OSWEGO RD BALDWINSVILLE NY 13027	02/03/2020	01/09/2023
DOL	DOL	*****5175	EAGLE MECHANICAL AND GENERAL CONSTRUCTION LLC		11371 RIDGE RD WOLCOTT NY 14590	02/03/2020	02/03/2025

**NYSDOL Bureau of Public Work Debarment List    11/15/2022**

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DOL	DOL		EAST COAST PAVING		2238 BAKER RD GILLETT PA 16923	03/12/2018	03/12/2023
DOL	AG		EDWIN HUTZLER		23 NORTH HOWELLS RD BELLPORT NY 11713	08/04/2021	08/04/2026
DOL	DA		EDWIN HUTZLER		2375 RAYNOR STREET RONKONKOMA NY 11779	08/04/2021	08/04/2026
DOL	DOL	*****0780	EMES HEATING & PLUMBING CONTR		5 EMES LANE MONSEY NY 10952	01/20/2002	01/20/3002
DOL	NYC	*****5917	EPOCH ELECTRICAL, INC		97-18 50TH AVE CORONA NY 11368	04/19/2018	04/19/2024
DOL	DOL		FAIGY LOWINGER		11 MOUNTAIN RD 28 VAN BUREN DRMONROE NY 10950	03/20/2019	03/20/2024
DOL	DOL		FRANK BENEDETTO		19 CATLIN AVE JAMESTOWN NY 14701	09/17/2018	09/17/2023
DOL	DOL	*****4722	FRANK BENEDETTO AND CHRISTOPHER J MAINI	B & M CONCRETE	19 CAITLIN AVE JAMESTOWN NY 14701	09/17/2018	09/17/2023
DOL	NYC		FRANK MAINI		1766 FRONT ST YORKTOWN HEIGHTS NY 10598	01/17/2018	01/17/2023
DOL	DA		FREDERICK HUTZLER		2375 RAYNOR STREET RONKONKOMA NY 11779	08/04/2021	08/04/2026
DOL	NYC	*****6616	G & G MECHANICAL ENTERPRISES, LLC.		1936 HEMPSTEAD TURNPIKE EAST MEADOW NY 11554	11/29/2019	11/29/2024
DOL	DOL		GABRIEL FRASSETTI			04/10/2019	04/10/2024
DOL	NYC		GAYATRI MANGRU		21 DAREWOOD LANE VALLEY STREAM NY 11581	09/17/2020	09/17/2025
DOL	DOL		GEOFF CORLETT		415 FLAGGER AVE #302STUART FL 34994	10/31/2018	10/31/2023
DOL	DA		GEORGE LUCEY		150 KINGS STREET BROOKLYN NY 11231	01/19/1998	01/19/2998
DOL	DOL		GIGI SCHNECKENBURGER		261 MILL RD EAST AURORA NY 14052	05/29/2019	05/29/2024
DOL	DOL		GIOVANNI LAFACE		8531 OSWEGO RD BALDWINSVILLE NY 13027	02/03/2020	01/09/2023
DOL	NYC	*****3164	GLOBE GATES INC	GLOBAL OVERHEAD DOORS	405 BARRETTO ST BRONX NY 10474	05/31/2018	05/31/2023
DOL	DOL		GREGORY S. OLSON		P.O BOX 100 200 LATTA BROOK PARKHORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL		HANS RATH		24 ELDOR AVENUE NEW CITY NY 10565	02/03/2020	02/03/2025
DOL	NYC	*****3228	HEIGHTS ELEVATOR CORP.		1766 FRONT ST YORKTOWN HEIGHTS NY 10598	01/17/2018	01/17/2023
DOL	DOL	*****5131	INTEGRITY MASONRY, INC.	M&R CONCRETE	722 8TH AVE WATERVLIET NY 12189	06/05/2018	06/05/2023
DOL	DOL		IRENE KASELIS		32 PENNINGTON AVE WALDwick NJ 07463	05/30/2019	05/30/2024
DOL	DOL	*****9211	J. WASE CONSTRUCTION CORP.		8545 RT 9W ATHENS NY 12015	03/09/2021	03/09/2026
DOL	DOL		J.A. HIRES CADWALLADER		P.O BOX 100 200 LATTA BROOK PARKHORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL		JAMES C. DELGIACCO		722 8TH AVE WATERVLIET NY 12189	06/05/2018	06/05/2023
DOL	DOL		JAMES J. BAKER		7901 GEE ROAD CANASTOTA NY 13032	08/17/2021	08/17/2026
DOL	DOL		JAMES LIACOME		9365 WASHINGTON ST LOCKPORT IL 60441	07/23/2018	07/23/2023
DOL	DOL		JAMES RACHEL		9365 WASHINGTON ST LOCKPORT IL 60441	07/23/2018	07/23/2023
DOL	DOL		JASON P. RACE		3469 STATE RT. 69 PERISH NY 13131	09/29/2021	09/29/2026
DOL	DOL		JASON P. RACE		3469 STATE RT. 69 PERISH NY 13131	02/09/2022	02/09/2027
DOL	DOL	*****7993	JBS DIRT, INC.		3469 STATE RT. 69 PERISH NY 13131	03/01/2022	03/01/2027
DOL	DOL	*****5368	JCH MASONRY & LANDSCAPING INC.		7901 GEE ROAD CANASTOTA NY 13032	08/17/2021	08/17/2026
DOL	NYC		JENNIFER GUERRERO		35 CLINTON AVE OSSINING NY 10562	09/12/2018	09/12/2023
DOL					1936 HEMPSTEAD TURNPIKE EAST MEADOW NY 11554	11/29/2019	11/29/2024

**NYSDOL Bureau of Public Work Debarment List    11/15/2022**

**Article 8**

DOL	DOL		JIM PLAUGHER		17613 SANTE FE LINE ROAD WAYNEFIELD OH 45896	07/16/2021	07/16/2026
DOL	AG		JOHN ANTHONY MASSINO		36-49 204TH STREET BAYSIDE NY 11372	02/07/2018	02/07/2023
DOL	DOL		JOHN F. CADWALLADER		200 LATTA BROOK PARK HORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL	*****4612	JOHN F. CADWALLADER, INC.	THE GLASS COMPANY	P.O BOX 100 200 LATTA BROOK PARKHORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL		JOHN GOCEK		14B COMMERCIAL AVE ALBANY NY 12065	11/14/2019	11/14/2024
DOL	DOL		JOHN LUCIANO			05/14/2018	05/14/2023
DOL	DOL		JOHN MARKOVIC		47 MANDON TERRACE HAWTHORN NJ 07506	03/29/2021	03/29/2026
DOL	DOL		JOHN WASE		8545 RT 9W ATHENS NY 12015	03/09/2021	03/09/2026
DOL	AG	*****0600	JOHNCO CONTRACTING, INC.		36-49 204TH STREET BAYSIDE NY 11372	02/07/2018	02/07/2023
DOL	DOL		JON E DEYOUNG		261 MILL RD P.O BOX 296EAST AURORA NY 14052	05/29/2019	05/29/2024
DOL	DOL		JORGE RAMOS		8970 MIKE GARCIA DR MANASSAS VA 20109	07/16/2021	07/16/2026
DOL	DOL		JORI PEDERSEN		415 FLAGER AVE #302STUART FL 34994	10/31/2018	10/31/2023
DOL	DOL		JOSE CHUCHUCA		35 CLINTON AVE OSSINING NY 10562	09/12/2018	09/12/2023
DOL	NYC		JOSEPH MARTINO		1535 RICHMOND AVENUE STATEN ISLAND NY 10314	12/13/2017	12/13/2022
DOL	DOL		JOY MARTIN		2404 DELAWARE AVE NIGARA FALLS NY 14305	09/12/2018	09/12/2023
DOL	DOL	*****5116	JP RACE PAINTING, INC. T/A RACE PAINTING		3469 STATE RT. 69 PERISH NY 13131	02/09/2022	02/09/2027
DOL	DOL	*****5116	JP RACE PAINTING, INC. T/A RACE PAINTING		3469 STATE RT. 69 PERISH NY 13131	09/29/2021	09/29/2026
DOL	DOL	*****5116	JP RACE PAINTING, INC. T/A RACE PAINTING		3469 STATE RT. 69 PERISH NY 13131	03/01/2022	03/01/2027
DOL	DOL	*****5116	JP RACE PAINTING, INC. T/A RACE PAINTING		3469 STATE RT. 69 PERISH NY 13131	03/01/2022	03/01/2027
DOL	DOL		JULIUS AND GITA BEHREND		5 EMES LANE MONSEY NY 10952	11/20/2002	11/20/3002
DOL	DOL		KARIN MANGIN		796 PHELPS ROAD FRANKLIN LAKES NJ 07417	12/01/2020	12/01/2025
DOL	DOL		KATE E. CONNOR		7088 INTERSTATE ISLAND RD SYRACUSE NY 13209	03/31/2021	03/31/2026
DOL	DOL		KATIE BURDICK		2238 BAKER RD GILLETT PA 16923	03/12/2018	03/12/2023
DOL	DOL	*****2959	KELC DEVELOPMENT, INC		7088 INTERSTATE ISLAND RD SYRACUSE NY 13209	03/31/2021	03/31/2026
DOL	DOL		KIMBERLY F. BAKER		7901 GEE ROAD CANASTOTA NY 13032	08/17/2021	08/17/2026
DOL	DOL	*****3490	L & M CONSTRUCTION/DRYWALL INC.		1079 YONKERS AVE YONKERS NY 10704	08/07/2018	08/07/2023
DOL	DA	*****8816	LAKE CONSTRUCTION AND DEVELOPMENT CORPORATION		150 KINGS STREET BROOKLYN NY 11231	08/19/1998	08/19/2998
DOL	DOL		LAVERN GLAVE		161 ROBYN RD MONROE NY 10950	01/30/2018	01/30/2023
DOL	AG	*****3291	LINTECH ELECTRIC, INC.		3006 TILDEN AVE BROOKLYN NY 11226	02/16/2022	02/16/2027
DOL	DA	*****4460	LONG ISLAND GLASS & STOREFRONTS, LLC		4 MANHASSET TRL RIDGE NY 11961	09/06/2018	09/06/2023
DOL	AG	*****4216	LOTUS-C CORP.		81-06 34TH AVENUE APT. 6EJACKSON HEIGHTS NY 11372	02/07/2018	02/07/2023
DOL	DOL		LOUIS A. CALICCHIA		1223 PARK ST. PEEKSKILL NY 10566	05/17/2021	05/17/2026
DOL	NYC		LUBOMIR PETER SVOBODA		27 HOUSMAN AVE STATEN ISLAND NY 10303	12/26/2019	12/26/2024
DOL	NYC		M & L STEEL & ORNAMENTAL IRON CORP.		27 HOUSMAN AVE STATEN ISLAND NY 10303	12/26/2019	12/26/2024
DOL	DOL	*****2196	MAINSTREAM SPECIALTIES, INC.		11 OLD TOWN RD SELKIRK NY 12158	02/02/2021	02/02/2026

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DOL	DA		MANUEL P TOBIO		150 KINGS STREET BROOKLYN NY 14444	08/19/1998	08/19/2998
DOL	DA		MANUEL TOBIO		150 KINGS STREET BROOKLYN NY 11231	08/19/1998	08/19/2998
DOL	NYC		MAREK FABIJANOWSKI		50 MAIN ST WHITE PLAINS NY 10606	01/04/2019	01/04/2024
DOL	NYC		MARIA NUBILE		84-22 GRAND AVENUE ELMHURST NY 11373	03/10/2020	03/10/2025
DOL	DOL		MASONRY CONSTRUCTION, INC.		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL	*****3333	MASONRY INDUSTRIES, INC.		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	NYC		MATINA KARAGIANNIS		97-18 50TH AVE CORONA NY 11368	04/19/2018	04/19/2023
DOL	DOL		MATTHEW P. KILGORE		4156 WILSON ROAD EAST TABERG NY 13471	03/26/2019	03/26/2024
DOL	DOL		MAURICE GAWENO		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		MICHAEL LENIHAN		1079 YONKERS AVE UNIT 4YONKERS NY 10704	08/07/2018	08/07/2023
DOL	AG		MICHAEL RIGLIETTI		31 BAY ST BROOKLYN NY 11231	03/28/2018	03/28/2023
DOL	DOL	*****4829	MILESTONE ENVIRONMENTAL CORPORATION		704 GINESI DRIVE SUITE 29MORGANVILLE NJ 07751	04/10/2019	04/10/2024
DOL	NYC	*****9926	MILLENNIUM FIRE PROTECTION, LLC		325 W. 38TH STREET SUITE 204NEW YORK NY 10018	11/14/2019	11/14/2024
DOL	NYC	*****0627	MILLENNIUM FIRE SERVICES, LLC		14 NEW DROP LNE 2ND FLOORSTATEN ISLAND NY 10306	11/14/2019	11/14/2024
DOL	AG		MSR ELECTRICAL CONSTRUCTION CORP.		31 BAY ST BROOKLYN NY 11231	03/28/2018	03/28/2023
DOL	NYC		MUHAMMED A. HASHEM		524 MCDONALD AVENUE BROOKLYN NY 11218	09/17/2020	09/17/2025
DOL	NYC		NAMOW, INC.		84-22 GRAND AVENUE ELMHURST NY 11373	03/10/2020	03/10/2025
DOL	DA	*****9786	NATIONAL INSULATION & GC CORP		180 MILLER PLACE HICKSVILLE NY 11801	12/12/2018	12/12/2023
DOL	DOL	*****3684	NATIONAL LAWN SPRINKLERS, INC.		645 N BROADWAY WHITE PLAINS NY 10603	05/14/2018	05/14/2023
DOL	NYC		NAVIT SINGH		402 JERICHO TURNPIKE NEW HYDE PARK NY 11040	08/10/2022	08/10/2027
DOL	DOL		NICHOLE E. FRASER A/K/A NICHOLE RACE		3469 STATE RT. 69 PERISH NY 13131	03/01/2022	03/01/2027
DOL	DOL		NICHOLE E. FRASER A/K/A NICHOLE RACE		3469 STATE RT. 69 PERISH NY 13131	09/29/2021	09/29/2026
DOL	DOL		NICHOLE E. FRASER A/K/A NICHOLE RACE		3469 STATE RT. 69 PERISH NY 13131	02/09/2022	02/09/2027
DOL	DOL	*****7429	NICOLAE I. BARBIR	BESTUCCO CONSTRUCTI ON, INC.	444 SCHANTZ ROAD ALLENTOWN PA 18104	09/17/2020	09/17/2025
DOL	NYC	*****5643	NYC LINE CONTRACTORS, INC.		402 JERICHO TURNPIKE NEW HYDE PARK NY 11040	08/10/2022	08/10/2027
DOL	DOL	*****1845	OC ERECTERS, LLC A/K/A OC ERECTERS OF NY INC.		1207 SW 48TH TERRACE DEERFIELD BEACH FL 33442	01/16/2018	01/16/2023
DOL	DOL		PAULINE CHAHALES		935 S LAKE BLVD MAHOPAC NY 10541	03/02/2021	03/02/2026
DOL	DOL		PETER STEVENS		11 OLD TOWN ROAD SELKIRK NY 12158	02/02/2021	02/02/2026
DOL	DOL	*****0466	PRECISION BUILT FENCES, INC.		1617 MAIN ST PEEKSKILL NY 10566	03/03/2020	03/03/2025
DOL	NYC		RASHEL CONSTRUCTION CORP		524 MCDONALD AVENUE BROOKLYN NY 11218	09/17/2020	09/17/2025
DOL	DOL	*****1068	RATH MECHANICAL CONTRACTORS, INC.		24 ELDOR AVENUE NEW CITY NY 10956	02/03/2020	02/03/2025
DOL	DOL	*****2633	RAW POWER ELECTRIC CORP.		3 PARK CIRCLE MIDDLETOWN NY 10940	01/30/2018	01/30/2023
DOL	DOL	*****2633	RAW POWER ELECTRIC CORP.		3 PARK CIRCLE MIDDLETOWN NY 10940	07/11/2022	07/11/2027
DOL	AG	*****7015	RCM PAINTING INC.		69-06 GRAND AVENUE 2ND FLOORMASPETH NY 11378	02/07/2018	02/07/2023
DOL	DA	*****7559	REGAL CONTRACTING INC.		24 WOODBINE AVE NORTHPORT NY 11768	10/01/2020	10/01/2025

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DOL	DOL		REGINALD WARREN		161 ROBYN RD MONROE NY 10950	01/30/2018	01/30/2023
DOL	DOL	*****9148	RICH T CONSTRUCTION		107 WILLOW WOOD LANE CAMILLUS NY 13031	11/13/2018	11/13/2023
DOL	DOL		RICHARD MACONE		8617 THIRD AVE BROOKLYN NY 11209	09/17/2018	09/17/2023
DOL	DOL		RICHARD REGGIO		1617 MAIN ST PEEKSKILL NY 10566	03/03/2020	03/03/2025
DOL	DOL	*****9148	RICHARD TIMIAN	RICH T CONSTRUCTI ON	108 LAMONT AVE SYRACUSE NY 13209	10/16/2018	10/16/2023
DOL	DOL		RICHARD TIMIAN JR.		108 LAMONT AVE SYRACUSE NY 13209	10/16/2018	10/16/2023
DOL	DOL		RICHARD TIMIAN JR.		108 LAMONT AVE SYRACUSE NY 13209	11/13/2018	11/13/2023
DOL	DOL		ROBBYE BISSESAR		89-51 SPRINGFIELD BLVD QUEENS VILLAGE NY 11427	01/11/2003	01/11/3003
DOL	DOL		ROBERT A. VALERINO		3841 LANYARD COURT NEW PORT RICHEY FL 34652	07/09/2019	07/09/2024
DOL	DOL		ROBERT BRUNO		5 MORNINGSIDE DRIVE AUBURN NY 13021	05/28/2019	05/28/2024
DOL	DOL		RODERICK PUGH		404 OAK ST SUITE 101SYRACUSE NY 13203	07/23/2018	07/23/2023
DOL	DOL	*****4880	RODERICK PUGH CONSTRUCTION INC.		404 OAK ST SUITE 101SYRACUSE NY 13203	07/23/2018	07/23/2023
DOL	DOL		ROMEO WARREN		161 ROBYN RD MONROE NY 10950	01/30/2018	01/30/2023
DOL	DOL		ROMEO WARREN		161 ROBYN RD MONROE NY 10950	07/11/2022	07/11/2027
DOL	DOL		RONALD MESSEN		14B COMMERCIAL AVE ALBANY NY 12065	11/14/2019	11/14/2024
DOL	DOL		ROSEANNE CANTISANI			06/12/2018	06/12/2023
DOL	DOL	*****7172	RZ & AL INC.		198 RIDGE AVENUE VALLEY STREAM NY 11581	06/06/2022	06/06/2027
DOL	DOL	*****1365	S & L PAINTING, INC.		11 MOUNTAIN ROAD P.O BOX 408MONROE NY 10950	03/20/2019	03/20/2024
DOL	DOL	*****7730	S C MARTIN GROUP INC.		2404 DELAWARE AVE NIAGARA FALLS NY 14305	09/12/2018	09/12/2023
DOL	DOL		SAL FRESINA MASONRY CONTRACTORS, INC.		1935 TEALL AVENUE SYRACUSE NY 13206	07/16/2021	07/16/2026
DOL	DOL		SAL MASONRY CONTRACTORS, INC.		(SEE COMMENTS) SYRACUSE NY 13202	07/16/2021	07/16/2026
DOL	DOL	*****9874	SALFREE ENTERPRISES INC		P.O BOX 14 2821 GARDNER RD POMPEI NY 13138	07/16/2021	07/16/2026
DOL	DOL		SALVATORE A FRESINA A/K/A SAM FRESINA		107 FACTORY AVE P.O BOX 11070SYRACUSE NY 13218	07/16/2021	07/16/2026
DOL	DOL		SAM FRESINA		107 FACTORY AVE P.O BOX 11070SYRACUSE NY 13218	07/16/2021	07/16/2026
DOL	NYC	*****0349	SAM WATERPROOFING INC		168-42 88TH AVENUE APT.1 AJAMAICA NY 11432	11/20/2019	11/20/2024
DOL	NYC	*****1130	SCANA CONSTRUCTION CORP.		863 WASHINGTON STREET FRANKLIN SQUARE NY 11010	03/10/2020	03/10/2025
DOL	DOL	*****2045	SCOTT DUFFIE	DUFFIE'S ELECTRIC, INC.	P.O BOX 111 CORNWALL NY 12518	03/03/2020	03/03/2025
DOL	DOL		SCOTT DUFFIE		P.O BOX 111 CORNWALL NY 12518	03/03/2020	03/03/2025
DOL	NYC	*****6597	SHAIRA CONSTRUCTION CORP.		421 HUDSON STREET SUITE C5NEW YORK NY 10014	02/20/2019	02/20/2024
DOL	DOL	*****1961	SHANE BURDICK	CENTRAL TRAFFIC CONTROL, LLC.	2238 BAKER ROAD GILLETT PA 16923	03/12/2018	03/12/2023
DOL	DOL		SHANE BURDICK		2238 BAKER ROAD GILLETT PA 16923	03/12/2018	03/12/2023
DOL	DOL		SHANE NOLAN		9365 WASHINGTON ST LOCKPORT IL 60441	07/23/2018	07/23/2023
DOL	DOL		SHULEM LOWINGER		11 MOUNTAIN ROAD 28 VAN BUREN DRMONROE NY 10950	03/20/2019	03/20/2024

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DOL	DOL	*****0816	SOLAR ARRAY SOLUTIONS, LLC		9365 WASHINGTON ST LOCKPORT IL 60441	07/23/2018	07/23/2023
DOL	DOL	*****0440	SOLAR GUYS INC.		8970 MIKE GARCIA DR MANASSAS VA 20109	07/16/2021	07/16/2026
DOL	NYC		SOMATIE RAMSUNAHAI		115-46 132ND ST SOUTH OZONE PARK NY 11420	09/17/2020	09/17/2025
DOL	DOL	*****2221	SOUTH BUFFALO ELECTRIC, INC.		1250 BROADWAY ST BUFFALO NY 14212	02/03/2020	02/03/2025
DOL	NYC	*****3661	SPANIER BUILDING MAINTENANCE CORP		200 OAK DRIVE SYOSSET NY 11791	03/14/2022	03/14/2027
DOL	DOL		STANADOS KALOGELAS		485 RAFT AVENUE HOLBROOK NY 11741	10/19/2021	10/19/2026
DOL	DOL	*****3496	STAR INTERNATIONAL INC		89-51 SPRINGFIELD BLVD QUEENS VILLAGE NY 11427	08/11/2003	08/11/3003
DOL	DOL	*****6844	STEAM PLANT AND CHX SYSTEMS INC.		14B COMMERCIAL AVENUE ALBANY NY 12065	11/14/2019	11/14/2024
DOL	DOL	*****9933	STEED GENERAL CONTRACTORS, INC.		1445 COMMERCE AVE BRONX NY 10461	05/30/2019	05/30/2024
DOL	DOL	*****9528	STEEL-IT, LLC.		17613 SANTE FE LINE ROAD WAYNESFIELD OH 45896	07/16/2021	07/16/2026
DOL	DOL		STEFANOS PAPASTEFANOU, JR. A/K/A STEVE PAPASTEFANOU, JR.		256 WEST SADDLE RIVER RD UPPER SADDLE RIVER NJ 07458	05/30/2019	05/30/2024
DOL	DOL		STEVE TATE		415 FLAGER AVE #302STUART FL 34994	10/31/2018	10/31/2023
DOL	DOL		STEVEN MARTIN		2404 DELWARE AVE NIAGARA FALLS NY 14305	09/12/2018	09/12/2023
DOL	DOL	*****3800	SUBURBAN RESTORATION CO. INC.		5-10 BANTA PLACE FAIR LAWN PLACE NJ 07410	03/29/2021	03/29/2026
DOL	DOL	*****1060	SUNN ENTERPRISES GROUP, LLC		370 W. PLEASANTVIEW AVE SUITE 2.329HACKENSACK NJ 07601	02/11/2019	02/11/2024
DOL	DOL		SYED RAZA		198 RIDGE AVENUE NY 11581	06/06/2022	06/06/2027
DOL	DOL	*****8209	SYRACUSE SCALES, INC.		158 SOLAR ST SYRACUSE NY 13204	01/07/2019	01/07/2024
DOL	DOL		TALAILA OCAMPA		1207 SW 48TH TERRACE DEERFIELD BEACH FL 33442	01/16/2018	01/16/2023
DOL	DOL		TERRY THOMPSON		11371 RIDGE RD WOLCOTT NY 14590	02/03/2020	02/03/2025
DOL	DOL	*****9733	TERSAL CONSTRUCTION SERVICES INC		107 FACTORY AVE P.O BOX 11070SYRACUSE NY 13208	07/16/2021	07/16/2026
DOL	DOL		TERSAL CONTRACTORS, INC.		221 GARDNER RD P.O BOX 14POMPEI NY 13138	07/16/2021	07/16/2026
DOL	DOL		TERSAL DEVELOPMENT CORP.		1935 TEALL AVENUE SYRACUSE NY 13206	07/16/2021	07/16/2026
DOL	DOL		TEST		P.O BOX 123 ALBANY NY 12204	05/20/2020	05/20/2025
DOL	DOL	*****6789	TEST1000		P.O BOX 123 ALBANY NY 12044	03/01/2021	03/01/2026
DOL	DOL	*****5766	THE COKER CORPORATION	COKER CORPORATIO N	2610 SOUTH SALINA ST SUITE 14SYRACUSE NY 13205	12/04/2018	12/04/2023
DOL	DOL	*****5766	THE COKER CORPORATION	COKER CORPORATIO N	2610 SOUTH SALINA ST SUITE 14SYRACUSE NY 13205	09/17/2020	09/17/2025
DOL	DA	*****4106	TRIPLE H CONCRETE CORP		2375 RAYNOR STREET RONKONKOMA NY 11779	08/04/2021	08/04/2026
DOL	DOL	*****8210	UPSTATE CONCRETE & MASONRY CONTRACTING CO INC		449 WEST MOMBSHA ROAD MONROE NY 10950	06/06/2022	06/06/2027
DOL	DOL	*****6392	V.M.K CORP.		8617 THIRD AVE BROOKLYN NY 11209	09/17/2018	09/17/2023
DOL	DOL	*****6418	VALHALLA CONSTRUCTION, LLC.		796 PHLEPS ROAD FRANKLIN LAKES NJ 07417	12/01/2020	12/01/2025
DOL	NYC	*****2426	VICKRAM MANGRU	VICK CONSTRUCTI ON	21 DAREWOOD LANE VALLEY STREAM NY 11581	09/17/2020	09/17/2025
DOL	NYC		VICKRAM MANGRU		21 DAREWOOD LANE VALLEY STREAM NY 11581	09/17/2020	09/17/2025
DOL	DOL		VICTOR ALICANTI		42-32 235TH ST DOUGLASTON NY 11363	01/14/2019	01/14/2024
DOL	NYC		VIKTAR PATONICH		2630 CROPSEY AVE BROOKLYN NY 11214	10/30/2018	10/30/2023

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DOL	DOL		VIKTORIA RATH		24 ELDOR AVENUE NEW CITY NY 10956	02/03/2020	02/03/2025
DOL	NYC		VITO GARGANO		1535 RICHMOND AVE STATEN ISLAND NY 10314	12/13/2017	12/13/2022
DOL	NYC	*****3673	WALTERS AND WALTERS, INC.		465 EAST AND THIRD ST MT. VERNON NY 10550	09/09/2019	09/09/2024
DOL	DOL	*****3296	WESTERN NEW YORK CONTRACTORS, INC.		3841 LAYNARD COURT NEW PORT RICHEY FL 34652	07/09/2019	07/09/2024
DOL	DOL		WHITE PLAINS CARPENTRY CORP		442 ARMONK RD	06/12/2018	06/12/2023
DOL	DOL		WILLIAM G. PROERFRIEDT		85 SPRUCEWOOD ROAD WEST BABYLON NY 11704	01/19/2021	01/19/2026
DOL	DOL	*****5924	WILLIAM G. PROPHY, LLC	WGP CONTRACTIN G, INC.	54 PENTAQUIT AVE BAYSHORE NY 11706	01/19/2021	01/19/2026
DOL	DOL	*****4043	WINDSHIELD INSTALLATION NETWORK, INC.		200 LATTA BROOK PARK HORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL	*****4730	XGD SYSTEMS, LLC	TDI GOLF	415 GLAGE AVE #302STUART FL 34994	10/31/2018	10/31/2023

**SECTION 01 1000**  
**SUMMARY OF MULTIPLE CONTRACTS**

**PART 1 - GENERAL**

**1.1 SECTION INCLUDES**

- A. Work covered by contract documents
- B. Related documents
- C. Summary
- D. Definitions
- E. Coordination
- F. Contracts, General
- G. Contract 1 – General Construction
- H. Contract 2 – HVAC Contract
- I. Contract 3 – Plumbing Contract
- J. Contract 4 – Electrical Contract
- K. Site Use Restrictions
- L. General Quality Control

**1.2 WORK COVERED BY CONTRACT DOCUMENTS**

- A. The work of this Project is separated into a number of Prime Contracts, and it has been determined which portions of the Work of this Project belong to each Prime Contract.
- B. The Prime Contracts for this project are listed as follows:
  - 1. **CONTRACT 1 - GENERAL CONSTRUCTION**
  - 2. **CONTRACT 2 - HVAC**
  - 3. **CONTRACT 3 - PLUMBING**
  - 4. **CONTRACT 4 - ELECTRICAL**

**1.3 RELATED DOCUMENTS**

- A. Drawings and general provisions of each Prime Contract, including General and Supplementary Conditions, Special Conditions and other Division 1 Specification Sections, apply to this Section. Refer to Spec Section 01 1001 “Exhibit D: Drawings and Specifications.” This Exhibit will be updated throughout the life of the project with a current list.

**1.4 SUMMARY**

- A. This Section includes a summary of each Prime Contract, including responsibilities for coordination and temporary facilities and controls.
- B. Specific requirements of each Prime Contract are also indicated in individual Specification Sections and on Drawings.
- C. Project Schedule:

1. The work of the Project is to be substantially complete approximately within (182) calendar days. Project work shall commence on or about April 1, 2023 with substantial completion on or about September 30, 2023.
2. The Contractor has the responsibility of completing the work within the scheduled time as set forth in the project schedule. The project schedule shall be updated as work proceeds based on information supplied to the contractor.
3. The Owner and Construction Manager reserve the right to incorporate into the approved project schedule, the work of additional contractors and services that may be engaged on the project.
4. The Owner and Construction Manager shall have the authority to order the Contractor to speed up his rate of progress if the rate of progress is not satisfactory as determined by the approved project schedule.

## 1.5 DEFINITIONS

- A. Permanent Enclosure: As determined by Architect, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures.
- B. General Construction Contractor, Electrical Contractor, HVAC Contractor and Mechanical Contractor may be referenced in this Section collectively as the "Prime Contractors" and individually as a "Prime Contractor".

## 1.6 COORDINATION

- A. Each Primer Contractor shall schedule and coordinate with other Prime Contractors as required.
  1. **Cooperate with Each Other.** Each Prime Contractor shall participate, cooperate and fully coordinate its work with other Prime Contractors.
  2. **Full Time Supervision.** Each Prime Contractor shall have an on-site, full-time, non-working supervisor while working on site and as described in the General Requirements.
  3. **Use Appropriate Trades.** Each Prime Contractor shall employ the appropriate trades people for their work as required. These workers shall be experienced in their trades. A shortage of labor in the industry shall not be accepted as an excuse for not properly manning each project.
  4. **Job Site Clean-up.** Each Prime Contractor shall organize daily clean ups as well as participate in a weekly joint clean up involving all Prime Contractors. Clean up shall be considered a safety issue. All Prime Contractors that do not participate in cleanup will be back-charged. In addition to normal cleanup, each Prime Contractor working on site shall provide one worker at the Construction Manager's request to clean each project site work location. All excess materials, debris, clearing and demolition items shall be removed from the site and disposed of in a safe and legal manner by the Contractor.
  5. **Hourly Rates.** Upon award of Contract, each Prime Contractor shall submit to the Construction Manager hourly rate sheets that apply to time and material work for all pertinent trades and subcontractors.

6. **Two-Week Look-Ahead.** Each Prime Contractor shall submit a two-week look-ahead schedule (man loaded by work activity and area) to the Construction Manager each week. Each Prime Contractor's representative shall attend a weekly two-week look-ahead meeting with all other Prime Contractors, chaired by Construction Manager, for the purposes of job coordination and sequencing. Each Prime Contractor is responsible to coordinate the job with other Prime Contractors and Construction Manager, and to cooperate with other Prime Contractors in the pursuit of the overall project success. Each Prime Contractor shall review other Prime Contractors' shop drawings and actively participate in resolving discrepancies, conflicts, interferences, etc.
7. **Master CPM Schedule.** Based upon the "Construction Schedule" indicated, each Prime Contractor shall prepare within seven (7) days of award of Contract, an overall job CPM schedule in accordance with spec section 01-3300 1.3. Prime Contractors shall indicate significant events such as submittals, shop drawings, material ordering, fabrication, delivery, coordination precedents, installation, testing, milestones, substantial completion, punch list period, and turnover by area or system as agreed with Construction Manager. This schedule should be updated monthly, showing progress and problems, and shall be submitted in reproducible form to the Construction Manager by the last working day of the month. Each Prime Contractor's proposed schedule must be approved by the Construction Manager. The General Construction Contractor shall integrate all Prime Contractors' schedules and issue a mutually agreed to Master CPM schedule for Construction Managers review and approval by all Prime Contractors.
8. **Time is of the Essence.** Each Prime Contractor understands that time is of the essence and will adequately staff the job to successfully complete the Contract Work in accordance with the Project's schedule. The option to work extended hours and weekends at the Prime Contractors' expense under prior agreement with the Construction Manager may be made available to meet this schedule.
9. **Coordination Drawings:**
  - a) The General Construction, HVAC, Plumbing & Electrical Contractors shall take part in the coordination of work with all affected trades and shall sign-off on each Prime Contractor's coordinated drawings. The coordinated drawings shall be coordinated with the interior masonry wall erection schedule. Wall penetration drawings shall be submitted to the General Construction Contractor no later than five (5) days prior to wall erection. Changes to the ceiling due to the coordination shall be submitted to the General Construction Contractor no later than five (5) days prior to ceiling installation.
  - b) The General Construction Contractor shall prepare background drawings (using a mutually agreed to drawing software) including Buildings and Pool, Splash Park equipment, and site piping to be used as the basis for coordination drawings in all areas or as determined by the Construction Manager. These drawings shall be completed by a qualified draftsperson. All Architectural features shall be detailed clearly, i.e., permanent casework, interior columns, partitions, finish ceiling, lighting, and roof elevations, etc. Provide one file to the following trades: HVAC, Plumbing, Electric, General Construction. Upon completion by other trades, the drawing files will be overlaid to resolve all conflicts and determine locations and elevations. Once complete and signed off, the Heating Work Contractor will submit dimensioned wall and slab penetration drawings and pad drawings.
  - c) Note: Coordination Drawings to be signed off by affected Prime Contractors within 30 days of Notice to Proceed.
  - d) Each Prime Contractor must install his work in accordance with the coordinated drawings at no additional cost to the Owner. No additional compensation will be made for extra offsets and/or piping or retrofit work due to improper component location, or lack of Contractor(s) coordination.

- e) The HVAC Contractor shall take special care in verifying with the Electrical Contractor that his equipment matches the characteristics of the power being supplied. The Electrical Contractor is similarly bound.
  - f) The Prime Contractors shall submit to the Construction Manager an "Equipment Procurement Report" 3 weeks after the Prime Contractor is notified of award. The Prime Contractor shall list all equipment items which are being purchased, drawing submittals, samples, etc., for a complete composite report. The report shall be resubmitted to the Construction Manager with updated information weekly, until such time as the Construction Manager notifies the Prime Contractors that only bi-monthly or monthly reports are required.
  - g) The MEP Drawings are schematic in nature and are not intended to show every offset and detail. The Prime Contractors will make adequate provisions in their bid to accommodate the actual conditions without additional cost to the Owner.
10. **Responsible for Contractors' Work.** All Prime Contractors will be responsible for their own sub-contractors' work.

## 1.7 CONTRACTS, GENERAL

- A. Extent of Contract: The Contract Documents contain a more specific description of the Work, names and terminology on Drawings and in Specification Sections facilitating which contract includes a specific element of Project.
  - 1. **Complete Systems.** 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. **Tax Exempt.** The Owner is exempt from payment of Federal, State, and local taxes, including sales and compensating use taxes on all materials and supplies incorporated into the completed work. These taxes are not to be included in the bids. This exemption does not apply to tools, machinery, equipment, or other property leased by or to the Prime Contractor or a Subcontractor, or to supplies and materials which, even though they are consumed, are not incorporated into the completed work, and the Prime Contractor and Subcontractors shall be responsible for, and pay any and all applicable taxes, including sales and compensating use taxes, on said leased tools, machinery, equipment, or other property, and upon all said unincorporated supplies and materials.
  - 3. **Prime Contractor Responsibility.** Each Prime Contractor is responsible for all Work shown on Contract Documents, including drawings of other Prime Contractor disciplines. For example, the HVAC Contractor will be responsible for heating work shown on Architectural, Plumbing, and Electrical Drawings.
  - 4. **Cooperation by Primes.** Each Prime Contractor is expected to fully cooperate with all firms performing testing and inspection work and provide complete data and material for required reports. The Construction Manager may request additional testing and inspection.
  - 5. **Ample Time for Decisions.** Decisions required from the Construction Manager & Architect shall be anticipated by each Prime Contractor to provide ample time for inspection, investigation, or detailed drawings and installation.
  - 6. **Use of Premises.** Each Prime Contractor shall coordinate the use of premises with the Owner and Construction Manager and shall move at his own expense any stored products under such Prime Contractor's control, including excavated material, which interfere with operations of the Owner or other Prime Contractors.

7. **Additional Storage.** Each Prime Contractor shall obtain and pay for the use of additional storage of work areas needed for operations if required.
8. **Out of Sequence Work.** The intention of the Work is to follow a logical sequence; however, each Prime Contractor may be required by the Construction Manager to temporarily omit or leave out any section of its Work out of sequence. All such out of sequence work and come back time to these areas shall be performed at no additional cost.
9. **Union Jurisdiction.** Local custom and trade union jurisdictional settlements do not control the scope of the Work of each contract.
10. **Acts & Omissions.** The Prime Contractors shall be responsible for the acts and omissions of each of its employees, agents, subcontractors, and for any other person performing its Work.
11. **Labor & Jurisdictional Disputes.** It shall be each Prime Contractor's responsibility to see that labor used during delivery of materials to the site and during the construction will cause no labor or jurisdictional dispute to occur.
12. **Indemnification.** Each Prime Contractor shall indemnify and hold harmless the Owner, Construction Manager, the Architect, and the Engineer from and against any and all losses, claims, actions (including but not limited to patent, copyright and trademark infringement), damages, penalties, costs, and expenses including attorneys' fees and court costs caused by the action or inaction of the Contractor, its employees, agents, or authorized representatives, in the performance of Contractor's obligations under this Agreement.
13. **Materials.** All material shall be new and fresh quality and of the highest standard grade products.
14. **Verification of Dimensions & Measurements.** Each Prime Contractor shall satisfy itself as to the accuracy of all grades, elevations, dimensions, and locations. In all cases of interconnection of its Work with existing or other work, it shall verify at the site all dimensions relating to such existing or other work. Each Prime Contractor shall notify the Architect and Construction Manager immediately of any errors or discrepancies. Any errors due to the Prime Contractor's failure to so verify all such grades, elevations, locations, or dimensions shall be promptly rectified by the Prime Contractor without any increase to the Contract Price.
15. **Items of Work.** It shall be each Prime Contractor's responsibility to have all items of work as called for under the Drawings and Specifications included in the Contract and covered by the proper trade. Minor details not specifically mentioned in the plans and specifications, but necessary to secure a workmanlike job and proper operation shall be provided by the Prime Contractor without additional cost to the Owner.
16. **Field Office Drawings & Specifications.** One (1) set of construction drawings and one (1) set of specifications are to be in the field office at all times. Field construction documents shall be kept current with as-built information and all approved changes.
17. **Project Site Storage.** Each Prime Contractor may provide and maintain on the project site a storage facility adequate to prevent weather damage to vulnerable materials. The Construction Manager shall approve the location of the storage facility. Upon completion of their work, each Prime Contractor shall remove the storage facility from the project site.

18. **Storage of Materials & Equipment.** Each Prime Contractor shall store any material and equipment for use on the job in a neat and orderly fashion at a location within the job site as designated by the Construction Manager.
19. **Payment for Off-Site Materials.** If the Construction Manager approves the payment of material stored off site, in addition to the requirements of General Conditions, each Prime Contractor shall comply with the following requirements:
  - a) Title to such materials shall be vested in the Owner, as evidenced by documentation satisfactory in form and substance to the Owner and the Owner's Construction Lender (if applicable), including, without limitation, recorded financing statements, UCC filings, and UCC searches.
  - b) With each Application for Payment, the Prime Contractor shall submit to the Construction Manager a written list identifying each location where materials are stored off the Project site and the value of materials at each location. The Prime Contractor shall arrange for the procurement of insurance or procure insurance itself, satisfactory to the Construction Manager and the Owner, for materials stored off the Project site in an amount not less than the total value thereof.
  - c) The consent of any surety shall be obtained to the extent required prior to payment for any materials stored off the Project site.
  - d) Representatives of the Construction Manager, the Owner, and the Lender (if applicable) shall have the right to make inspections of the storage areas at any time.
  - e) Such materials shall be specifically marked for use on the Project and segregated from other materials at the storage facility.
20. **Cost Plus a Fee Agreement or Change Order.** If this is a cost plus a fee agreement, or for any change orders which are based upon a cost plus a fee, the following shall apply:
  - a) No change order work is to proceed without a written "Change Order Request" (COR): issued by the Construction Manager.
  - b) The Contractor shall keep full and detailed accounts and exercise such controls as may be necessary for proper financial management under the Agreement or change order, as applicable.
  - c) The accounting and control systems shall be satisfactory to the Construction Manager and Owner.
  - d) The Construction Manager, Owner, and the Owner's accountants shall be afforded access (at Prime Contractor's office, at reasonable hours, and upon reasonable notice), to the Prime Contractor's records, books, correspondence, instructions, drawings, receipts, subcontracts, purchase orders, vouchers, memoranda, and other data relating to this Contract, and the Prime Contractor shall preserve these for a period of three years after final payment, or for such longer period as may be required by law.
  - e) All records shall be maintained in accordance with generally accepted accounting procedures, consistently applied.
21. **No Unnecessary Noise.** Unnecessary noise will not be permitted. The Contractor shall comply with any noise ordinance regulations as promulgated by the City of Schenectady

- or other affected regulatory bodies. The Contractor shall eliminate noise to as great an extent as possible at all times. Air compressors shall be equipped with silencers, and the exhaust of all gasoline motors and other power equipment shall be provided with mufflers.
22. **Weather Conditions.** If adverse weather conditions are the basis for a claim for additional time, such claim shall be documented by data substantiating that weather conditions were abnormal for the period of time and could not have been reasonably anticipated, and that weather conditions had an adverse effect on the scheduled construction.
  23. **Timing of Material Purchases.** Each Prime Contractor is to purchase and store materials prior to the actual time required for installation to ensure that there is no delay to the schedule due to procurement of materials.
  24. **Contractor's Protection of Materials, Equipment, and Work.** Each Prime Contractor shall provide for the safety and good condition of all materials and equipment. Each Prime Contractor shall provide adequate means for and shall fully protect all finished and unfinished work, equipment, or fixtures against damage of any type whatsoever during the progress of the Work and until final completion. Removal of protection shall be by the Prime Contractor at the direction of the Construction Manager.
  25. **Prevent Intrusion.** Each Prime Contractor shall be responsible for taking measures and safeguards to prevent intrusion, and for the proper protection of the site, project, trades, and public in general from damage due to fire, rain, wind, or other causes. Contractor shall provide sufficient watchman as necessary for proper protection of the work and project at all times. Contractor shall take measures to protect against vandalism, loss of materials or personal injury.
  26. **No Exclusive Rights.** The Owner and/or the Construction Manager acting separately or through their authorized agents reserve the right to award contracts or similar work of any nature in connection with the other phases of the Project. Such work may be conducted within or adjacent to the lines of this Contract. Such contracts may be awarded under similar conditions of this Contract without invalidating this Contract. There is nothing intended, expressed, or implied in this Contract that would give a Prime Contractor exclusive rights or control of the classifications of work within or adjacent to the limits of this Contract.
  27. **Contractor's Responsibilities for Schedules & Cost Breakdowns.** Each Prime Contractor shall promptly submit all progress schedules and cost breakdowns required by the Construction Manager.
  28. **Contractor's Responsibilities for Meetings & Daily Logs.** All scheduled job progress meetings and job safety meetings will be attended by designated personnel of each Prime Contractor. Additionally, weekly toolbox safety meetings shall be held by each Prime Contractor with Prime Contractor's own workers. Records of such meetings shall be forwarded to Construction Manager, after all personnel in attendance sign and acknowledge they will comply with all related safety items. Additionally, each Prime Contractor is to provide Construction Manager with copies of Prime Contractor's daily logs.
  29. **Daily Time and Materials Tickets.** Time and materials tickets for authorized extra work must be presented daily for signature by the Construction Manager's Project Manager and invoiced within 7 days. Hourly rates shall be calculated per an approved Rate Sheet.
  30. **Personal Protective Equipment.** Each Prime Contractor shall ensure that all personnel and visitors wear proper personal protective equipment at all times while on the jobsite and

that all personnel and visitors comply with all applicable safety agencies' rules and regulations, including OSHA and the CDC.

31. **Superintendent's Cell Phone.** Each Prime Contractor shall furnish its jobsite supervisor with a cell phone and provide the cell phone number to Construction Manager.
32. **No Cost Escalation.** No cost escalation of any kind is accepted.
33. **Travel Time.** Each Prime Contractor is responsible for all employee travel time between designated parking areas and jobsite locations. Adhering to a designated start time is expected and absolutely no early departure from jobsite will be accepted to compensate for any employee travel time.
34. **Contractor Access to Contract Plans & Specifications.** Upon Contract award, Construction Manager will provide access to each Prime Contractor via ShareFile (or other document sharing service) the contract plans and specifications. Any updates, bulletins, or revisions to the Contract set will be issued to each Prime Contractor via such document sharing service.
35. **COVID Protocol/HERO Act.** As applicable, each Prime Contractor shall provide a copy of its COVID Project Safety Plan/HERO Act Safety Plan and adhere to all approved safety protocols.
36. **Use of Zoom or Other Similar Meeting Software.** Each Prime Contractor and its employees, subcontractors, and consultants shall be capable of attending Project, focus, and other meetings via Zoom or other similar meeting software and shall utilize and ensure that their camera is on during the meeting.
37. **General Quality Control.**
  - a) The work of this contract shall be performed only with personnel possessing the required skills for each portion of the work. Any work not meeting Owner's Representative's standards for adequate workmanship must be removed and replaced. All work shall be performed in accordance with the applicable standards, requirements, and specifications.
  - b) The Contractor shall take full responsibility for failure of materials, devices, equipment, systems, and finishes erected or applied in accordance with the requirements of this article and shall remove, replace, repair, or correct any such failures or deficiencies promptly, upon notification by Owner or Owner's Representative.
  - c) Whenever any manufacturer of material utilized in the project issues recommended fabrication, installation, erection and/or application standards or instructions, such standards or instructions shall be strictly followed in the performance of the work, except as specified or approved otherwise in writing.
  - d) Whenever any trade, organization, institution, utility company, code group, society, association and/or governing board standard, requirement or specification is adopted by the reference in these specifications, perform all work related thereto in strict accordance with the latest edition thereof and/or amendments thereto or the specifications herewith, whichever is more stringent.

- B. **Existing Conditions:** All existing conditions must be verified in the field. The Owner and Architect take no responsibility for actual conditions found deviating from the drawings.

1. Each Prime Contractor is responsible for familiarizing itself with jobsite logistics.
2. The Contractor shall visit the site where the work of the contract is to be performed. The Contractor shall examine and inform themselves of all existing conditions related to the performance of the contract.
3. The existence and location of utilities shown on the plans are not guaranteed and shall be investigated and verified by the Contractor before starting work. Excavation in the vicinity of existing utilities and structures shall be carefully performed. The Contractor shall take all necessary steps to safeguard and keep from damage any and all existing structures and utilities.
4. Should a utility line, which is to remain, be damaged during the process of the work, the Contractor shall promptly notify the Owner's Representative. The Contractor shall be held responsible for any damage to utility lines during the process of the work.
5. Provide for, and maintain in operation, all existing services intended to remain, and restore all such services if damaged, at the expense of the Contractor.

C. **Temporary Facilities and Controls:** In addition to specific responsibilities for temporary facilities and controls indicated in this section and Spec Section 01 5000, each Prime Contractor is responsible for the following:

1. Installation, operation, maintenance, and removal of each temporary facility usually considered as its own normal construction activity, and costs and use charges associated with each facility.
2. Plug-in electric power cords and extension cords, supplementary plug-in task lighting, and special lighting necessary exclusively for its own activities.
3. Special or unusual hoisting requirements for its own construction activities, including hoisting, hoisting material or equipment into spaces below grade, and hoisting requirements outside building enclosure.
4. Secure lockup of its own tools, materials, and equipment.
5. Construction aids and miscellaneous services and facilities necessary exclusively for its own construction activities.
6. Each Prime Contractor must plan, provide, and maintain its own access, task ramping, and egress as required into and out of the site, staging of trailer(s), materials, machinery, and equipment in agreement with the Construction Manager. Maintain free and safe access on the jobsite for other related project personnel. Maintain safe pedestrian traffic outside the work area. Any operation interfering with pedestrian or vehicular traffic must be regulated by a flagman. Trucking and delivery operations should be coordinated with the Construction Manager and all other trades.
7. General Construction Contractor to provide complete all temporary ramps as required. Remove ramps upon completion of project or as directed by Construction Manager.
8. The General Construction Contractor shall provide and maintain temporary weather protection partitions at all windows and/or doors until the complete installation of all exterior doors and windows as required. General Construction Contractor shall also be responsible for removing this protection at the end of construction or as directed by the Construction Manager.

9. The General Construction Contractor shall provide temporary toilet facilities at site under Contract per applicable OSHA standards. All Prime Contractors may use temporary toilet facility as provided on the jobsite by the General Construction Contractor. Toilets shall be maintained, located, and removed as directed by the Construction Manager. Contents shall be removed and disposed of in a manner and at such intervals as necessary to maintain sanitary conditions: at minimum weekly.
10. General Construction Contractor to provide complete ice and snow removal required by all Prime Contractors for general access to and around the construction site. Each Prime is responsible for ice and snow removal to allow for their specific tasks and work as required and shall coordinate with the General Construction Contractor.
11. Any and all shutdowns are to be coordinated with the Construction Manager and Owner.
12. General Construction Contractor shall provide main axis lines and elevation benchmarks as required. General Construction Contractor shall preserve and transfer lines as well as offsets as necessary during construction progress for its works as well as use by other Prime Contractors.
13. Each Prime Contractor is responsible for layout of their own work off of Vertical and Horizontal control lines as provided by General Construction Contractor. Each Prime Contractor is required to carry up all the lines, grades, and offset so as to correctly perform all their work.
14. General Construction Contractor shall provide all dumpsters for Prime Contractors for general daily refuse.
15. Provide complete the disposal of crates, boxes, packing, blocking associated with the General Construction Contractor's work on a daily basis or as directed by the Construction Manager.
16. Provide complete final cleaning of all areas of construction prior to Owner Occupancy. General Construction Contractor to include final cleaning not limited to dusting, mopping, paint touch-up, sweeping, vacuuming, cleaning of windows, etc.
17. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects. Avoid using tools and equipment that produce harmful noise. Coordinate the use of noisemaking tools and equipment to hours that will minimize complaints from persons or firms near the Project site.

**D. Use Charges:** Each Prime Contractor is expected to comply with the following:

1. Each Prime Contractor is responsible for the coordination and location of a jobsite trailer and storage boxes as permitted by the Construction Manager per the approved logistics plan. Each Prime Contractor is responsible for his own trailers, telephone, power, and sewer and water if required including usage costs at their trailers.

**E. Safety/Fire Protection**

1. Each Prime Contractor shall be responsible for providing safe access in order to perform their own work; i.e., OSHA designated ladders, grading of landscape, scaffolding, stairs, lifts, removal of snow and ice, etc.
2. Each Prime Contractor shall enforce and correct safety hazards and violations immediately. If safety violations are not resolved within 24 hours, the Construction Manager

will obtain outside sources to correct the violation and back charge such Prime Contractor. Each Prime Contractor shall assign an employee as the Company Safety Engineer, with the power and flexibility to enforce safety and to correct and eliminate unsafe conditions.

3. Temporary Fire Protection: Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
4. Each Prime Contractor shall provide fire extinguishers, installed on walls on mounting brackets, visible and accessible from the space being served, with sign mounted above. Number to conform to applicable codes.
  - a) Fire Extinguishers: Multi-purpose (ABC) dry chemical.
  - b) UL labeled shall be visible.
  - c) Current inspection tags affixed.
5. Store combustible materials in containers in fire-safe locations.
6. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for firefighting. Prohibit smoking onsite.
7. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition.
8. Each Prime Contractor shall assume full responsibility for the protection and safekeeping of materials under this Contract stored on the site and shall cooperate with the Construction Manager to ensure security for the Owner's property.
9. Where required for additional safety, the Contractor shall provide and maintain fences at its own expense, along the roadways, and around the grounds occupied by the Prime Contractors for the protection of adjoining property and all persons lawfully using same. Fences shall be of materials and construction suitable in the opinion of the Construction Manager for their intended purpose.
10. Each Prime Contractor is to provide to the Construction Manager, prior to start of Work, a copy of such Prime Contractor's Hazard Communication Program and Company Safety Program. Each Prime Contractor shall provide complete Material Safety Data Sheets to the Construction Manager for all chemicals and materials used on the Project.
11. Provide all safeguards necessary for fire protection and prevention due to operations. All Prime Contractors shall maintain a fire watch during all "burning/welding/soldering" operations using only qualified personnel. The fire watch shall continue not less than thirty (30) minutes after the completion of "burning/welding/soldering" operations each day. Each Prime Contractor shall furnish and maintain sufficient fire protection equipment in each area being worked.
12. Insubordination, unsafe practices, horseplay, abusive behavior or language, wanton destruction of property, use of drugs or alcohol, possession of firearms, and solicitation shall not be tolerated.
13. Covers Over Openings: Prime Contractors shall provide protection per OSHA immediately.
  - a) Any Prime Contractor that creates or contributes to an unsafe condition, such as but not limited to a fall hazard, shall correct the same immediately.
  - b) Each Contractor who requires temporary or permanent removal of perimeter and opening protection to perform his own work, shall remove and replace such protection as necessary. Protection permanently removed shall be returned to the Prime Contractor who provided the protection. Prime Contractor shall not allow

openings or edges to be unguarded or unprotected at any time, i.e. slab openings, trenches, duct chases, stairwells, slab edges, etc.

## 1.8 CONTRACT 1 - GENERAL CONSTRUCTION

A. Work in the General Construction Contract includes, but is not limited to, the following:

1. Provide furnish and install all labor, material, supervision, equipment, scaffolding, layout, engineering, deliveries, trucking, hoisting, rigging, shop drawings, submittals, and all other items related and required to complete all General Construction work in accordance with the Contract Documents and all applicable codes having jurisdiction.
2. Provide the Work of Division 01 General Requirements unless stated otherwise. The listing of Drawings and Specifications is intended as a guide and does not relieve the General Construction Contractor of the responsibility of reviewing all Drawings and Specifications for bidding and coordinating with other Prime Contractors during construction.
3. The General Construction Contractor represents it has the expertise in the performance of Work for this trade and assures all items to be complete, functional, and installed in accordance with the best practices consistent with premium quality material and workmanship.
4. The following specifications are to be included and completed in their entirety unless specifically noted otherwise:
  - a) Division 03 - Concrete, in its entirety except Mechanical and Electrical Contractors are responsible for their own housekeeping pads if required.
  - b) Division 04 - Masonry, in its entirety.
  - c) Division 05 - Metal Fabrications, in its entirety.
  - d) Division 06 - Wood Fabrications, in its entirety.
  - e) Division 07 - Thermal and Moisture Protection, in its entirety.
  - f) Division 08 - Openings, in its entirety.
  - g) Division 09 - Finishes, in its entirety.
  - h) Division 10 - Specialties, in its entirety.
  - i) Division 13 - Special Construction (Pool, Water Spray, Splash Pad, and all accessories), in its entirety.
  - j) Division 22 - Plumbing, only as it applies to supply and install of Pool, Water Spray, Splash Pad, Site Work Piping, and Facility Packaged Sewage Pump Station.
  - k) Division 26 - Electrical, only as it applies to Pool, Water Spray, & Splash Pad controls.
  - l) Division 31 - Earthwork, in its entirety.
  - m) Division 32 - Exterior Improvements, in its entirety.
  - n) Division 33 - Site Utilities, in its entirety. The Plumbing Contractor shall be responsible for coordinating all tie-ins to domestic water, storm, sanitary lines with the General Construction Contractor. Plumbing Contractor to extend all underground piping a minimum of 5'-0" beyond building footprints. Final tie in by General Construction Contractor.
5. Prior to steel erection, the General Construction Contractor shall provide written certification of field dimensions of existing anchor bolt layout and foundation work, Report any and all discrepancies in elevation and locations to the Construction Manager.
6. Trenches for the Work of each Prime Contract shall be provided by the respective Prime Contractor.

7. Cutting and patching for the Work of each contract shall be provided by each Prime Contractor.
8. Provide all penetrations through new and existing roofs for all other trades. General Construction Contractor to install all roof accessories, curbs, mechanical and electrical penetrations, etc. supplied by others. Each Prime Contractor shall provide the General Construction Contractor with a detailed roof plan indicating each penetration and verifying size of penetration.
9. Pre-Roofing Conference – The General Construction Contractor shall arrange a jobsite meeting with Construction Manager, Architect, General Contractor, and Manufacturer's Representative, not less than 30 days before application of roofing is to be started to discuss construction procedures, specifications, job and surface readiness, material storage, and protection arrangements. No roofing shall be applied prior to this meeting.
10. All lintels for HVAC openings to be furnished and installed by the General Construction Contractor.
11. Install all exterior louvers, and vents complete, as supplied by HVAC Contractor. General Construction Contractor to seal all frames with a weather tight seal. HVAC Prime to supply and install all interior vent, grills, and louvers.
12. Provide repairs to any damages to adjacent property or other Prime Contractors' work for which the General Construction Contractor is responsible.
13. Stormwater Control: Assume all responsibility from previous rough grade contractor and provide work as required per SWPPP, including supply and install of mailbox as required. Maintain and remove silt fence as installed By Others.
14. Temporary Access Roads: Maintain temporary access roads installed By Others so as to support loads and to withstand exposure to traffic during construction period. Extend temporary roads within construction limits as necessary for construction operations.
15. Traffic Controls: Provide temporary traffic controls at the junction of temporary roads with public roads. Include warning signs for public traffic and "STOP" signs for entrance onto public roads. Comply with requirements of authorities having jurisdiction. Refer to Spec Section 32 1100: Maintenance and Protection of Traffic.
16. General Construction Contractor must perform street cleaning operations to avoid dirt, mud, and debris from being tracked onto public roads. Street cleaning must be done daily if required or as directed by the Construction Manager. Ensure compliance with Spec Section 31 2501 Erosion and Sediment Control and project SWPPP.
17. Site Enclosure Fence: Before construction operations begin, install 6' portable chain-link enclosure fence with lockable entrance gates. Locate where indicated as shown on drawing L101. In addition, clearly delineate the remaining perimeter of the project site by enclosing it with a snow fence (at a minimum) prohibiting public access. Install and maintain in a manner that will prevent people, dogs, and other animals from easily entering the site except by entrance gates.
  - a) Set fence posts at gates to maintain integrity.
  - b) Provide gates in sizes and at locations necessary to accommodate delivery vehicles and other construction operations.
  - c) Maintain security by limiting the number of keys and restricting distribution to authorized personnel. Provide the Owner and Construction Manager with one set of keys each.

- d) Install and maintain temporary fencing, covers, and barricading within the site as required to coordinate with work by others and to keep unauthorized persons away from excavations and hazardous areas for which contractor is responsible.
18. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.
- a) Disposable Supplies: Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.
  - b) Toilets: Install self-contained toilet units. Shield toilets to ensure privacy. Provide separate facilities for male and female personnel as required.
  - c) Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel who handle materials that require wash up. Dispose of drainage properly. Supply cleaning compounds appropriate for each type of material handled.
19. Project Field Office Trailer
- a) Provide 10'x36' field office (minimum) for use by General Construction Contractor, Construction Manager, and Architect/Engineer (both part-time) that shall contain 1 (one) 10'x10' office for General Construction Contractor use and 1 (one) 10'x26' conference room with plan table, desk, and conference table for use by Construction Manager and Architect/Engineer. General Construction Contractor may choose to establish a separate Field Office from the above if it so chooses.
  - b) All associated costs, including delivery, set-up, leveling, rental, operation, maintenance, furnishings, heating and cooling, internet, WIFI, stairs for access at all doors, removal, etc. through the specified duration. Provide all disconnects and removals at time designated by the Construction Manager.
  - c) Locate 10'x36' (minimum) field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access as per an approved logistics plan.
  - d) Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet of building lines. Comply with NFPA 241.
  - e) Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
  - f) At the end of the project, when the field office is removed, this Contractor is to return the area to the original condition including repaving, reseeding, etc.
  - g) Two (2) fire extinguishers type 20 BC
  - h) One (1) storage cabinet, with locking doors, 2'dx3'wx6'h.
  - i) All stairs shall have railings and a landing at the entrance door.
  - j) Two (2) new desk chairs
  - k) Two (2) table tops in the office, 2' x width of trailer with two (2), 2-drawer filing cabinets under top.
  - l) One (1) plan table 3'x8' for the Conference Room.
  - m) Plan racks for thirty (30) sets of plans with clamps.
  - n) Two (2) Conference tables – 3' x 8'.
  - o) Fifteen (15) folding chairs.
  - p) 30 If x 12" wide shelving as required.
  - q) Two (2) 3-drawer file cabinets legal size, with lock.
  - r) Water cooler and cups, with scheduled water delivery as required.
  - s) Supply and install "Blink Outdoor 5 – cam" Security Camera System. Install all furnishings as directed by the Construction Manager.
  - t) The furnishings will become the property of the owner upon completion of the project, with the exception of the water cooler, which may be rented.

20. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction such as pool, foundation, trench excavations, etc. Provide temporary fencing or lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
21. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erecting structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of possible hazards. Where appropriate and needed, provide lighting, including flashing red or amber lights.
22. 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 facilities. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
23. Excludes:
  - a) Bonding and grounding of all Pool & Spray park systems
  - b) Supply and installation of original sediment control fence only (was installed BO)
  - c) Temporary access road install (was installed BO)
  - d) Installation of Temporary Power to Project Office Trailer
  - e) Temporary Power & Internet Usage Cost at Office Trailer
  - f) City Building Permit Fees
  - g) Supply and install exterior 4" sanitary and domestic supply piping system adjacent to the bath house as per drawing P 101.
  - h) Supply and install Drinking Fountain and Pool Shower equipment and system as indicated on details 14 and 15 on L-602.
  - i) Install only of Splash Pad Manifold Assembly, Backflow Preventer, and Pressure regulator including mounting and final connection to 2" domestic. (Final connection to individual piping circuits by General Construction Prime).

## 1.9 CONTRACT 2 – HVAC CONTRACT

- A. Work in the HVAC Contract includes, but is not limited to, the following:
1. Provide, furnish, and install all labor, material, supervision, equipment, scaffolding, layout, engineering, deliveries, trucking, hoisting, rigging, shop drawings, submittals, and all other items related and required to complete all HVAC Contract work in accordance with the Contract Documents and all applicable codes having jurisdiction.
  2. Provide the work of Division 01 General Requirements unless stated otherwise. The listing of Drawings and Specifications is intended as a guide and does not relieve the HVAC Contractor of the responsibility of reviewing all Drawings and Specifications for bidding and coordinating with other Prime Contractors during construction.
  3. The HVAC Contractor represents it has the expertise in the performance of work for this trade and assures all items to be complete, functional, and installed in accordance with the best practices consistent with premium quality material and workmanship.
  4. The following specifications are to be included and completed in their entirety unless specifically noted otherwise:
    - a) Division 23 - Heating, Ventilating and Air Conditioning (HVAC), in its entirety.

5. Provide all excavation, bedding, backfill, trenching, shoring, pipe, and materials as required for work of this Prime Contract if required. Excavated materials shall not encumber the progress of other trades. Comply with Division 31 – Earthwork, for this work.
6. Prime Contractors are responsible for their own housekeeping pads if required. Comply with Division 03 - Concrete for this work.
7. HVAC Contractor to install piping to all equipment and provide final hook-up (include final hook-up to equipment furnished by others).
8. Provide complete Control Wiring of Mechanical Equipment. The HVAC Contractor to note the following:
  - a) All control wiring for equipment specified in Division 23 in accordance with Division 26 sections. This specifically includes all motors, starters, relays, control switches, and other incidental devices for complete control of the mechanical equipment.
  - b) Control wiring may not be limited to low voltage wiring.
  - c) Sizes of the motor circuit breakers and fuses shown on the drawings or in the specifications are based on criteria available at the time of design and are for bidding purposes only.
  - d) The HVAC Contractor and the Electrical Contractor shall coordinate these sizes with actual motors to be installed for correct motor short circuit and overload protection to ensure that the electrical equipment is sufficient for the starting current of the motor and to ensure compliance with all prevailing electrical codes.
  - e) The Electrical Contractor shall size motor circuit breakers and fuses as directed by the HVAC coordination. The HVAC Contractor shall bear all costs for electric changes by equipment substitutions.
9. Provide complete Heating Motor Controls
  - a) HVAC Contractor shall furnish to the Electrical Contractor, all HVAC equipment motor starters not factory mounted.
  - b) Electrical Contractor to mount and wire.
10. Provide all terminations, removals, and tie-ins as required. Include any necessary premium time or shift work as required by the schedule in order to complete required terminations at fixtures or equipment as required for demolition, capping of equipment to be removed, and tie-ins. Any premium time work shall be approved in advance by the Construction Manager.
11. Supply all exterior louvers, and vents complete, for installation by General Construction Contractor. General Construction Contractor to seal all frames with a weather tight seal. HVAC Prime to supply and install all interior diffusers, vents, grills, and louvers.
12. All lintels for HVAC openings to be furnished and installed by the General Construction Contractor.
13. All motors and controllers specified to be factory mounted and wired shall be purchased with equipment. Field installation of equipment controls and wiring specified to be “factory mounted” will not be allowed. Where miscellaneous electrical devices are to be supplied to the Electrical Contractor, the HVAC Contractor is responsible for forwarding a copy of a signed receipt to the Construction Manager.
14. Equipment furnished by the HVAC Contractor shall be factory painted and field protected until acceptance by the Owner. If protection has not been provided or maintained, the material will be refinished, repaired, or replaced at the discretion of the Construction Manager and at no cost to the Owner.

15. Provide complete fire dampers in locations where ducts pass through fire rated structural floor slabs, partitions, and walls of fire rating greater than one (1) hour. Install in accordance with manufacturer's recommendations utilizing steel sleeves and angles.
16. Firestopping for the work of each Prime Contractor shall be provided by the respective contractor.
17. General Construction Contractor to provide all penetrations through new and existing roofs for all other trades. Roof flashing shall be by the General Construction Contractor. General Construction Contractor to install all roof accessories, curbs, mechanical and electrical penetrations flashing etc. supplied by others. Each Prime Contractor to provide the General Construction Contractor with a detailed roof plan indicating each penetration and verifying size of penetration.
18. Provide complete weather protection for all openings in outside walls, slabs, and roof when pipe-related devices are removed or installed. Patches must be maintained weather-tight and finished in a way acceptable to the Construction Manager, Architect, and Owner.
19. Provide repairs to any damages to adjacent property or other trades' work for which the HVAC Contractor is responsible. This includes, but not limited to, restoration of all site conditions upon removal of debris and equipment.
20. Provide daily clean-ups at the end of each work day to ensure safe work conditions.
21. The HVAC Contractor shall obtain HVAC Permit and Inspections that may be required by any local and state agency.
22. Temporary Closure: At ends of ducts which are not connected to equipment or air distribution devices at time of ductwork installation, provide temporary closure of polyethylene film or other covering which will prevent entrance of dust and debris until time connections are to be completed. If the above have not been strictly followed during the construction period, Contractor will be required to cover all air outlets with cheesecloth and blow out the duct system (supply and return). This requirement shall take place for the first week of continuous air systems operation with the cheesecloth replaced every three days. Contractor shall also be responsible for all associated clean-up.
23. The HVAC Contractor shall provide all testing and balancing as required per Specifications for work installed under this Trade Contract, (no testing to be conducted by Owner). All retests and rebalancing required to meet project Specifications are the responsibility of this Contractor.
24. Provide complete a final cleaning of all areas designated as Mechanical Rooms and all material partial to this Contract to the satisfaction of the Construction Manager and Division 01 Requirements.
25. General Construction Contractor to provide all dumpsters as described in Division 01 Section 5000 "Temporary Facilities and controls" for all trades
26. Provide the disposal of crates, boxes, packing, blocking associated with your work daily or as directed by the Construction Manager.
27. The HVAC, Plumbing, and Electrical Contractor(s) shall hang streamers from all above ceiling equipment that will require access. This is in addition to any specification requirements for tags, labels, etc. Shop Drawings should also highlight these areas for Architect/Engineer's review. In addition, the HVAC Contractor shall notify the Construction Manager and Architect/Engineer of all areas where equipment maintenance access is difficult. Coordinate architecturally placed access doors with points of mechanical systems

requiring that access. Any additional access doors shall be supplied by the HVAC Contractor at no additional cost to the Owner.

28. Excludes:
  - a) City Building Permit Fees
  - b) Installation only of Exterior Louvered vent and grills

#### **1.10 CONTRACT 3 – PLUMBING CONTRACT**

- A. Work in the Plumbing Contract includes, but is not limited to, the following:
1. Furnish and install all labor, material, supervision, equipment, scaffolding, layout, engineering, deliveries, trucking, hoisting, rigging, shop drawings, submittals, and all other items related and required to complete all Plumbing work in accordance with the Contract Documents and all applicable codes having jurisdiction.
  2. Provide the work of Division 01 General Requirements unless stated otherwise. The listing of Drawings and Specifications is intended as a guide and does not relieve the Contractor of the responsibility of reviewing all Drawings and Specifications for bidding and coordinating with other Contractors during construction.
  3. The Contractor represents they have expertise in the performance of work for this trade and assures all items to be complete, functional, and installed in accordance with the best practices consistent with premium quality material and workmanship.
  4. The following specifications are to be included and completed in their entirety unless specifically noted otherwise:
    - a) Division 22 - Plumbing, in its entirety.
  5. The Plumbing Contractor shall be responsible for coordinating all building tie-ins to domestic water as well as storm and sanitary lines with the General Construction Contractor. Plumbing Contractor to extend all underground piping a minimum of 5'-0" beyond building footprints. Final tie in by others.
  6. Supply and install exterior 4" sanitary and domestic supply piping system adjacent to the bath house as per drawing P 101.
  7. Supply and install Drinking Fountain and Pool Shower equipment and system as indicated on details 14 and 15 on L-602.
  8. Install only Splash Pad Manifold Assembly, Backflow Preventer, and Pressure regulator including mounting and final connection to 2" domestic. Final connection to individual piping circuits by others.
  9. Trenches for the Work of each contract shall be provided by each respective Prime Contractor. Refer to Division 31, Earthwork for requirements of this work. Provide all excavation, bedding, backfill, trenching, shoring, pipe, and materials as required for work of this Plumbing Prime Contract. Excavated materials shall not encumber the progress of other trades.
  10. Prime Contractors are responsible for their own respective housekeeping pads, leveling pads, thrust blocks, bases etc. Comply with Division 03 Concrete.

11. Prime Contractors are responsible for their own respective housekeeping pads, thrust blocks, yard clean-out pad, etc. Comply with Division 3 Concrete. The Plumbing Contractor shall provide all floor drains and clean-outs to be set in a bed of concrete prior to slab pour.
12. Provide all core drilling, cutting, and patching of existing construction as required for installation of work of this Prime Contract. All patching, whether due to new work or removal of existing systems, shall be done to match existing construction and finishes. The Plumbing Contractor shall be responsible for water damage to the existing structures and finishes resulting from core drilling related to plumbing work during the course of construction.
13. Provide, as a minimum, one (1) temporary hose outlet per spec section 01 5000 - 1.11. The Plumbing Contractor shall coordinate locations with the Construction Manager.
14. Provide all terminations, removals, and tie-ins as required
15. All motors and controllers specified to be factory-mounted and wired shall be purchased with equipment. Field installation of equipment controls and wiring specified to be "factory mounted" will not be allowed. Where miscellaneous electrical devices are to be supplied to the Electrical Contractor, the Plumbing Contractor is responsible for forwarding a copy of a signed receipt to the Construction Manager.
16. Equipment furnished by the Plumbing Contractor shall be factory painted and field protected until acceptance by the Owner. If protection has not been provided or maintained, the material will be refinished, repaired or replaced at the discretion of the Construction Manager and at no cost to the Owner.
17. Firestopping for the Work of each Prime Contract shall be provided by each respective contractor.
18. General Construction Contractor to provide all penetrations through new and existing roofs for all other trades. Roof flashing shall be by the General Construction Contractor. General Construction Contractor to install all roof accessories, curbs, mechanical and electrical penetrations flashing etc. supplied by others. Plumbing Contractor to install roof drains. Contractors provide the General Construction Contractor with a detailed roof plan indicating each penetration and verifying size of penetration.
19. Provide repairs to any damages to adjacent property or other trades' work for which the Plumbing Contractor is responsible. This includes, but is not limited to, restoration of all site conditions upon removal of debris and equipment.
20. The Plumbing Contractor shall obtain Plumbing Permit and Inspections that may be required by any local or state agency.
21. The Plumbing Contractor shall provide all testing as required per Specifications for work installed under this Prime Contract (no testing to be conducted by Owner). All retests required to meet project Specifications are the responsibility of this Contractor.
22. General Construction Contractor to provide all wood blocking for the following trades. Each Prime Contractor to provide the General Construction Contractor a detailed drawing indicating the layout of each trades wood blocking.
23. General Construction Contractor to provide all dumpsters as described in Division 01 Section 5000 "Temporary Facilities and controls" for all trades.
24. Provide complete disposal of crates, boxes, packing, blocking associated with your work daily or as directed by the Construction Manager.

25. The Heating, Plumbing, and Electrical Contractor(s) shall hang streamers from all above ceiling equipment that will require access. This is in addition to any specification requirements for tags, labels, etc. Shop Drawings should also highlight these areas for Architect/Engineer's review. In addition, the Plumbing Contractor shall notify the Construction Manager and Architect/Engineer of all areas where equipment maintenance access is difficult. Coordinate architecturally placed access doors with points of mechanical systems requiring that access. Any additional access doors shall be supplied by the Plumbing Contractor at no additional cost to the Owner.
26. Excludes:
  - a) Force Main Pump Station & Controls
  - b) City Building Permit Fees

#### **1.11 CONTRACT 4 – ELECTRICAL CONTRACT**

A. Work in the Electrical Contract includes, but is not limited to, the following:

1. Furnish and install all labor, material, supervision, equipment, scaffolding, layout, engineering, deliveries, trucking, hoisting, rigging, shop drawings, submittals, and all other items related and required to complete all Electrical work in accordance with the Contract Documents and all applicable codes having jurisdiction.
2. Provide the work of Division 1 General Requirements unless stated otherwise. The listing of Drawings and Specifications is intended as a guide and does not relieve the Contractor of the responsibility of reviewing all Drawings and Specifications for bidding and coordinating with other Prime Contractors during construction.
3. The Electrical Contractor represents that it has the expertise in the performance of work for this trade and assures all items to be complete, functional, and installed in accordance with the best practices consistent with premium quality material and workmanship.
4. The following specifications are to be included and completed in their entirety unless specifically noted otherwise:
  - a) Division 26 Electrical, in its entirety.
  - b) Division 28 Electrical Safety and Security, in its entirety.
5. Trenches for the Work of each contract shall be provided by each respective Prime Contractor. Refer to Division 31, Earthwork for requirements of this work. Provide all excavation, bedding, backfill, trenching shoring, pipe and materials as required for work of this Electrical Prime Contract. Excavated materials shall not encumber the progress of other trades.
6. Prime Contractors are responsible for their own respective housekeeping pads, leveling pads, conduit concrete encasement, light pole bases etc. Comply with Division 3 Concrete.
7. Bonding and grounding of all Pool and Spray pad systems.
8. All motors and controllers specified to be factory mounted and wired shall be purchased with equipment. Field installation of equipment controls and wiring specified to be "factory mounted" will not be allowed. Where miscellaneous electrical devices are to be supplied to the other trades, The Electrical Contractor is responsible for forwarding a copy of a signed receipt to the Construction Manager.

9. Equipment furnished by the Electrical Contractor shall be factory painted and field protected until acceptance by the Owner. If protection has not been provided or maintained, the material will be refinished, repaired, or replaced at the discretion of the Construction Manager and at no cost to the Owner.
10. Provide all core drilling, cutting, and patching of existing construction as required for installation of work of this Trade Contract. All patching, whether due to new work or removal of existing systems, shall be done to match existing construction and finishes. The Electrical Contractor shall be responsible for water damage to the existing structures and finishes resulting from core drilling related to electrical work during construction.
11. Provide all terminations, removals, and tie-ins as required.
12. General Construction Contractor to provide all penetrations through roofs for all other trades. General Construction Contractor to install all roof accessories, curbs, mechanical and electrical penetrations etc. supplied by others. Electrical Contractor to provide all raceway portals for conduit penetrating the roof. Prime Contractors to provide The General Construction Contractor with a detailed roof plan indicating each penetration and verifying size of penetration.
13. Provide all safeguards necessary for fire protection and prevention due to operations. The Electric Contractor shall furnish and maintain sufficient fire protection equipment in each area being worked by the Electric Contractor.
14. Provide final cleaning of all areas designated as switchgear and electrical rooms and all material partial to this Contract to the satisfaction of the Construction Manager and per Division 01 Specifications.
15. Provide repairs to any damages to adjacent property or other trades' work for which the Electrical Contractor is responsible. This includes, but not limited to, restoration of all site conditions upon removal of debris and equipment.
16. All boxes and enclosures for emergency circuits must be painted red, marked with a contrasting-colored label saying "EMERGENCY CIRCUIT", or in some other approved manner.
17. All conduit, whether loose or installed, shall be protected to prohibit the contamination of foreign material in a manner acceptable to the Construction Manager. If proper protection has not been enforced, an independent cleaning contractor shall be employed by this contractor to clean systems in a manner acceptable to the Construction Manager at no cost to the Owner.
18. The Electrical Contractor shall obtain Electrical Permit and Inspections that may be required by any local and state agency.
19. The Electrical Contractor shall provide all testing as required per Specifications for work installed under this Trade Contract (no testing to be conducted by Owner). All retests required to meet project Specifications are the responsibility of this Contractor.
20. The Electric Contractor shall provide temporary construction lighting and power for buildings, utilizing temporary power distribution panels centrally located for all Trade Contractors' use. Any temporary power and lighting set-ups shall comply with the requirements of all agencies having jurisdiction as well as Section 01-5000.1.4. and 1.5 and item 27 herein.

21. General Construction Contractor to provide all wood blocking for the following trades. Each Prime Contractor to provide the General Construction Contractor a detailed drawing indicating the layout of each trades wood blocking.
22. General Construction Contractor to provide all dumpsters as described in Division 01 Section 5000 "Temporary Facilities and controls" for all trades.
23. Provide complete the disposal of crates, boxes, packing, blocking associated with your work on a daily basis or as directed by the Construction Manager.
24. Firestopping for the work of each Prime Contract shall be provided by each respective Prime Contractor.
25. Provide all final electrical connections to equipment provided by others. Coordinate with Contractors to verify that equipment matches the characteristics of the service being supplied.
26. The Heating, Plumbing, and Electrical Contractor(s) shall hang streamers from all above ceiling equipment that will require access. This is in addition to any specification requirements for tags, labels, etc. Shop Drawings should also highlight these areas for Architect/Engineer's review. In addition, the Heating Contractor shall notify the Construction Manager and Architect/Engineer of all areas where equipment maintenance access is difficult. Coordinate architecturally placed access doors with points of mechanical systems requiring that access. Any additional access doors shall be supplied by the Heating Contractor at no additional cost to the Owner.
27. Temp Lighting & Power: Provide temporary lighting with local switching that provides adequate illumination for construction operations and working conditions per Spec Section 01-5000 - 1.4 and 1.5.
  - a) Install and operate temporary lighting that fulfills security and protection requirements without operating the entire permanent system if required.
  - b) Provide one 100-W incandescent lamp per 500 sq. ft. (45 sq. m), uniformly distributed, for general lighting, or equivalent illumination.
  - c) The Electrical Contractor shall furnish, install, and maintain a temporary electric feeder to the Project Office Trailer immediately after it is placed at the jobsite. The trailer will be located at the project site. Power shall be provided 24 hours a day, 7 days per week. The temporary electrical feeder shall be as required and shall be protected by a fused safety switch, complying with codes and utility company requirements having jurisdiction. Make all arrangements and pay all costs to provide electric service from **April 1, 2023 To October 31, 2023**. Maintain the system in good operating condition, including the furnishing of the necessary bulb replacement lamps, etc. for the duration of the project. At the expiration of time set forth above, the temporary feeder, safety switch, etc., shall be removed and disposed of as directed.
28. Excludes:
  - a) HVAC, Pool, and Splash pad controls.
  - b) Electric use cost for GCC / CM / Designer Project Trailer and project temp power (cost by Owner)
  - c) Cost of City permit fees

## **1.11 SITE USE RESTRICTIONS**

- A. The Contractor shall schedule all operations to minimize interference with existing pedestrian and

- vehicular traffic and existing utilities.
- B. The Contractor shall contain all construction activities within the project area. Damage to areas outside the project area shall be repaired to the original condition, by the Contractor, at the Contractor's expense.
  - C. The Contractor shall notify the Owner's Representative and appropriate utility companies at least 48 hours in advance of any proposed interruptions to existing utility services.
  - D. The Contractors shall provide and maintain as neat and clean a construction site as possible.
  - E. No diesel fuel or other toxic materials are to be stored on site.
  - F. Comply with all conditions of applicable laws and permits with respect to allowed periods of construction.

#### **1.12 GENERAL QUALITY CONTROL**

- A. The Contractor shall visit the site where the work of the contract is to be performed. The Contractor shall examine and inform themselves of all existing conditions related to the performance of the contract.
- B. The work of this contract shall be performed only with personnel possessing the required skills for each portion of the work. Any work not meeting Owner's Representative's standards for adequate workmanship must be removed and replaced. All work shall be performed in accordance with the applicable standards, requirements, and specifications.
- C. The Contractor shall take full responsibility for failure of materials, devices, equipment, systems, and finishes erected or applied in accordance with the requirements of this article and shall remove, replace, repair, or correct any such failures or deficiencies promptly, upon notification by Owner or Owner's Representative.
- D. Whenever any manufacturer of material utilized in the project issues recommended fabrication, installation, erection and/or application standards or instructions, such standards or instructions shall be strictly followed in the performance of the work, except as specified or approved otherwise in writing.
- E. Whenever any trade, organization, institution, utility company, code group, society, association and/or governing board standard, requirement or specification is adopted by the reference in these specifications, perform all work related thereto in strict accordance with the latest edition thereof and/or amendments thereto or the specifications herewith, whichever is more stringent.

<b>Exhibit "D"</b> Drawings and Specifications					
INCLUDED IN THIS PACKAGE	DRAWING/SPEC	DESCRIPTION	ISSUE DATE	REVISION DATE	REVISION #
<b>GENERAL</b>					
X	G100	COVER SHEET	11/1/2022		
X	G101	GENERAL INFORMATION	11/1/2022		
<b>LANDSCAPE ARCHITECTURE</b>					
X	L100	EXISTING CONDITIONS PLAN	11/1/2022		
X	L101	EXISTING CONDITIONS PLAN	11/1/2022		
X	L102	EXISTING CONDITIONS PLAN	11/1/2022		
X	L200	DEMOLITION PLAN	11/1/2022		
X	L201	DEMOLITION PLAN	11/1/2022		
X	L300	LAYOUT AND MATERIALS PLAN	11/1/2022		
X	L301	SPLASH PAD ENLARGEMENT	11/1/2022		
X	L302	SPLASH PAD UTILITIES	11/1/2022		
X	L400	GRADING AND DRAINAGE PLAN	11/1/2022		
X	L401	GRADING PLAN: SPLASH PAD	11/1/2022		
X	L500	PLANTING PLAN	11/1/2022		
X	L501	PLANTING PLAN: ENTRANCE	11/1/2022		
X	L502	PLANTING PLAN: SPLASH PAD	11/1/2022		
X	L503	PLANTING PLAN: STORMWATER BASIN	11/1/2022		
X	L600	SITE DETAILS	11/1/2022		
X	L601	SITE DETAILS	11/1/2022		
X	L602	SITE DETAILS	11/1/2022		
X	L603	SITE DETAILS	11/1/2022		
X	L604	SITE DETAILS	11/1/2022		
X	L605	SITE DETAILS	11/1/2022		
X	L606	SITE DETAILS	11/1/2022		
X	L607	SITE DETAILS	11/1/2022		
X	L608	SITE DETAILS	11/1/2022		
X	L609	SITE DETAILS	11/1/2022		
<b>ARCHITECTURAL</b>					
X	A001	LFE SAFETY PLAN	11/1/2022		
X	A100	FLOOR PLAN POOL HOUSE	11/1/2022		
X	A101	PLANS PUMP HOUSE	11/1/2022		
X	A102	REFLECTED CEILING PLAN POOL HOUSE	11/1/2022		
X	A103	ROOF PLANS	11/1/2022		
X	A200	ELEVATIONS POOL HOUSE	11/1/2022		
X	A201	ELEVATIONS POOL HOUSE	11/1/2022		
X	A202	ELEVATIONS AND SECTIONS AT PUMP HOUSE	11/1/2022		

INCLUDED IN THIS PACKAGE	DRAWING/SPEC	DESCRIPTION	ISSUE DATE	REVISION DATE	REVISION #
<b>ARCHITECTURAL</b>					
X	A300	BUILDING SECTIONS POOL HOUSE	11/1/2022		
X	A400	ENLARGED PLANS MEN'S AND WOMEN'S	11/1/2022		
X	A401	ENLARGED PLANS	11/1/2022		
X	A500	WALL SECTIONS	11/1/2022		
X	A501	WALL SECTIONS	11/1/2022		
X	A600	DETAILS	11/1/2022		
X	A601	DETAILS	11/1/2022		
X	A700	INTERIOR ELEVATIONS AND FINISH SCHEDULE	11/1/2022		
X	A800	DOORS AND WINDOWS	11/1/2022		
<b>STRUCTUAL</b>					
X	S.0	STRUCTURAL NOTES	11/1/2022		
X	S.1	FOUNDATION PLAN AND DETAILS	11/1/2022		
X	S.2	STRUCTURAL FLOOR PLAN	11/1/2022		
X	S.3	ROOF FRAMING PLAN	11/1/2022		
X	S.4	STRUCTURAL ELEVATIONS	11/1/2022		
X	S.5	STRUCTURAL SECTIONS	11/1/2022		
X	S.6	STRUCTURAL DETAILS 1	11/1/2022		
X	S.7	STRUCTURAL DETAILS 2	11/1/2022		
<b>AQUATIC PLANS</b>					
X	AQ101	OVERALL AQUATIC PLAN	11/1/2022		
X	AQ102	DETAILED POOL PLAN-ZERO ENTRY POOL	11/1/2022		
X	AQ103	DETAILED POOL PLAN-LAP POOL	11/1/2022		
X	AQ201	POOL SECTIONS	11/1/2022		
X	AQ301	OVERALL PIPING PLAN	11/1/2022		
X	AQ401	EQUIPMENT ROOM PLAN AND SCHEMATICS	11/1/2022		
X	AQ402	EQUIPMENT SCHEDULES	11/1/2022		
X	AQ501	POOL DETAILS	11/1/2022		
X	AQ502	POOL DETAILS	11/1/2022		
X	AQ503	POOL DETAILS	11/1/2022		
X	AQ504	3D VIEWS	11/1/2022		
<b>CIVIL</b>					
X	C101	UTILITY PLAN 1	11/1/2022		
X	C102	UTILITY PLAN 2	11/1/2022		
X	C201	UTILITY DETAILS	11/1/2022		
X	C202	UTILITY DETAILS	11/1/2022		
<b>MECHANICAL</b>					
X	M001	MECHANICAL LEGEND, SYMBOLS AND ABBREVIATIONS	11/1/2022		
X	M101	MECHANICAL FLOOR PLAN	11/1/2022		
X	M102	MECHANICAL PUMP HOUSE FLOOR PLAN	11/1/2022		

INCLUDED IN THIS PACKAGE	DRAWING/SPEC	DESCRIPTION	ISSUE DATE	REVISION DATE	REVISION #
<b>PLUMBING</b>					
X	P001	PLUMBING LEGEND, SYMBOLS AND ABBREVIATIONS	11/1/2022		
X	P101	PLUMBING POOL HOUSE FLOOR PLAN	11/1/2022		
X	P102	PLUMBING PUMP HOUSE FLOOR PLAN	11/1/2022		
X	P301	RISER DIAGRAMS	11/1/2022		
X	P600	PLUMBING DETAILS	11/1/2022		
<b>ELECTRICAL</b>					
X	E001	ELECTRICAL LEGEND, SYMBOLS AND ABBREVIATIONS	11/1/2022		
X	E101	ELECTRICAL LIGHTING FLOOR PLAN	11/1/2022		
X	E201	ELECTRICAL POWER FLOOR PLAN	11/1/2022		
X	E600	ELECTRICAL DETAILS	11/1/2022		
X	E601	ELECTRICAL SCHEDULES	11/1/2022		
X	ES001	ELECTRICAL SITE LIGHTING PLAN	11/1/2022		
X	ES002	ELECTRICAL UTILITY PLAN	11/1/2022		
<b>SPECIFICATIONS</b>					
X		PROJECT MANUAL CONSISTING OF 849 PAGES	11/30/2022		

## **SECTION 01 2000**

### **PRICE AND PAYMENT PROCEDURES**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Schedule of values.
- B. Applications for payment.
- C. Field Order Allowance
- D. Change procedures.
- E. Defect assessment.

##### **1.02 SCHEDULE OF VALUES**

- A. Submit printed schedule on AIA Form G703 - Continuation Sheet for G702.
- B. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement.
- C. Format: Utilize Table of Contents of this Project Manual. Identify each line item with number and title of major specification Section. Identify site mobilization, bonds, and insurance.
- D. Include separately from each line item, direct proportional amount of Contractor's overhead and profit.
- E. Revise schedule to list approved Change Orders, with each Application for Payment.

##### **1.03 APPLICATIONS FOR PAYMENT**

- A. Submit two copies of each application on AIA Form G702 - Application and Certificate for Payment and AIA G703 - Continuation Sheet for G702. Include two (2) copies of Contractors and Subcontractors certified payroll.
- B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.
- C. Submit updated construction schedule with each Application for Payment.
- D. Payment Period: Submit at intervals stipulated in the Agreement.
- E. Submit with transmittal letter as specified for Submittals in Section 01 3300.
- F. Submit certified payrolls with each payment application.

- G. Contractor shall receive payment approximately 4 weeks from the time the payment application is submitted to the Museum.

#### **1.04 FIELD ALLOWANCE**

- A. Contractor's costs for products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, overhead and profit will be included in Change Orders authorizing expenditure of funds from this Field Allowance.
- B. Funds will be drawn from Field Allowance only by Change Order.
- C. At closeout of Contract, funds remaining in Contingency Allowance will be credited to Owner by Change Order.

#### **1.05 CHANGE PROCEDURES**

- A. Submittals: Submit name of individual authorized to receive change documents and be responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.
- B. The Owner's Representative will advise of minor changes in the Work not involving adjustment to Contract Sum/Price or Contract Time by issuing supplemental instructions on AIA Form G710.
- C. The Owner's Representative may issue a Proposal Request including a detailed description of proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change with stipulation of overtime work required and the period of time during which the requested price will be considered valid. Contractor will prepare and submit estimate within 15 days.
- D. Stipulated Sum / Price Change Order: Based on Proposal Request and Contractor's fixed price quotation.
- E. Construction Change Directive: Owner's Representative may issue directive, on AIA Form G713 Construction Change Directive signed by Owner, instructing Contractor to proceed with change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work, and designate method of determining any change in Contract Sum/Price or Contract Time. Promptly execute change.

#### **1.06 DEFECT ASSESSMENT**

- A. Replace the Work, or portions of the Work, not conforming to specified requirements.
- B. If, in the opinion of the Owner's Representative, it is not practical to remove and replace the Work, the Owner's Representative will direct appropriate remedy or adjust payment.
- C. The defective Work may remain, but unit sum/price will be adjusted to new sum/price at discretion of Owner's Representative.
- D. Defective Work will be partially repaired to instructions of Owner's Representative and unit sum / price will be adjusted to new sum/price at discretion of Owner's Representative.

- E. Individual specification sections may modify these options or may identify specific formula or percentage sum/price reduction.
- F. Authority of Owner's Representative to assess defects and identify payment adjustments, is final.
- G. Non-Payment For Rejected Products: Payment will not be made for rejected products for any of the following:
  1. Products wasted or disposed of in a manner that is not acceptable.
  2. Products determined as unacceptable before or after placement.
  3. Products not completely unloaded from transporting vehicle.
  4. Products placed beyond lines and levels of required Work.
  5. Products remaining on hand after completion of the Work.
  6. Loading, hauling, and disposing of rejected products.

## **PART 2 PRODUCTS**

Not Used.

## **PART 3 EXECUTION**

Not Used.

**END OF SECTION**

**SECTION 01 3000**  
**ADMINISTRATIVE REQUIREMENTS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Coordination and project conditions.
- B. Field engineering.
- C. Preconstruction meeting.
- D. Progress meetings.

**1.2 COORDINATION AND PROJECT CONDITIONS**

- A. Coordinate scheduling, submittals, and Work of various sections of Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements.

**1.3 FIELD ENGINEERING**

- A. Employ Land Surveyor registered in State of New York and acceptable to Architect / Engineer.
- B. Locate and protect survey control and reference points. Promptly notify Owner's Representative of discrepancies discovered.
- C. Control datum for survey is that established by Owner provided survey.
- D. Verify set-backs and easements; confirm drawing dimensions and elevations.
- E. Provide field engineering services. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.
- F. Submit copy of site drawing and certificate signed by Land Surveyor certifying elevations and locations of the Work are in conformance with Contract Documents.
- G. Maintain complete and accurate log of control and survey work as Work progresses.
- H. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- I. Promptly report to Owner's Representative loss or destruction of reference point or relocation required because of changes in grades or other reasons.
- J. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Owner's Representative.

**1.4 PRECONSTRUCTION MEETING**

- A. Owner's Representative will schedule meeting after Notice of Award.

- B. Attendance Required: Owner, Construction Manager, Architect/Engineer, and Prime Contractors, at a minimum.
- C. Contractor to provide (1) 38-oz. "Party Size" bag of Peanut M&Ms for meeting attendees.
- D. Agenda:
  - 1. Execution of Owner-Contractor Agreement.
  - 2. Submission of executed bonds and insurance certificates.
  - 3. Distribution of Contract Documents.
  - 4. Submission of list of Subcontractors, list of products, schedule of values, and progress schedule.
  - 5. Designation of personnel representing parties in Contract, and Owner's Representative.
  - 6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
  - 7. Scheduling.
- E. Contractor to record minutes and distribute copies within two days after meeting to participants and those affected by decisions made.

## **1.5 PROGRESS MEETINGS**

- A. Schedule and administer meetings throughout progress of the Work at bi-monthly intervals, at minimum. Comply with Spec Section 01 1000, 1.5.
- B. Contractor to make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- C. Attendance Required: Job superintendent, major subcontractors and suppliers, Owner, Construction Manager, Architect/Engineer, as appropriate to agenda topics for each meeting.
- D. Agenda:
  - 1. Review minutes of previous meetings.
  - 2. Review of Work progress.
  - 3. Field observations, problems, and decisions.
  - 4. Identification of problems impeding planned progress.
  - 5. Review of submittals schedule and status of submittals.
  - 6. Review of off-site fabrication and delivery schedules.
  - 7. Maintenance of progress schedule.
  - 8. Corrective measures to regain projected schedules.
  - 9. Planned progress during succeeding work period.
  - 10. Coordination of projected progress.
  - 11. Maintenance of quality and work standards.
  - 12. Effect of proposed changes on progress schedule and coordination.
  - 13. Other business relating to Work.
- E. Contractor to record minutes and distribute copies within two days after meeting to participants, and those affected by decisions made.

## **PART 2 PRODUCTS**

Not Used.

### **PART 3 EXECUTION**

Not Used.

**END OF SECTION**

## **SECTION 01 3300**

### **SUBMITTAL PROCEDURES**

#### **PART 1 GENERAL**

##### **1.1 SECTION INCLUDES**

- A. Submittal procedures.
- B. Construction progress schedules.
- C. Product data.
- D. Shop drawings.
- E. Samples.
- F. Test reports.
- G. Certificates.
- H. Manufacturer's instructions.

##### **1.2 SUBMITTAL PROCEDURES**

- A. The Contractor shall provide a submittal schedule to the Owner's Representative at the start of the Project, for approval. Schedule submittals to expedite the project based on the dates materials are required on site, taking into account fabrication or manufacturing time. Coordinate the submission of related items. Deliver all submittals to Owner's Representative.
- B. Transmit each submittal with AIA Form G810 or Owner's Representative accepted form.
- C. Sequentially number transmittal forms. Mark revised submittals with original number and sequential alphabetic suffix.
- D. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with requirements of the Work and Contract Documents.
- E. Identify Project, Contractor, subcontractor and supplier, pertinent drawing, detail number and specification section.
- F. Allow 10 working days for the review of each shop drawing and five working days for review of all other submittals, excluding delivery time to and from the Contractor.
- G. Allow space on submittals for Contractor and Owner's Representative review stamps.
- H. When revised for resubmission, identify changes made since previous submission.
- I. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.

- J. Submittals not requested will not be recognized or processed.

### **1.3 CONSTRUCTION PROGRESS SCHEDULES**

- A. Submit initial construction schedule within 7 days after receipt of notice to proceed. After review, resubmit required revised data within ten days.
- B. Submit computer generated horizontal bar chart with separate line for each major portion within each division of Work, identifying the first work day of each week, for the initial schedule.
- C. Submit revised Progress Schedules periodically.
- D. Promptly report, in writing to the Owner's Representative and Owner, problems anticipated in meeting projected schedules.
- E. Submit a separate schedule of submittal dates for shop drawings, product data, and samples. Indicate the key dates when reviewed submittals for long lead items will be required from the Owner's Representative, and indicate latest decision dates for the selection of finishes.
- F. Revisions To Schedules:
  - 1. Indicate progress of each activity to date of submittal, and projected completion date of each activity.
  - 2. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.

### **1.4 PRODUCT DATA**

- A. Product Data: Submit for review to the Owner's Representative for the limited purpose of checking for conformance with the information given and the design concept expressed in the Contract Documents.
- B. Submit one digital copy.
- C. Mark copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- D. Indicate product utility and electrical characteristics and utility connection requirements.

### **1.5 SHOP DRAWINGS**

- A. Shop Drawings: Submit for review to the Owner's Representative for the limited purpose of checking for conformance with the information given and the design concept expressed in the Contract Documents.
- B. Submit one digital file.
- C. Indicate special utility and electrical characteristics, utility connection requirements, and, where appropriate, the location of utility outlets for service for equipment and appliances.

### **1.6 TEST REPORTS**

- A. Submit for Owner's Representative knowledge as contract administrator or for Owner.

- B. Submit test reports for the limited purpose of assessing conformance with the information given and the design concept expressed in Contract Documents.

#### **1.7 CERTIFICATES**

- A. When specified in individual specification sections, submit certification by the manufacturer, the installation/application subcontractor, or the Contractor to the Owner's Representative, in quantities specified for Product Data.
- B. Indicate if material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on a material or product, but must be acceptable to the Owner's Representative.

#### **1.8 MANUFACTURER'S INSTRUCTIONS**

- A. When specified in individual specification sections, submit printed instructions for the delivery, storage, assembly, installation, start-up, adjusting, and finishing of a device or product, to the Owner's Representative for delivery to Owner in quantities specified.
- B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

### **PART 2 PRODUCTS**

Not Used.

### **PART 3 EXECUTION**

Not Used.

**END OF SECTION**

## **SECTION 01 4000**

### **QUALITY REQUIREMENTS**

#### **PART 1 GENERAL**

##### **1.1 SECTION INCLUDES**

- A. Quality control and control of installation.
- B. Tolerances
- C. References.
- D. Testing and inspection services.
- E. Manufacturers' field services.

##### **1.2 QUALITY CONTROL AND CONTROL OF INSTALLATION**

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. When manufacturers' instructions conflict with Contract Documents, request clarification from Owner's Representative before proceeding.
- D. 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.
- E. Perform Work by persons qualified to produce the required and specified quality.
- F. Verify that field measurements are as indicated on Shop Drawings or as instructed by manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

##### **1.3 TOLERANCES**

- A. Monitor fabrication and installation tolerance control of products so as to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. When manufacturers' tolerances conflict with Contract Documents, request clarification from Owner's Representative before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

## **1.4 REFERENCES**

- A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current on date of Contract Documents, except where specific date is established by code.
- C. Obtain copies of standards where required by product specification sections.
- D. When specified reference standards conflict with Contract Documents, request clarification from Owner's Representative before proceeding.
- E. Neither contractual relationships, duties, nor responsibilities of the parties in Contract, nor those of the Owner's Representative, shall be altered from that which is stated in the Contract Documents by mention or inference in reference documents.

## **1.5 TESTING AND INSPECTION SERVICES**

- A. The contractor shall employ and pay for the specified services of an independent firm to perform testing and inspection services.
- B. When a testing laboratory is retained by the Contractor, submit, prior to the start of Work, the testing laboratory name, address, and telephone number, and names of full time specialist and responsible officer. Submit copy of report of laboratory facilities inspection made by Materials Reference Laboratory of National Bureau of Standards during most recent inspection, with memorandum of remedies of deficiencies reported by inspection.
- C. An independent firm will perform tests, inspections and other services specified in individual specification sections and as required by the Owner's Representative.
  - 1. Laboratory: Authorized to operate in State of New York.
  - 2. Laboratory Staff: Maintain full time specialist on staff to review services.
  - 3. Testing Equipment: Calibrated at reasonable intervals with devices of accuracy traceable to National Bureau of Standards or accepted values of natural physical constants.
- D. Testing, inspections and source quality control may occur on or off project site. Perform off-site testing as required by the Owner's Representative or Owner.
- E. Reports shall be submitted by an independent testing firm to the Owner's Representative and Contractor, in duplicate, and will provide observations and test results that indicate compliance or non-compliance with the Contract Documents.
- F. Cooperate with the independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
  - 1. Notify Owner's Representative and independent firm 24 hours prior to expected time for operations requiring services.
  - 2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.
- G. Testing and the employment of a testing agency or laboratory shall not relieve the Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

- H. Re-testing or re-inspection required because of non-conformance with specified requirements shall be performed by the same independent firm that performed the initial test, at the discretion of the Owner's Representative. Payment for re-testing or re-inspection shall be the responsibility of the Contractor.
- I. Testing Agency Responsibilities:
  - 1. Test samples of mixes submitted by Contractor.
  - 2. Provide qualified personnel at site. Cooperate with Owner's Representative and Contractor in performance of services.
  - 3. Perform specified sampling and testing of products in accordance with specified standards.
  - 4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
  - 5. Promptly notify Owner's Representative and Contractor of observed irregularities or non-conformance of Work or products.
  - 6. Perform additional tests required by Owner's Representative.
  - 7. Attend pre-construction meetings and progress meetings.
- J. Testing Agency Reports: After each test, promptly submit two copies of report to Owner's Representative and to Contractor. When requested by Owner's Representative, provide interpretation of test results. Include the following:
  - 1. Date issued.
  - 2. Project title and number.
  - 3. Name of inspector.
  - 4. Date and time of sampling or inspection.
  - 5. Identification of product and specifications section.
  - 6. Location in Project.
  - 7. Type of inspection or test.
  - 8. Date of test.
  - 9. Results of tests.
  - 10. Conformance with Contract Documents.
- K. Limits On Testing Authority:
  - 1. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
  - 2. Agency or laboratory may not assume duties of Contractor.
  - 3. Agency or laboratory has no authority to stop the Work.

## **1.6 MANUFACTURERS' FIELD SERVICES**

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment and as applicable, and to initiate instructions when necessary.
- B. Submit qualifications of observer to Owner's Representative 30 days in advance of required observations. Observer subject to approval of Owner's Representative.
- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- D. Refer to Section 01 3300 - SUBMITTAL PROCEDURES

## **PART 2 PRODUCTS**

Not Used.

## **PART 3 EXECUTION**

Not Used.

**END OF SECTION**

**SECTION 01 5000**  
**TEMPORARY FACILITIES AND CONTROLS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Temporary Utilities: Electricity, lighting, telephone service, water, sanitary, first aid and fire extinguisher facilities.
- B. Temporary Controls: Barriers, enclosures and fencing, protection of the Work, and water control.
- C. Construction Facilities: Access roads, parking, progress cleaning, project signage, and temporary construction trailer

**1.2 RELATED SECTIONS**

- A. Section 01 7000 – Execution Requirements.

**1.3 GENERAL**

- A. Use qualified tradespersons for installation of temporary services and facilities. Locate temporary services and facilities where they will serve the entire project adequately and result in minimum interference with the performance of the Work.
  - 1. Require that tradespersons accomplishing this work be licensed as required by the local authority for whom the work is performed.
  - 2. Relocate, modify and extend services and facilities as required during the course of the work so as to accommodate the entire work of the project.

**1.4 TEMPORARY ELECTRICITY**

- A. General: Comply with applicable NEMA, NECA and UL standards and governing regulations for materials and layout of temporary electrical service.
- B. Power Distribution System: Provide circuits of adequate size and proper characteristics for each use.
- C. Ground Fault Protection: Equip all circuits for any purpose entering Work Area with ground fault circuit interrupters (GFCI). Locate GFCI's exterior to Work Area so that all circuits are protected prior to entry to work area. Provide circuit breaker type GFCI equipped with a test button and reset switch for all circuits to be used for any purpose in the Work Area, exterior, or as otherwise required by the National Electrical Code, OSHA or other authority.
- D. Electrical Power Cords: Use only grounded extension cords; use "hard-service" cords where exposed to abrasion or traffic. Use single lengths or use waterproof connectors to connect separate lengths of electric cords if single lengths will not reach the areas of work.
- E. Lamps and Light Fixtures: Provide general service incandescent, fluorescent, or LED lamps of wattage indicated or required for adequate illumination as required for the work.

- F. Cost: By Contractor; provide and pay for power service required.
- G. Owner's power source is not available. Contractor is to provide their own power sources as necessary.

#### **1.5 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES**

- A. Provide and maintain lighting necessary for construction operations.
- B. Lockout all existing power to lighting circuits in the Work Area. Unless specifically noted otherwise, existing lighting circuits to the Work Area are not to be used.
- C. Protect each circuit with ground fault circuit interrupters (GFCI) of the proper size.
- D. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.
- E. Maintain lighting and provide routine repairs.

#### **1.6 TELEPHONE SERVICE**

- A. Provide, maintain, and pay for telephone service at Contractor's field office.

#### **1.7 TEMPORARY WATER SERVICE**

- A. Temporary Water Service Connection: Provide, maintain and pay for suitable quality water service required for construction operations at time of project mobilization. Connect hoses or other fittings only to existing water supplies designated by the Owner. After completion of use, connections and fittings shall be removed without damage or alteration to existing water piping and equipment. Leaking or dripping valves shall be piped to the nearest drain or located over an existing sink or grade where water will not damage existing finishes or equipment.
- B. Water Hoses: Employ heavy duty abrasion-resistant hoses with a pressure rating greater than the maximum pressure of the water distribution system to provide water to each work area and to each Decontamination Unit. Provide fittings as required to allow for connection to existing hydrants or spouts, as well as temporary water heating equipment, branch piping, showers, shut-off nozzles and equipment.
- C. Hot Water: Hot water will not be available from the Owner.

#### **1.8 TEMPORARY SANITARY FACILITIES**

- A. Provide and maintain required facilities and enclosures for the duration of the project. Coordinate location of units with Construction Manager. Clean units weekly or more often as necessary. Provide all toilet supplies as required.

#### **1.9 WATER CONTROL**

- A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment. Silt fence and or straw bales to be provided as necessary to prevent off-site sediment transport.
- B. Protect site from puddling or running water.

## **1.10 PARKING**

- A. Coordinate with Owner's Representative for temporary parking areas to accommodate construction personnel.

## **PART 2 PRODUCTS**

Not Used.

## **PART 3 EXECUTION**

Not Used.

**END OF SECTION**

## **SECTION 01 6000**

### **PRODUCT REQUIREMENTS**

#### **PART 1 GENERAL**

##### **1.1 SECTION INCLUDES**

- A. Products.
- B. Product delivery requirements.
- C. Product storage and handling requirements.
- D. Product options.
- E. Product substitution procedures.

##### **1.2 PRODUCTS**

- A. Furnish products of qualified manufacturers suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise.

##### **1.3 PRODUCT DELIVERY REQUIREMENTS**

- A. Transport and handle products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to ensure products comply with requirements, quantities are correct, and products are undamaged.
- C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

##### **1.4 PRODUCT STORAGE AND HANDLING REQUIREMENTS**

- A. Store and protect products in accordance with manufacturers' instructions.
- B. Store with seals and labels intact and legible.
- C. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- D. For exterior storage of fabricated products, place on sloped supports above ground.
- E. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.
- F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- G. Store loose granular materials on solid flat surfaces in well-drained area. Prevent mixing with foreign matter.

- H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

#### **1.5 PRODUCT OPTIONS**

- A. Products Specified by Naming One or More Manufacturers with Provision for Substitutions: Submit request for substitution for any manufacturer not named in accordance with the following article.

#### **1.6 PRODUCT SUBSTITUTION PROCEDURES**

- A. Substitutions may be considered when a product becomes unavailable through no fault of Contractor.
- B. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- C. A request constitutes a representation that Contractor:
  - 1. Has investigated proposed product and determined that it meets or exceeds quality level of specified product.
  - 2. Will provide same warranty for Substitution as for specified product.
  - 3. Will coordinate installation and make changes to other Work that may be required as a result of the substitution with no additional cost to Owner.
  - 4. Waives claims for additional costs or time extensions that may subsequently become apparent, as a result of the substitution.
  - 5. Will reimburse Owner for review or redesign services associated with re-approval by authorities having jurisdiction.
- D. Substitutions will not be considered when they are indicated or implied on Shop Drawing or Product Data submittals, without separate written request, or when acceptance will require revision to Contract Documents.
- E. Substitution Submittal Procedure:
  - 1. Submit three (3) copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
  - 2. Submit Shop Drawings, Product Data, and certified test results attesting to proposed product equivalence. Burden of proof is on proposer.
  - 3. Owner's Representative will notify Contractor in writing of decision to accept or reject request.

**END OF SECTION**

**SECTION 01 7000**  
**EXECUTION REQUIREMENTS**

**PART 1**

**1.1 SECTION INCLUDES**

- A. Closeout procedures.
- B. Final cleaning.
- C. Protecting installed construction.
- D. Project record documents.
- E. Operation and maintenance data.
- F. Product warranties and product bonds.

**1.2 CLOSEOUT PROCEDURES**

- A. 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 Owner's Representative's review.
- B. Provide submittals to Owner's Representative required by authorities having jurisdiction.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

**1.3 FINAL CLEANING**

- A. Execute final cleaning prior to final project assessment.
- B. Clean surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces,
- C. Clean furnishings and fixtures to sanitary condition with cleaning materials appropriate to surface and material being cleaned.
- D. Clean debris from drainage systems.
- E. Clean site; sweep paved areas, rake clean landscaped surfaces.
- F. Remove waste and surplus materials, rubbish, and construction facilities from site.

**1.4 PROTECTING INSTALLED CONSTRUCTION**

- A. Protect installed Work and provide special protection where specified in individual specification sections.
- B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

- C. Provide protective coverings as required.
- D. Prohibit traffic from landscaped areas.

## **1.5 PROJECT RECORD DOCUMENTS**

- A. 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 Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress, not less than weekly.
- 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, valves, equipment, major conduits, and appurtenances, referenced to permanent surface improvements.
  2. Field changes of dimension and detail.
  3. Details not on original Contract drawings.
- G. Submit documents to Owner's Representative with claim for final Application for Payment. Contractor shall maintain a copy of all record documents for a minimum of three (3) years after final payment has been made.

## **1.6 OPERATION AND MAINTENANCE DATA**

- A. Obtain and provide operation and maintenance instructions for all applicable work.

## **1.7 PRODUCT WARRANTIES AND PRODUCT BONDS**

- A. Obtain warranties and bonds executed in duplicate by responsible subcontractors, suppliers, and manufacturers.
- B. Execute and assemble transferable warranty documents and bonds from subcontractors, suppliers, and manufacturers.
- C. Verify documents are in proper form, contain full information, and are notarized.
- D. Co-execute submittals.

- E. Include Table of Contents and assemble in three D side ring binder with durable plastic cover.
- F. Submit minimum of 10 days prior to final Application for Payment.
- G. Time Of Submittals:
  - 1. Make submittals within ten (10) days after Date of Substantial Completion, prior to final Application for Payment.
  - 2. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing date of acceptance as beginning of warranty or bond period.

## **PART 2 PRODUCTS**

Not Used.

## **PART 3 EXECUTION**

Not Used.

**END OF SECTION**

**SECTION 031100  
CONCRETE FORMWORK**

**PART 1 – GENERAL**

**1.01 DESCRIPTION OF WORK**

- A. Provide forms wherever necessary to confine concrete and shape it to required dimensions.

**1.02 REFERENCED SECTIONS:**

- |                   |                              |
|-------------------|------------------------------|
| A. Section 033000 | Cast-In-Place Concrete       |
| B. Section 032100 | Steel Concrete Reinforcement |

**1.03 CITED STANDARDS:**

References and industry standards listed in this Section are applicable to the Work. Unless more restrictive criteria or differing requirements are explicitly stated in the Specifications, or mandated by governing codes or regulations, the recommendations, suggestions, and requirements described in the referenced standards shall be deemed mandatory and applicable to the Work.

- A. American Concrete Institute (ACI):

301: Specification for Structural Concrete for Buildings.

347: Guide to Formwork for Concrete.

**1.04 DESIGN REQUIREMENTS**

- A. The design and engineering of the formwork, as well as its construction, is the responsibility of the Contractor.
- B. Design formwork in accordance with ACI 347 and paragraph 27-1035(c) of the Building Code.

**1.05 SUBMITTALS**

- A. Product Data

Submit manufacturers' information for the following:

1. Overlaid plyform formwork or formliners
2. Ties, each type and where to be used
3. Form-release agent. Form-release agent to be submitted for review only.

- B. Shop Drawings

1. Prepare and submit formwork shop drawings and calculations prepared and sealed by a Professional Engineer licensed in the State of New York for review when required by paragraph 27-1035(c) of the Building Code.

- C. Quality Control Submittals

1. Contractor Qualifications:
  - a. Provide proof of Formwork Installer qualifications specified under "Quality Assurance".

## **1.07 QUALITY ASSURANCE**

- A. Qualifications
  1. Company specializing in performing the Work of this Section shall have three years minimum experience.
- B. Regulatory Requirements
  1. Building Code:
    - a. Work of this Section shall conform to all requirements of the NYS and or local Building Codes. Where more severe requirements than those contained in the Building Code are given in this Section and ACI 347, the requirements of this Section and ACI 347 shall govern.
  2. Industrial Code Rule #23 of the Department of Labor, paragraphs 23.10.1 to 23-10.5 inclusive.
  3. ACI 347.

## **1.08 DELIVERY, STORAGE, AND HANDLING**

- A. Protection
  1. Protect formwork materials before, during and after installation.
  2. Protect installed work and materials of other trades.
- B. Replacement
  1. Repair or replace damaged formwork as approved by the LIRR.
  2. Repair overlaid Plyform formwork as per manufacturer's instructions. Replace pieces when number of manufacturer recommended reuses is up or when finish deteriorates.

## **PART 2 - PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Overlaid Plyform Formwork
  1. Simpson Timber Company, Shelton Washington 98584.
  2. Dayton Richmond Concrete Accessories, Folcroft PA

### **2.02 MATERIALS**

- A. Rough Formwork shall be Commercial Douglas Fir, DFPA: 5/8" thick minimum or modular metal units.

- B. Overlaid Plyform Formwork:
  - a. Plywood with thermosetting phenolic resin or urethane coating bonded to it to provide a flat matte finish. Shall be equal to B-Matte Formguard by Simpson Timber Company.
- C. Release Agent:
  - a. VOC compliant material such as those of the Cresset Chemical Company for coating forms.
- D. Form Ties
  - 1. Form ties for exposed concrete shall be adjustable.
  - 2. Form ties for exposed concrete and concrete to receive membranes shall be a break-off type and leave no metal closer than 1 $\frac{1}{2}$ " to the surface.
  - 3. Form ties for concrete stated in 2 above shall be free of devices which leave holes or depressions larger than 7/8" back of exposed surface.
  - 4. Wire ties not permitted.

### PART 3 - EXECUTION

#### 3.01 PREPARATION OF FORMWORK SURFACES

- A. Clean all surfaces of forms and embedded items of any accumulated mortar or grout from previous concreting and other foreign material before concrete is placed in them. Repair or replace any formwork as required.
- B. Before placing either reinforcing steel or concrete, cover the surfaces of the rough or overlaid plyform formwork (when used) with an approved form release agent that will effectively prevent absorption of moisture, prevent bond with the concrete, and which will not stain the concrete surfaces. Material shall be carefully applied at the amount recommended by the release agent manufacturer to obtain the desired finish. Do not apply oil or release agents on formwork for concrete to receive coatings such as membrane waterproofing, plaster, or additional concrete (such as at construction joints). Follow manufacturer's recommendations for alternatives. For the overlaid plyform formwork, release agent should be a chemically reactive agent compatible with the factory treatment. Do not allow excess form coating material to stand in puddles in the forms nor allow coating to come in contact with hardened concrete against which fresh concrete is to be placed.

#### 3.02 CONSTRUCTION AND DETAILS

- A. Adequately support and substantially brace formwork to hold lines and shape.
- B. Formwork shall be tight jointed to prevent leakage of mortar from the concrete.
- C. Set slab-forms with camber of 1/4" per 10 feet of span to maintain tolerances. For two way slabs the lesser span dimension shall govern.
- D. Provide positive means of adjustment (wedges or jacks) for shores and struts to take up all settlement during concrete placing operations. Fasten wedges used for final adjustment of forms prior to concrete placement in position after final check. Securely brace forms against lateral deflection.\

- E. Form holes for pipes, pipe sleeves, electric outlets, electric conduits, etc. as required.
- F. Provide for rebates, reglets, grooves keys, pockets, ground nailers, projections and other built-in work prior to placement of concrete. Install reglets as per manufacturer's instructions.
- G. At construction joints, contact surface of the form sheathing for flush surfaces exposed to view shall overlap the hardened concrete in the previous placement by not more than 1". The forms shall be held against the hardened concrete to prevent offsets or loss of mortar at the construction joint and to maintain a true surface.
- H. Form accessories to be partially or wholly embedded in the concrete, such as ties and hangers, shall be of a commercially manufactured type. Use of non-fabricated wire is not permitted. Construct form ties so that the ends or end fasteners can be removed without causing appreciable spalling at the faces of the concrete. After the ends or end fasteners of the form ties have been removed, terminate the embedded portion of the ties not less than 2 diameters or twice the minimum dimension of the tie from the formed faces of concrete to be permanently exposed to view, except that in no case shall this distance be less than 3/4". When the formed face of the concrete is not to be permanently exposed to view, form ties may be cut off flush with the formed surfaces.
- I. Carefully check all forms before placement of concrete. Give special care to suspended first floor slabs resting on compressible material to prevent settlement.
- J. Notify the Engineer if openings are required but not shown on the Drawings, who will issue instructions accordingly.

### **3.03 REMOVAL OF FORMS AND SHORING**

- A. Remove forms in such a manner as to assure the complete safety of the structure. In no case remove forms or shoring supporting the weight of concrete in beams, slabs or structural members until the members have reached the minimum compressive strength specified on the Drawings or as permitted by the Engineer.
- B. Formwork for columns, walls, sides of beams, and other parts not supporting the weight of the concrete may be removed as soon as the concrete has hardened sufficiently to resist damage from removal operations and as required by C below. For normal temperature conditions, this shall be a minimum of 12 hours. For cold weather conditions, this shall be increased to 24 hours. Concrete shall remain protected at all times.
- C. When repair of surface defects or finishing is required at an early age, remove forms as soon as the concrete has hardened sufficiently to resist damage from removal operations.
- D. Remove top forms on sloping surfaces of concrete as soon as the concrete has attained sufficient stiffness to prevent sagging. Perform any needed repairs or treatments required on such sloping surfaces at once and follow it with the specified curing.
- E. Loosen wood forms for openings as soon as this can be accomplished without damage to the concrete.
- F. Proper safe shoring, number of shores, adequacy, size and location of these shores and forms shall be in accordance with acceptable good construction practice and it is the sole responsibility of the Contractor to provide safe conditions at all times during stripping.
- G. Reshoring is subject to the approval of the Engineer for Controlled Inspection. While reshoring is underway, do not permit live load on new construction. Members shall never be left unsupported until concrete has attained strength or if approved by the Engineer.

- H. When reshoring of flat slab construction is required, leave the shores for the area within the intersection of the middle strip of each panel in place at all times until the concrete has attained sufficient strength to support the loading to which it will be subjected. After the other shores in each panel have been removed (within the bay), place reshores on the column lines at the midpoints between columns, before the next panel is stripped.
- I. Stripping and reshoring shall conform to the requirements of paragraph 27-1035 of the Building Code. Perform control tests as per 27-1035(e)(3) for the removal of forms and shoring without simultaneous reshoring. Proper number, adequacy, size, and location of reshores shall be in accordance with acceptable good construction practice and it is the sole responsibility of the Contractor to provide safe conditions at all times during stripping and reshoring operations.

### **3.04 TOLERANCES**

- A. Construct formwork so that concrete surfaces will conform to the tolerance limits listed in Table 4.3.1 of ACI 301.
- B. Establish and maintain in an undisturbed condition and until final completion and acceptance of the project sufficient control points and bench marks to be used for reference purposes to check tolerances.
- C. Regardless of the tolerances listed, do not extend any portion of the concrete work beyond the lot or street line.

### **3.05 INSPECTION**

- A. The LIRR will designate an Engineer for Controlled Inspection to inspect formwork, including shores, reshores, braces, and other supports, to verify the sizes of concrete members being formed. The Engineer will make inspections prior to placement of steel, after placement, and during placement of concrete.
- B. The Contractor's person superintending the work shall inspect the forms prior to placement of steel and subsequently periodically after placement and during placement of concrete to detect incipient problems.
- C. During and after concrete placement, check elevations, camber, and vertical alignment of formwork systems using tell-tale devices.
- D. Keep a record of all inspections, the name of the persons making them, and the name of the foreman in charge of formwork at the site. Submit to the LIRR, a copy of the inspection records prior to each concrete placement.

END OF SECTION

**SECTION 032100  
STEEL CONCRETE REINFORCEMENT**

**PART 1 - GENERAL**

**1.1 RELATED WORK SPECIFIED ELSEWHERE**

- A. Concrete Formwork: Section 031100.
- B. Cast-In-Place Concrete: Section 033000.

**1.2 REFERENCES**

- A. Except as shown or specified otherwise, the Work of this Section shall conform to the applicable requirements of the following:
  1. Specifications for Structural Concrete, ACI 301-16 of the American Concrete Institute (ACI).
  2. Manual of Standard Practice, MSP-1-01 of the Concrete Reinforcing Steel Institute (CRSI).

**1.3 SUBMITTALS**

- A. Shop Drawings: Placing drawings for bar reinforcement.
- B. Samples:
  1. Bar Supports: Full size.
  2. Fabric Reinforcement: 8 inches square, each wire size.
  3. Fabric Reinforcement Supports: 3'-0" long pieces.
  4. Reed Clips: 2'-6" long pieces.
- C. Quality Control Submittals:
  1. Certificates: Affidavit required under Quality Assurance Article.

**1.4 QUALITY ASSURANCE**

- A. Certifications: Affidavit by the bar reinforcement manufacturer certifying that bar material meets the contract requirements.
  1. Submit evidence of steel material compliance with this Specification. Evidence shall consist of certification of source of material, copies of purchase orders and manufacturer's certifications. For stock material, submit copies of latest mill or purchase orders for material replacement.
    - a. Documentation to confirm compliance with General Conditions NYSDOT spec 106-11 'Buy America'.
  2. Fabricator's and Erector's Qualifications Data: Name and experience of fabricator and erector.
- B. 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 incorporated in the Work of this Contract shall be produced and made in whole or substantial part in the United States, its territories or possessions.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Bar Reinforcement: Epoxy-Coated Reinforcing Bars:
  - 1. Steel Bars: ASTM A615/A615M, Grade 60 (Grade 420) deformed bars.
  - 2. Epoxy Coating: ASTM A775/A775M or ASTM A934/A934M with less than 2 percent damaged coating in each 12-inch (305-mm) bar length.
- B. Welded Wire Reinforcement: ASTM A 185, welded wire fabric, fabricated into flat sheets unless otherwise indicated.
- C. Bar Supports; Either of the Following Types:
  - 1. Galvanized steel or AISI Type 430 stainless steel, and without plastic tips.
  - 2. Insoluble plastic, with minimum 1,500 psi tensile strength and capable of retaining fabricated shape at temperatures between 5 degrees F and 170 degrees F.
  - 3. For epoxy-coated reinforcement, use CRSI Class 1A epoxy-coated or other dielectric-polymer-coated wire bar supports.
- D. Welded Wire Reinforcement Supports:
  - 1. Shall comply with CRSI RB4.1
- E. Tie Wire: Black annealed wire, 16-1/2 gage or heavier.
- F. Steel Wire: ASTM A 82, cold-drawn plain steel wire, size No. W2.9 unless otherwise indicated.
- G. Reed Clips: ASTM A 185, rigid type reed clips, fabricated of W1.4 steel cross wires spaced 12 inches apart and looped at edges of flanges, and W1.4 longitudinal wire. Reinforcement shall have two longitudinal wires for flanges 9 inches to 15 inches in width, and three longitudinal wires for flanges over 15 inches in width. Cross wires shall be welded to longitudinal wire(s).
- H. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A775/A775M.

## PART 3 - EXECUTION

### 3.1 PLACING

- A. ACI 301, Section 3.3 Execution:
  - 1. Place, support, and fasten reinforcement as shown on the project drawing or approved shop submittal.
  - 2. Bar Reinforcement: In rectangular panels of two-way construction, place the steel in the short direction first with the longer bars on top in the opposite direction.
  - 3. Welded Wire Reinforcement: Offset end laps in adjacent sheets to prevent continuous joints at ends of sheets.

4. In concrete slabs supported by steel joists, place welded wire reinforcement approximately 3/4 inch below top surface of the concrete.
5. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating in accordance with ASTM D3963/D3963M.

END OF SECTION

**SECTION 033000**  
**CAST-IN-PLACE CONCRETE**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
1. Footings.
  2. Foundations.
  3. Interior slabs-on-grade.

**1.3 DEFINITIONS**

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

**1.4 ACTION SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

**1.5 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For Installer.
- B. Welding certificates.
- C. Material Certificates: For each of the following, signed by manufacturers:
1. Cementitious materials.
  2. Admixtures.
  3. Form materials and form-release agents.
  4. Steel reinforcement and accessories.
  5. Waterstops.
  6. Curing compounds.
  7. Floor and slab treatments.

8. Underslab waterproofings.
  9. Joint-filler strips.
  10. Repair materials.
- D. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.
- E. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.
- F. Field quality-control reports.

## **1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94 requirements for production facilities and equipment.
- B. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code - Reinforcing Steel."
- D. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
  1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.
  2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- E. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
- F. Preinstallation Conference: Conduct conference at Project site.
  1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete 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 subcontractor.
  2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement

installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

## **1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.
- B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

## **PART 2 - PRODUCTS**

### **2.1 FORM-FACING MATERIALS**

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

3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

## **2.2 STEEL REINFORCEMENT**

- A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.

## **2.3 REINFORCEMENT ACCESSORIES**

- A. Joint Dowel Bars: ASTM A 615, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.
- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
  1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

## **2.4 CONCRETE MATERIALS**

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
  1. Portland Cement: ASTM C 150, Type I/II. Supplement with the following:
    - a. Fly Ash: ASTM C 618, Class F.
- B. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
  1. Maximum Coarse-Aggregate Size: As indicated in design mixes.
  2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: ASTM C 94 and potable.

## **2.5 ADMIXTURES**

- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
  1. Water-Reducing Admixture: ASTM C 494, Type A.
  2. Retarding Admixture: ASTM C 494, Type B.
  3. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
  4. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
  5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.
  6. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.

C. Concrete Densifier:

1. Manufacturer/Product: Basis of design.
  - a. Green Umbrella, Green Ice Curing system, Green IceStop Hydrophobic Treatment. (to be used with Green IceStart WB curing agent only).
2. Subject to compliance with requirements, products that may be incorporated into the work include, but is not limited to the followings:
  - b. AVECS, PRO-ACT Admixture.
  - c. Barrier One."
2. Subject to compliance with requirements, products that may be incorporated into the work include, but is not limited to the followings:
  - a. AVECS, PRO-ACT Admixture.
  - b. Barrier One.

D. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494, Type C.

1. Products: Subject to compliance with requirements, provide one of the following:
  - a. Euclid Chemical Company (The), an RPM company; EUCON CIA.
  - b. Grace Construction Products, W. R. Grace & Co.; DCI.
  - c. Sika Corporation; Sika CNI.

## 2.6 WATERSTOPS

A. Flexible PVC Waterstops: CE CRD-C 572, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. BoMetals, Inc.
  - b. Greenstreak.
  - c. Vinylex Corp.
2. Profile: Ribbed with center bulb.
3. Dimensions: As applicable to location; nontapered.

B. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch.

1. Products: Subject to compliance with requirements, provide one of the following:
  - a. Concrete Sealants Inc.; Conseal CS-231.
  - b. Greenstreak; Swellstop.
  - c. Henry Company, Sealants Division; Hydro-Flex.
  - d. JP Specialties, Inc.; Earth Shield Type 20.

C. Self-Expanding Rubber Strip Waterstops: Manufactured rectangular or trapezoidal strip, bentonite-free hydrophilic polymer modified chloroprene rubber, for adhesive bonding to concrete, 3/8 by 3/4 inch.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. Adeka Ultra Seal/OCM, Inc.; Adeka Ultra Seal.
- b. Greenstreak; Hydrotite.
- c. Vinylex Corp.; Swellseal.

## 2.7 LIQUID FLOOR TREATMENTS

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

1. Products: Subject to compliance with requirements, provide one of the following:

- a. ChemMasters; Chemisil Plus.
- b. ChemTec Int'l; ChemTec One.
- c. Conspec by Dayton Superior; Intraseal.
- d. Edoco by Dayton Superior; Titan Hard.
- e. Euclid Chemical Company (The), an RPM company; Euco Diamond Hard.
- f. Meadows, W. R., Inc.; LIQUI-HARD.
- g. Symons by Dayton Superior; Buff Hard.

## 2.8 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. ChemMasters; SprayFilm.
- b. Conspec by Dayton Superior; Aquafilm.
- c. Edoco by Dayton Superior; BurkeFilm.
- d. Euclid Chemical Company (The), an RPM company; Eucobar.
- e. L&M Construction Chemicals, Inc.; E-CON.
- f. Meadows, W. R., Inc.; EVAPRE.
- g. Sika Corporation; SikaFilm.
- h. Symons by Dayton Superior; Finishing Aid.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, 18 to 25 percent solids, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. BASF Construction Chemicals - Building Systems; Kure-N-Seal W.
- b. ChemMasters; Safe-Cure Clear.
- c. Conspec by Dayton Superior; High Seal.
- d. Euclid Chemical Company (The), an RPM company; Diamond Clear VOX; Clearseal WB STD.
- e. L&M Construction Chemicals, Inc.; Dress & Seal WB.
- f. Meadows, W. R., Inc.; Vocomp-20.

- g. Symons by Dayton Superior; Cure & Seal 18 Percent E.
- F. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
1. Products: Subject to compliance with requirements, provide one of the following:
    - a. BASF Construction Chemicals - Building Systems; Kure-N-Seal 25 LV.
    - b. ChemMasters; Spray-Cure & Seal Plus.
    - c. Conspec by Dayton Superior; Sealcure 1315.
    - d. Edoco by Dayton Superior; Cureseal 1315.
    - e. Euclid Chemical Company (The), an RPM company; Super Diamond Clear; LusterSeal 300.
    - f. L&M Construction Chemicals, Inc.; Lumiseal Plus.
    - g. Meadows, W. R., Inc.; CS-309/30.

## **2.9 RELATED MATERIALS**

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- C. Reglets: Fabricate reglets of not less than 0.022-inch- thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
- D. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

## **2.10 REPAIR MATERIALS**

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
  1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
  2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
  3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
  4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109.
- 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 C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
  2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
  3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.

4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109.

## **2.11 CONCRETE MIXTURES, GENERAL**

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
  1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
  1. Fly Ash: 25 percent.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.
- D. Admixtures: Use admixtures according to manufacturer's written instructions.
  1. Use water-reducing, high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
  2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
  3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
  4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

## **2.12 CONCRETE MIXTURES FOR BUILDING ELEMENTS**

- A. Footings and Non-Retaining Walls: Proportion normal-weight concrete mixture as follows:
  1. Minimum Compressive Strength: 4000 psi at 28 days.
  2. Maximum Water-Cementitious Materials Ratio by Weight: 0.50.
  3. Minimum Cementitious Materials Content: 475 lb/cu. yd.
  4. Maximum Nominal Aggregate Size: 1 inch.
  5. Maximum Slump Limit: 3-1/2 inches, plus 1 inch.
  6. Air Content: 4 to 6 percent.
- B. Slabs-on-Grade (Interior): Proportion normal-weight concrete mixture as follows:
  1. Minimum Compressive Strength: 4000 psi at 28 days.
  2. Maximum Water-Cementitious Materials Ratio by Weight: 0.45.
  3. Minimum Cementitious Materials Content: 540 lb/cu. yd.
  4. Maximum Nominal Aggregate Size: 1 inch.
  5. Maximum Slump Limit: 3-1/2 inches, plus 1 inch.
- C. Foundation and Retaining Walls: Proportion normal-weight concrete mixture as follows:
  1. Minimum Compressive Strength: 4000 psi at 28 days.
  2. Maximum Water-Cementitious Materials Ratio by Weight: 0.45.
  3. Minimum Cementitious Materials Content: 590 lb./cu.yd.
  4. Maximum Nominal Aggregate Size: 1-1/2 inches.

5. Maximum Slump Limit: 3-1/2 inches, plus 1 inch.
6. Air Content: 4 to 6 percent.

## **2.13 FABRICATING REINFORCEMENT**

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

## **2.14 CONCRETE MIXING**

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94, and furnish batch ticket information.
  1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

# **PART 3 - EXECUTION**

## **3.1 FORMWORK**

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
  1. Class A, 1/8 inch for smooth-formed finished surfaces.
  2. Class C, 1/2 inch for rough-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
  1. Install keyways, reglets, recesses, and the like, for easy removal.
  2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

### **3.2 EMBEDDED ITEMS**

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
  - 2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
  - 3. Install dovetail anchor slots in concrete structures as indicated.

### **3.3 REMOVING AND REUSING FORMS**

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.
  - 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
  - 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

### **3.4 SHORES AND RESHORES**

- A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.
  - 1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.
- B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.

- C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

### **3.5 STEEL REINFORCEMENT**

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
  - 1. Do not cut or puncture underslab waterproofing. Repair damage and reseal underslab waterproofing before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
  - 1. Weld reinforcing bars according to AWS D1.4, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

### **3.6 JOINTS**

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
  - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
  - 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
  - 3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
  - 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. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
  - 6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth insert depth of concrete thickness as follows:
  - 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover 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 concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
  2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Section 07 9200 "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: 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.

### **3.7 WATERSTOPS**

- A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.
- B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

### **3.8 CONCRETE PLACEMENT**

- A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items and underslab waterproofing is complete and that required inspections have been performed.
  - B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
  - C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
    1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
  2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
  3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6

inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

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

### **3.9 FINISHING FORMED SURFACES**

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
  - 1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
  - 1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.

- C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:
1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
  2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
  3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

### **3.10 FINISHING FLOORS AND SLABS**

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.
1. Apply scratch finish to surfaces to receive concrete floor toppings or to receive mortar setting beds for bonded cementitious floor finishes.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
1. Apply float finish to surfaces to receive trowel finish or to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.

2. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:
  3. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch.
- E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.
  1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.
- F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.
  1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

### **3.11 MISCELLANEOUS CONCRETE ITEMS**

- A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

### **3.12 CONCRETE PROTECTING AND CURING**

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
  - a. Water.
  - b. Continuous water-fog spray.
  - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
  - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
  - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
  - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
  - a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.
4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

### **3.13 LIQUID FLOOR TREATMENTS**

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.
1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
  2. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.

### **3.14 CONCRETE SURFACE REPAIRS**

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
  2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
  3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
  2. After concrete has cured at least 14 days, correct high areas by grinding.
  3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
  4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
  5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
  6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
  7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

### **3.15 FIELD QUALITY CONTROL**

- A. Testing and Inspecting: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Inspections:
  1. Steel reinforcement placement.
  2. Steel reinforcement welding.
  3. Headed bolts and studs.
  4. Verification of use of required design mixture.
  5. Concrete placement, including conveying and depositing.
  6. Curing procedures and maintenance of curing temperature.
  7. Verification of concrete strength before removal of shores and forms from beams and slabs.
- C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
  1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
  2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
  3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
  4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
  5. Compressive-Strength Tests: ASTM C 39; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
    - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
    - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
  6. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
  7. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
  8. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
  9. 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.
  10. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other

- requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by Architect.
11. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
  12. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- D. Measure floor and slab flatness and levelness according to ASTM E 1155 within 24 hours of finishing.

### **3.16 PROTECTION OF LIQUID FLOOR TREATMENTS**

- A. 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.

**END OF SECTION 033000**

**SECTION 03 4500**  
**PRECAST ARCHITECTURAL CONCRETE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Architectural precast concrete accessories.
- B. Supports, anchors, and attachments.
- C. Grouting.

**1.02 RELATED REQUIREMENTS**

- A. Section 07 9200 - Joint Sealants: Sealing perimeter and intermediate joints.

**1.03 REFERENCE STANDARDS**

- A. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2014 (Errata 2017).
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- D. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete; 2012.
- E. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2016, with Editorial Revision (2016).
- F. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.
- G. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2015.
- H. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2016.
- I. PCI MNL-117 - Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products; 2013.
- J. PCI MNL-120 - PCI Design Handbook - Precast and Prestressed Concrete; 2017.
- K. PCI MNL-122 - Architectural Precast Concrete; 2007.
- L. PCI MNL-123 - Design and Typical Details of Connections for Precast and Prestressed Concrete; 1988.
- M. PCI MNL-135 - Tolerance Manual for Precast and Prestressed Concrete Construction; 2000.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Convene one week prior to commencing work of this section.

**1.05 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate layout, unit locations, configuration, unit identification marks, reinforcement, integral insulation, insulated panel system connectors, connection details, support items, location of lifting devices, dimensions, openings, and relationship to adjacent materials. Provide erection drawings.
- C. Samples for color selection: Provide color samples of manufacturer's standard colors for selection by Owner's Representative.
- D. Verification Samples: Submit two pieces, 3 by 3 inch (76.2 by 76.2 mm) in size, illustrating surface finish, color and texture.

**1.06 QUALITY ASSURANCE**

- A. Fabricator Qualifications:

1. Firm having at least 2 years of documented experience in production of precast concrete of the type required.

## **1.07 MOCK-UP**

- A. Provide 1 mock-up of column cap at South side of building.
- B. Mock-up may remain as part of the Work if approved by Owner's Representative.

## **1.08 DELIVERY, STORAGE, AND HANDLING**

- A. Handling: Lift and support precast units only from support points.
- B. Protect units to prevent staining, chipping, or spalling of concrete.

## **PART 2 PRODUCTS**

### **2.01 PRECAST UNITS, GENERAL**

- A. Precast Architectural Concrete Units: Comply with PCI MNL-120, PCI MNL-122, PCI MNL-123, PCI MNL-135, and ACI 318.
  1. Design Loads: Static loads, anticipated dynamic loading, including positive and negative wind loads, thermal movement loads, and erection forces as defined by applicable code.
  2. Calculate structural properties of units in accordance with ACI 318.
  3. Accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.
  4. Provide connections that accommodate building movement and thermal movement and adjust to misalignment of structure without unit distortion or damage.

### **2.02 CONCRETE MATERIALS**

- A. Cement: ASTM C150/C150M, Type I - Normal Portland type.
- B. Other Cementitious Materials:
  1. Fly Ash or Natural Pozzolans: Comply with ASTM C618.
- C. Fine and Coarse Structural Aggregates: ASTM C33/C33M.
- D. Surface Finish Aggregate: Clean, washed natural gravel; color to be selected from manufacturer's standard selection, from single source throughout
- E. Color Additives: Pure, concentrated mineral pigments specifically intended for mixing into concrete and complying with ASTM C979/C979M.
- F. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.
- G. Grout:
  1. Non-shrink, non-metallic, minimum 10,000 psi (70 MPa), 28 day strength.
  2. Epoxy.

### **2.03 SUPPORT DEVICES**

- A. Connecting and Support Devices; Anchors and Inserts: ASTM A36/A36M steel; hot-dip galvanized in accordance with ASTM A153/A153M.
  1. Clean surfaces of rust, scale, grease, and foreign matter.
  2. Prime paint in one coat, except surfaces in direct contact with concrete or requiring field welding.

### **2.04 FABRICATION**

- A. Fabricate in compliance with PCI MNL-117 and PCI MNL-135.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that building structure, anchors, devices, and openings are ready to receive work of this section.

### **3.02 PREPARATION**

- A. Provide for erection procedures and induced loads during erection. Maintain temporary bracing in place until final support is provided.

### **3.03 ERECTION**

- A. Erect units without damage to shape or finish. Replace or repair damaged panels.
- B. Erect units level and plumb within allowable tolerances.

### **3.04 TOLERANCES**

- A. Erect members level and plumb within allowable tolerances. Comply with PCI MNL-135, except as specifically amended below.

### **3.05 CLEANING**

- A. Clean at the close of project.

### **3.06 PROTECTION**

- A. Protect installed sill at wall transition and column caps from subsequent construction operations.

**END OF SECTION**

**SECTION 04 2000  
UNIT MASONRY**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section Includes:

1. Concrete masonry units.
2. Mortar and grout.
3. Ties and anchors.
4. Miscellaneous masonry accessories.

- B. Products Installed but not Furnished under This Section:

1. Steel lintels in unit masonry.

- C. Related Requirements:

1. Section 051200 "Structural Steel Framing" for installing anchor sections of adjustable masonry anchors for connecting to structural steel frame.

**1.3 DEFINITIONS**

- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

**1.4 ACTION SUBMITTALS**

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

- B. Shop Drawings: For the following:

1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
2. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315. Show elevations of reinforced walls.

- C. Samples for Initial Selection:

1. Concrete Masonry Units

## **1.5 INFORMATIONAL SUBMITTALS**

- A. List of Materials List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.
  - 1. Submittal is for information only. Receipt of list does not constitute approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.
- B. Material Certificates: For each type and size of the following:
  - 1. Masonry units.
    - a. Include data on material properties.
    - b. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
  - 2. Cementitious materials. Include name of manufacturer, brand name, and type.
  - 3. Joint reinforcement.
  - 4. Anchors, ties, and metal accessories.
- C. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
  - 1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.
  - 2. Include test reports, according to ASTM C1019, for grout mixes required to comply with compressive strength requirement.
- D. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6.
- E. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

## **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.

- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

## **1.7 FIELD CONDITIONS**

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
  - 1. Extend cover a minimum of 24 inches down both sides of walls, and hold cover securely in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
  - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
  - 2. Protect sills, ledges, and projections from mortar droppings.
  - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

### **2.2 PERFORMANCE REQUIREMENTS**

- A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.
  - 1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.
  - 2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C1314.

## **2.3 UNIT MASONRY, GENERAL**

- A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.
- C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
  - 1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

## **2.4 CONCRETE MASONRY UNITS**

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
  - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
  - 2. Provide square-edged units for outside corners unless otherwise indicated.
- B. Insulated CMUs: For exterior walls use 12" wide continuously insulated web-less (zero thermal bridge) masonry units with integral water repellent and color. Special shapes may have webs. Units contain rigid, specially shaped, molded-polystyrene insulation units complying with ASTM C578, Type I.
  - 1. "Basis of Design" Product – NRG Insulated Block
    - a. Size: 12" wide.
    - b. Finish: both split face and smooth.
    - c. Color: Full range of colors.
- C. CMUs: ASTM C90.
  - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2150 psi.
  - 2. Density Classification: Normal weight unless otherwise indicated.
  - 3. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
  - 4. Exposed Faces: Provide color and texture matching adjacent existing CMUs.

## **2.5 MORTAR AND GROUT MATERIALS**

- A. Masonry Cement: ASTM C91/C91M.

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. Holcim (US) Inc.
  - b. Lafarge North America Inc.
  - c. Lehigh Hanson; Heidelberg Cement Group.
- B. Water: Potable.

## **2.6 REINFORCEMENT**

- A. Masonry-Joint Reinforcement, General: ASTM A951/A951M.
  1. Exterior Walls: Hot-dip galvanized carbon steel.
  2. Wire Size for Side Rods: 0.148-inch diameter.
  3. Wire Size for Cross Rods: 0.148-inch diameter.
  4. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.

## **2.7 MASONRY CLEANERS**

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
  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. Diedrich Technologies, Inc.; a Hohmann & Barnard company.
    - b. EaCo Chem, Inc.
    - c. PROSOCO, Inc.

## **2.8 MORTAR AND GROUT MIXES**

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
  1. Do not use calcium chloride in mortar or grout.
  2. Use masonry cement mortar unless otherwise indicated.
  3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Mortar for Unit Masonry: Comply with ASTM C270, Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.
  1. For reinforced masonry, use Type N.
  2. For exterior, above-grade, load-bearing and nonload-bearing walls and parapet walls; for interior load-bearing walls; for interior nonload-bearing partitions; and for other applications where another type is not indicated, use Type N.
  3. For interior nonload-bearing partitions, Type O may be used instead of Type N.

- C. Grout for Unit Masonry: Comply with ASTM C476.
1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
  2. Proportion grout in accordance with ASTM C476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi .
  3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C143/C143M.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 INSTALLATION, GENERAL

- A. Install insulated CMUs per manufacture's recommendations.
- B. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.
- C. Build chases and recesses to accommodate items specified in this and other Sections.
- D. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.
- E. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- F. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.
- G. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

- H. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested according to ASTM C67. Allow units to absorb water so they are damp but not wet at time of laying.

### **3.3 TOLERANCES**

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch .
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch .
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet , or 1/2-inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet , 1/4 inch in 20 feet , or 1/2-inch maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet , 3/8 inch in 20 feet , or 1/2-inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet , 1/4 inch in 20 feet , or 1/2-inch maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet , 3/8 inch in 20 feet , or 1/2-inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet or 1/2-inch maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch , with a maximum thickness limited to 1/2 inch .
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch .
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch .
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch . Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch .
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

### **3.4 LAYING MASONRY WALLS**

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets.

- Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in a manner that matches existing adjacent construction ; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.
  - C. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
  - D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
  - E. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
  - F. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.
  - G. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.
  - H. Build nonload-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
    - 1. Install compressible filler in joint between top of partition and underside of structure above.
    - 2. Wedge nonload-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
    - 3. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078443 "Joint Firestopping."

### **3.5 MORTAR BEDDING AND JOINTING**

- A. Lay CMUs as follows:
  - 1. Bed face shells in mortar and make head joints of depth equal to bed joints.
  - 2. Bed webs in mortar in all courses of piers, columns, and pilasters.
  - 3. Bed webs in mortar in grouted masonry, including starting course on footings.
  - 4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
  - 5. Fully bed units and fill cells with mortar at anchors and ties as needed to fully embed anchors and ties in mortar.
- B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
  - 1. For glazed masonry units, use a nonmetallic jointer 3/4 inch or more in width.

- D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.
- E. Cut joints flush where indicated to receive cavity wall insulation unless otherwise indicated.

### **3.6 MASONRY-JOINT REINFORCEMENT**

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches .
  - 1. Space reinforcement not more than 16 inches o.c.
  - 2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
  - 3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.
- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- D. Provide continuity at corners by using prefabricated L-shaped units.
- E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

### **3.7 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE**

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

### **3.8 CONTROL AND EXPANSION JOINTS**

- A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- B. Form control joints in concrete masonry using one of the following methods:
  - 1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
  - 2. Install preformed control-joint gaskets designed to fit standard sash block.
  - 3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar, or rake out joint for application of sealant.
  - 4. Install temporary foam-plastic filler in head joints, and remove filler when unit masonry is complete for application of sealant.

- C. Form expansion joints in brick as follows:
  - 1. Build flanges of metal expansion strips into masonry. Lap each joint 4 inches in direction of water flow. Seal joints below grade and at junctures with horizontal expansion joints if any.
  - 2. Build flanges of factory-fabricated, expansion-joint units into masonry.
  - 3. Build in compressible joint fillers where indicated.
  - 4. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Section 079200 "Joint Sealants."
- D. Provide horizontal, pressure-relieving joints by either leaving an airspace or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 079200 "Joint Sealants," but not less than 3/8 inch .
  - 1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

### **3.9 FLASHING, WEEP HOLES, AND CAVITY VENTS**

- A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install cavity vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.
- B. Install flashing as follows unless otherwise indicated:
  - 1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
  - 2. At masonry-veneer walls, extend flashing through veneer, across airspace behind veneer, and up face of sheathing at least 8 inches ; with upper edge tucked under water-resistive barrier , lapping at least 4 inches . Fasten upper edge of flexible flashing to sheathing through termination bar.
  - 3. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
  - 4. Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than 1-1/2 inches or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.
  - 5. Install metal drip edges and sealant stops with ribbed sheet metal flashing by interlocking hemmed edges to form hooked seam. Seal seam with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.
  - 6. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall, and adhere flexible flashing to top of metal flashing termination.
- C. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.

### **3.10 REINFORCED UNIT MASONRY**

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
  - 1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
  - 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.

### **3.11 MASONRY WASTE DISPOSAL**

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.
- C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

**END OF SECTION 042000**

**SECTION 051200**  
**STRUCTURAL STEEL FRAMING**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes structural steel and grout.
- B. Related Sections:
  - 1. Section 014000 "Quality Requirements" for independent testing agency procedures and administrative requirements.
  - 2. Section 099113 "Exterior Painting" and Section 099123 "Interior Painting" for surface-preparation and priming requirements.

**1.3 DEFINITIONS**

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
- B. Seismic-Load-Resisting System: Elements of structural-steel frame designated as "SLRS" or along grid lines designated as "SLRS" on Drawings, including columns, beams, and braces and their connections.
- C. Heavy Sections: Rolled and built-up sections as follows:
  - 1. Shapes included in ASTM A 6/A 6M with flanges thicker than 1-1/2.
  - 2. Welded built-up members with plates thicker than 2 inches.
  - 3. Column base plates thicker than 2 inches.
- D. Protected Zone: Structural members or portions of structural members indicated as "Protected Zone" on Drawings. Connections of structural and nonstructural elements to protected zones are limited.
- E. Demand Critical Welds: Those welds, the failure of which would result in significant degradation of the strength and stiffness of the Seismic-Load-Resisting System and which are indicated as "Demand Critical" or "Seismic Critical" on Drawings.

**1.4 PERFORMANCE REQUIREMENTS**

- A. Connections: Provide details of connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand loads indicated and comply with other information and restrictions indicated.

1. Select and complete connections using schematic details indicated.
  2. Use LRFD; data are given at factored-load level.
- B. Moment Connections: Type FR, fully restrained.
- C. Construction: Moment frame.

## **1.5 ACTION SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication of structural-steel components.
1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
  2. Include embedment drawings.
  3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
  4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
  5. Identify members and connections of the seismic-load-resisting system.
  6. Indicate locations and dimensions of protected zones.
  7. Identify demand critical welds.
  8. For structural-steel connections indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint whether prequalified or qualified by testing, including the following:
1. Power source (constant current or constant voltage).
  2. Electrode manufacturer and trade name, for demand critical welds.

## **1.6 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For qualified installer, fabricator, professional engineer, testing agency.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- D. Mill test reports for structural steel, including chemical and physical properties.
- E. Product Test Reports: For the following:
1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
  2. Direct-tension indicators.
  3. Tension-control, high-strength bolt-nut-washer assemblies.
  4. Shear stud connectors.
  5. Shop primers.

6. Nonshrink grout.
- F. Source quality-control reports.

## **1.7 QUALITY ASSURANCE**

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.
  - B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category ACSE or CSE.
  - C. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement P1, P2, P3, or SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."
  - D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
    1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.
- E. Comply with applicable provisions of the following specifications and documents:
1. AISC 303.
  2. AISC 341 and AISC 341s1.
  3. AISC 360.
  4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- F. Preinstallation Conference: Conduct conference at Project site.

## **1.8 DELIVERY, STORAGE, AND HANDLING**

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
  1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
  1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
  2. Clean and relubricate bolts and nuts that become dry or rusty before use.
  3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

## **1.9 COORDINATION**

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

## **PART 2 - PRODUCTS**

### **2.1 STRUCTURAL-STEEL MATERIALS**

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than the following:
  - 1. W-Shapes: 60 percent.
  - 2. Channels, Angles: 60 percent.
  - 3. Plate and Bar: 25 percent.
  - 4. Cold-Formed Hollow Structural Sections: 25 percent.
  - 5. Steel Pipe: 25 percent.
  - 6. All Other Steel Materials: 25 percent.
- C. W-Shapes: ASTM A 572, Grade 50.
- D. Channels, Angles: ASTM A 572, Grade 50.
- E. Plate and Bar: ASTM A 572, Grade 50.
- F. Corrosion-Resisting Structural-Steel Shapes, Plates, and Bars: ASTM A 588/A 588M, Grade 50.
- G. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.
- H. Corrosion-Resisting Cold-Formed Hollow Structural Sections: ASTM A 847/A 847M, structural tubing.
- I. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
  - 1. Weight Class: Standard.
  - 2. Finish: Black except where indicated to be galvanized.
- J. Steel Castings: ASTM A 216/A 216M, Grade WCB with supplementary requirement S11.
- K. Steel forgings: ASTM A 668/A 668M.
- L. Welding Electrodes: Comply with AWS requirements.

## **2.2 BOLTS, CONNECTORS, AND ANCHORS**

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.
  - 1. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with plain finish.
- B. High-Strength Bolts, Nuts, and Washers: ASTM A 490, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers with plain finish.
  - 1. Direct-Tension Indicators: ASTM F 959, Type 490, compressible-washer type with plain finish.
- C. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers.
  - 1. Finish: Hot-dip zinc coating.
  - 2. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with mechanically deposited zinc coating finish.
- D. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
  - 1. Finish: Mechanically deposited zinc coating.
- E. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.
- F. Unheaded Anchor Rods: ASTM F 1554, Grade 36.
  - 1. Configuration: Hooked.
  - 2. Nuts: ASTM A 563 hex carbon steel.
  - 3. Plate Washers: ASTM A 36/A 36M carbon steel.
  - 4. Washers: ASTM F 436, Type 1, hardened carbon steel.
  - 5. Finish: Hot-dip zinc coating, ASTM A 153, Class C.
- G. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.
  - 1. Nuts: ASTM A 563 hex carbon steel.
  - 2. Plate Washers: ASTM A 36/A 36M carbon steel.
  - 3. Washers: ASTM F 436, Type 1, hardened carbon steel.
  - 4. Finish: Hot-dip zinc coating, ASTM A 153, Class C.
- H. Threaded Rods: A 572 Grade 50.
  - 1. Nuts: ASTM A 563 hex carbon steel.
  - 2. Washers: ASTM A 36 carbon steel.
  - 3. Finish: Hot-dip zinc coating, ASTM A 153, Class C.
- I. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.

- J. Sleeve Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1018.

### **2.3 PRIMER**

- A. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- B. Primer: Comply with Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
- C. Primer: SSPC-Paint 25, Type I, zinc oxide, alkyd, linseed oil primer.
- D. Primer: SSPC-Paint 25 BCS, Type I, zinc oxide, alkyd, linseed oil primer.
- E. Primer: SSPC-Paint 23, latex primer.
- F. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.
- G. Galvanizing Repair Paint: ASTM A 780.

### **2.4 GROUT**

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

### **2.5 FABRICATION**

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.
  - 1. Camber structural-steel members where indicated.
  - 2. Fabricate beams with rolling camber up.
  - 3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
  - 4. Mark and match-mark materials for field assembly.
  - 5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
  - 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
- C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

- E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 1, "Solvent Cleaning."
- F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.
- G. Steel Wall-Opening Framing: Select true and straight members for fabricating steel wall-opening framing to be attached to structural steel. Straighten as required to provide uniform, square, and true members in completed wall framing.
- H. Welded Door Frames: Build up welded door frames attached to structural steel. Weld exposed joints continuously and grind smooth. Plug-weld fixed steel bar stops to frames. Secure removable stops to frames with countersunk machine screws, uniformly spaced not more than 10 inches o.c. unless otherwise indicated.
- I. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.
  - 1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
  - 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
  - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

## **2.6 SHOP CONNECTIONS**

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
  - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
  - 1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

## **2.7 SHOP PRIMING**

- A. Shop prime steel surfaces except the following:
  - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
  - 2. Surfaces to be field welded.
  - 3. Surfaces to be high-strength bolted with slip-critical connections.
  - 4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
  - 5. Galvanized surfaces.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC-SP 2, "Hand Tool Cleaning."
  2. SSPC-SP 3, "Power Tool Cleaning."
  3. SSPC-SP 7/NACE No. 4, "Brush-Off Blast Cleaning."
  4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
  5. SSPC-SP 14/NACE No. 8, "Industrial Blast Cleaning."
  6. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  7. SSPC-SP 10/NACE No. 2, "Near-White Blast Cleaning."
  8. SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning."
  9. SSPC-SP 8, "Pickling."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
  2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.
- D. Painting: Prepare steel and apply a one-coat, nonasphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils.

## **2.8 GALVANIZING**

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.
1. Fill vent and drain holes that will be exposed in the finished Work unless they will function as weep holes, by plugging with zinc solder and filing off smooth.
  2. Galvanize lintels, shelf angles, and welded door frames attached to structural-steel frame and located in exterior walls.

## **2.9 SOURCE QUALITY CONTROL**

- A. Testing Agency: Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.
1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
- C. Bolted Connections: Shop-bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
1. Liquid Penetrant Inspection: ASTM E 165.

2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
  3. Ultrasonic Inspection: ASTM E 164.
  4. Radiographic Inspection: ASTM E 94.
- E. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
1. Bend tests will be performed if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
  2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify, with steel Erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
  1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.
  1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

### 3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Base Bearing and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
  1. Set plates for structural members on wedges, shims, or setting nuts as required.
  2. Weld plate washers to top of baseplate.
  3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.

- 4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
  - 1. Level and plumb individual members of structure.
  - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated.
- F. Do not use thermal cutting during erection.
- G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
- H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

### **3.4 FIELD CONNECTIONS**

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
  - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
  - 1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
  - 2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
  - 3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

### **3.5 PREFABRICATED BUILDING COLUMNS**

- A. Install prefabricated building columns to comply with AISC 360, manufacturer's written recommendations, and requirements of testing and inspecting agency that apply to the fire-resistance rating indicated.

### **3.6 FIELD QUALITY CONTROL**

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds.
- B. Bolted Connections: Bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Field welds will be visually inspected according to AWS D1.1/D1.1M.
  - 1. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
    - a. Liquid Penetrant Inspection: ASTM E 165.
    - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
    - c. Ultrasonic Inspection: ASTM E 164.
    - d. Radiographic Inspection: ASTM E 94.
- D. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
  - 1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
  - 2. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.
- E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

### **3.7 REPAIRS AND PROTECTION**

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780.
- B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
  - 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
- C. Touchup Painting: Cleaning and touchup painting are specified in Section 099113 "Exterior Painting" Section 099123 "Interior Painting."

**END OF SECTION 051200**

**SECTION 051213**  
**ARCHITECTURALLY EXPOSED STRUCTURAL STEEL FRAMING**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section Includes:
  1. Architecturally exposed structural steel (AESS).
  2. Section 051200 "Structural Steel Framing" requirements that also apply to AESS.

**1.3 DEFINITIONS**

- A. AEES: Architecturally exposed structural steel.

**1.4 PREINSTALLATION MEETINGS**

- A. Preinstallation Conference: Conduct conference at Project site.

**1.5 ACTION SUBMITTALS**

- A. Shop Drawings: Show fabrication of AEES components.
  1. Identify AEES category for each steel member and connection, including transitions between AEES categories and between AEES and non-AEES.
- B. Samples: Submit Samples to set quality standards for AEES.
  1. Two steel plates, 3/8 by 8 by 4 inches, with long edges joined by a groove weld and with weld ground smooth.
  2. Steel plate, 3/8 by 8 by 8 inches, with one end of a short length of rectangular steel tube, 4 by 6 by 3/8 inches, welded to plate with a continuous fillet weld and with weld ground smooth and blended.

**1.6 QUALITY ASSURANCE**

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU, or is accredited by the IAS Fabricator Inspection Program for Structural Steel (AC 172) and is experienced in fabricating AEES similar to that indicated on this Project.

- B. Installer Qualifications: A qualified Installer who participates in the AISC Quality Certification Program, is designated an AISC-Certified Erector, and is experienced in erecting AECC similar to that indicated on this Project.
- C. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint [Endorsement P1] [Endorsement P2] [Endorsement P3] or SSPC-QP 3.
- D. Mockups: Build mockups of AECC to set quality standards for fabrication and installation.
  - 1. Build mockup of typical portion of AECC as shown on Drawings.
  - 2. Coordinate painting requirements with Section 099113 "Exterior Painting." Section 099123 "Interior Painting."
  - 3. Coordinate high-performance coatings requirements with Section 099600 "High-Performance Coatings."
  - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

## **1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Use special care in handling AECC to prevent twisting, warping, nicking, and other damage during fabrication, delivery, and erection. Store materials to permit easy access for inspection and identification. Keep AECC members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect AECC members and packaged materials from corrosion and deterioration.
  - 1. Do not store AECC materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

## **1.8 FIELD CONDITIONS**

- A. Field Measurements: Where AECC is indicated to fit against other construction, verify actual dimensions by field measurements before fabrication.

## **PART 2 - PRODUCTS**

### **2.1 PERFORMANCE REQUIREMENTS**

- A. Comply with requirements of ANSI/AISC 303, Sections 1 through 9 and as modified in Section 10, "Architecturally Exposed Structural Steel."

### **2.2 FILLER**

- A. Polyester filler intended for use in repairing dents in automobile bodies.

### **2.3 PRIMER**

- A. Steel Primer:

1. Comply with Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
- B. Galvanized Steel Primer: MPI#26.
  1. Etching Cleaner: MPI#25, for galvanized steel.
  2. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20 ASTM A780/A780M.

## 2.4 FABRICATION

- A. Shop fabricate and assemble AE<sup>S</sup>S to the maximum extent possible. Locate field joints at concealed locations if possible. Detail assemblies to minimize handling and to expedite erection.
  1. Use special care handling and fabricating AE<sup>S</sup>S before and after shop painting to minimize damage to shop finish.
- B. Category AE<sup>S</sup>S 1:
  1. Comply with overall profile dimensions of AWS D1.1/D1.1M for welded built-up members. Keep appearance and quality of welds consistent. Maintain true alignment of members without warp exceeding specified tolerances.
  2. Prepare surfaces according to Part 2 "Shop Priming" Article and SSPC-SP 6 (WAB)/NACE WAB-3.
  3. Grind sheared, punched, and flame-cut edges to remove burrs and provide smooth surfaces and eased edges.
  4. Make intermittent welds appear continuous, using filler or additional welding.
  5. Seal weld open ends of hollow structural sections with 3/8-inch closure plates.
  6. Limit butt and plug weld projections to 1/16 inch.
  7. Install bolt heads on the same side of each connection and maintain orientation consistently from one connection to another.
  8. Remove weld spatter, slivers, and similar surface discontinuities.
  9. Remove blemishes and surface irregularities resulting from temporary braces or fixtures by filling or grinding, before cleaning, treating, and shop priming.
  10. Grind tack welds smooth unless incorporated into final welds.
  11. Remove backing and runoff tabs, and grind welds smooth.
- C. Category AE<sup>S</sup>S 2: In addition to requirements for Category AE<sup>S</sup>S 1, comply with the following:
  1. Limit as-fabricated straightness tolerance to one-half that permitted for structural-steel materials in ANSI/AISC 303.
  2. Limit as-fabricated curved structural steel tolerance to that permitted for structural-steel materials in ANSI/AISC 303.
  3. Limit as-fabricated straightness tolerance of welded built-up members to one-half that permitted by AWS D1.1/D1.1M.
  4. Conceal fabrication and erection markings from view in the completed structure.
  5. Make welds uniform and smooth.
- D. Category AE<sup>S</sup>S 3: In addition to requirements for Category AE<sup>S</sup>S 1 and AE<sup>S</sup>S 2, comply with the following:
  1. Cut out mill marks from mill material or hide these markings from view in the completed structure. Where neither method is possible, remove mill marks by grinding and filling surfaces as approved by Architect.
  2. Grind butt and plug welds smooth or fill, removing weld splatter exposed to view.

- 3. Orient HSS seams as indicated or away from view.
  - 4. Align and match abutting member cross sections.
  - 5. At visible open joints of copes, miters, and cuts, maintain uniform clear gaps of 1/8 inch.  
At closed joints, maintain uniform contact within 1/16 inch
  - 6. Fabricate with exposed surfaces smooth, square, and of surface quality approved by Architect.
- E. Category AESS 4: In addition to requirements for Category AESS 1, AESS 2, and AESS 3, comply with the following:
- 1. Treat HSS seams to appear seamless.
  - 2. Contour and blend welds and weld transitions between members, removing splatter exposed to view.
  - 3. Fill surface imperfections with filler and sand smooth to achieve surface quality approved by Architect.
  - 4. Minimize weld show-through and distortion on the opposite side of exposed connections by grinding to a smooth profile aligned with adjacent material.
- F. Erection marks, painted marks, and other marks are permitted on **[galvanized] [corrosion-resistant (weathering)]** steel surfaces of completed structure.
- G. Cleaning Corrosion-Resisting (Weathering) AESS: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 6 (WAB)/NACE WAB-3.

## **2.5 GALVANIZING**

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A123/A123M.
- 1. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.
  - 2. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

## **2.6 SHOP PRIMING**

- A. Shop prime steel surfaces, except the following:
- 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
  - 2. Surfaces to be field welded.
  - 3. Surfaces to be high-strength bolted with slip-critical connections.
  - 4. Corrosion-resisting (weathering) steel surfaces.
  - 5. Galvanized surfaces **[unless indicated to be painted]**.
- B. Surface Preparation: Clean nongalvanized surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
- 1. SSPC-SP 7 (WAB)/NACE WAB-4.
  - 2. SSPC-SP 14 (WAB)/NACE WAB-8.
  - 3. SSPC-SP 11.
  - 4. SSPC-SP 6 (WAB)/NACE WAB-3.

- 5. SSPC-SP 10 (WAB)/NACE WAB-2.
- 6. SSPC-SP 5 (WAB)/NACE WAB-1.
- C. Preparing Galvanized Steel for Shop Priming: After galvanizing, thoroughly clean steel of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.
- D. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Verify, with steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
- B. Examine AEES for twists, kinks, warping, gouges, and other imperfections before erecting.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 PREPARATION**

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

### **3.3 ERECTION**

- A. Take special care during erection to avoid marking or distorting the AEES and to minimize damage to shop painting. Set AEES accurately in locations and to elevations indicated and according to ANSI/AISC 303 and ANSI/AISC 360.
  - 1. Remove welded tabs that were used for attaching temporary bracing and safety cabling and that are exposed to view in the completed Work. Take care to avoid any blemishes, holes, or unsightly surfaces resulting from the use or removal of temporary elements.
  - 2. Grind tack welds smooth.
  - 3. Remove backing and runoff tabs, and grind welds smooth.
  - 4. Orient bolt heads on the same side of each connection and maintain orientation consistently from one connection to another.
  - 5. Remove erection bolts in Category AEES 4 AEES, fill holes with weld metal or filler, and grind or sand smooth to achieve surface quality approved by Architect.
  - 6. Fill weld access holes in Category AEES 4 AEES with weld metal or filler and grind, or sand smooth to achieve surface quality as approved by Architect.
  - 7. Conceal fabrication and erection markings from view in the completed structure.

### **3.4 REPAIR**

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and touchup galvanizing to comply with ASTM A780/A780M.

### **3.5 FIELD QUALITY CONTROL**

- A. Testing Agency: Owner will engage a qualified testing agency to inspect AE<sup>S</sup>S as specified in Section 051200 "Structural Steel Framing." The testing agency is not responsible for enforcing requirements relating to aesthetic effect.
- B. Architect will observe AE<sup>S</sup>S in place to determine acceptability relating to aesthetic effect.

**END OF SECTION 051213**

**SECTION 055000**  
**METAL FABRICATIONS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Miscellaneous steel framing and supports.
  - 2. Shelf angles.
  - 3. Miscellaneous steel trim including steel angle corner guards and steel edgings
- B. Products furnished, but not installed, under this Section:
  - 1. Loose steel lintels.
  - 2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.

**1.2 PERFORMANCE REQUIREMENTS**

- A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
  - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

**1.3 SUBMITTALS**

- A. Product Data: For the following:
  - 1. Prefabricated building columns.
  - 2. Metal nosings and treads.
  - 3. Paint products.
  - 4. Grout.
- B. Shop Drawings: Show fabrication and installation details for metal fabrications.
  - 1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
- C. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

## **PART 2 - PRODUCTS**

### **2.1 METALS, GENERAL**

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces without blemishes.

### **2.2 FERROUS METALS**

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
- C. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
- D. Rolled-Stainless-Steel Floor Plate: ASTM A 793.
- E. Abrasive-Surface Floor Plate: Steel plate with abrasive granules rolled into surface or with abrasive material metallically bonded to steel.
  - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. IKG Industries, a division of Harsco Corporation; Mebac.
    - b. SlipNOT Metal Safety Flooring, a W. S. Molnar company; SlipNOT.
- F. Steel Tubing: ASTM A 500, cold-formed steel tubing.
- G. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40) unless otherwise indicated.
- H. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
  - 1. Size of Channels: As indicated.
  - 2. Material: Galvanized steel, ASTM A 653/A 653M, structural steel, Grade 33 with G90 (Z275) coating; 0.079-inch 2-mm minimum thickness.
  - 3. Material: Cold-rolled steel, ASTM A 1008/A 1008M, structural steel, Grade 33; 0.0677-inch 1.7-mm minimum thickness; hot-dip galvanized after fabrication.
- I. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M.

### **2.3 NONFERROUS METALS**

- A. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T6.
- B. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.
- C. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.
- D. Bronze Extrusions: ASTM B 455, Alloy UNS No. C38500 (extruded architectural bronze).
- E. Bronze Castings: ASTM B 584, Alloy UNS No. C83600 (leaded red brass) or No. C84400 (leaded semired brass).

- F. Nickel Silver Castings: ASTM B 584, Alloy UNS No. C97600 (20 percent leaded nickel bronze).

## 2.4 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, at exterior walls.
1. Provide stainless-steel fasteners for fastening aluminum.
  2. Provide stainless-steel fasteners for fastening stainless steel.
  3. Provide stainless-steel fasteners for fastening nickel silver.
  4. Provide bronze fasteners for fastening bronze.
- B. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.
- C. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.
  2. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).
- D. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches (41 by 22 mm) by length indicated with anchor straps or studs not less than 3 inches (75 mm) long at not more than 8 inches (200 mm) o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

## 2.5 MISCELLANEOUS MATERIALS

- A. Shop Primers: Provide primers that comply with Division 09 painting Sections.
- B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
- C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- E. Non-shrink, Nonmetallic Grout: Factory-packaged, non-staining, non-corrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

## **2.6 FABRICATION, GENERAL**

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.
- C. Weld corners and seams continuously to comply with the following:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended.
- D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Locate joints where least conspicuous.
- E. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- F. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors not less than 24 inches (600 mm) o.c.

## **2.7 MISCELLANEOUS FRAMING AND SUPPORTS**

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
- C. Fabricate steel girders for wood frame construction from continuous steel shapes of sizes indicated.
- D. Fabricate steel pipe columns for supporting wood frame construction from steel pipe with steel baseplates and top plates as indicated. Drill or punch baseplates and top plates for anchor and connection bolts and weld to pipe with fillet welds all around. Make welds the same size as pipe wall thickness unless otherwise indicated.

## **2.8 PREFABRICATED BUILDING COLUMNS**

- A. Fire-Resistance Ratings: Provide prefabricated building columns listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for ratings indicated, based on testing according to ASTM E 119.
  - 1. Fire-Resistance Rating: As indicated.

## **2.9 SHELF ANGLES**

- A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch (19-mm) bolts, spaced not more than 6 inches (150 mm) from ends and 24 inches (600 mm) o.c., unless otherwise indicated.
- B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.
- C. Galvanize shelf angles located in exterior walls.
- D. Prime shelf angles located in exterior walls with zinc-rich primer.
- E. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

## **2.10 LOOSE BEARING AND LEVELING PLATES**

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

## **2.11 LOOSE STEEL LINTELS**

- A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.
- B. Galvanize loose steel lintels located in exterior walls.
- C. Prime loose steel lintels located in exterior walls with zinc-rich primer.

## **2.12 STEEL WELD PLATES AND ANGLES**

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

## **2.13 FINISHES, GENERAL**

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.

## **2.14 STEEL AND IRON FINISHES**

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
- B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

1. Shop prime with universal shop primer unless zinc-rich primer is indicated.
- C. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:
  1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  3. Other Items: SSPC-SP 3, "Power Tool Cleaning."
- D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of racking; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
  1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  2. Obtain fusion without undercut or overlap.
  3. Remove welding flux immediately.
  4. At exposed connections, finish exposed welds and surfaces smooth and blended.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

### 3.2 INSTALLING BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
- C. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

### **3.3 ADJUSTING AND CLEANING**

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

**END OF SECTION 055000**

**SECTION 06 1000**  
**ROUGH CARPENTRY**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Rough opening framing for doors, windows, and roof openings.
- B. Roofing nailers.
- C. Preservative treated wood materials.
- D. Concealed wood blocking, nailers, and supports.

**1.02 RELATED REQUIREMENTS**

- A. Section 03 3000 - Cast-in-Place Concrete: Setting anchors in concrete.
- B. Section 07 2500 - Weather Barriers: Water-resistive barrier over CMU.
- C. Section 09 2116 - Gypsum Board Assemblies: Gypsum-based sheathing.

**1.03 REFERENCE STANDARDS**

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- B. AWPA U1 - Use Category System: User Specification for Treated Wood; 2012.
- C. PS 2 - Performance Standard for Wood-Based Structural-Use Panels; 2010.
- D. PS 20 - American Softwood Lumber Standard; 2010.

**1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide technical data on insulated sheathing, wood preservative materials, and application instructions.

**PART 2 PRODUCTS**

**2.01 GENERAL REQUIREMENTS**

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
  - 1. Species: Douglas Fir-Larch, unless otherwise indicated.
  - 2. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
  - 3. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee ([www.alsc.org](http://www.alsc.org)) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
- B. Lumber fabricated from old growth timber is not permitted.

**2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS**

- A. Sizes: Nominal sizes as indicated on drawings, S4S.
- B. Moisture Content: S-dry or MC19.
- C. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
  - 1. Lumber: S4S, No. 2 or Standard Grade.
  - 2. Boards: Standard or No. 3.

**2.03 CONSTRUCTION PANELS**

- A. Roof Sheathing: Any PS 2 type, rated Structural I Sheathing.
  - 1. Bond Classification: Exterior.
  - 2. Span Rating: 60.
  - 3. Performance Category: 3/4 PERF CAT.

## **2.04 ACCESSORIES**

- A. Fasteners and Anchors:
  - 1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.

## **2.05 FACTORY WOOD TREATMENT**

- A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
  - 1. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.
- B. Preservative Treatment:
  - 1. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
    - a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
    - b. Treat lumber exposed to weather.
    - c. Treat lumber in contact with roofing, flashing, or waterproofing.
    - d. Treat lumber in contact with masonry or concrete.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION - GENERAL**

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

### **3.02 BLOCKING, NAILERS, AND SUPPORTS**

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.
- C. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.
- D. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- E. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
- F. Provide the following specific non-structural framing and blocking where required:
  - 1. Wall brackets.
  - 2. Grab bars.
  - 3. Towel and bath accessories.
  - 4. Wall-mounted door stops.
  - 5. Wall paneling and trim.
  - 6. Joints of rigid wall coverings that occur between studs.

### **3.03 INSTALLATION OF CONSTRUCTION PANELS**

- A. Roof Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.
  - 1. Nail panels to framing; staples are not permitted.

### **3.04 CLEANING**

- A. Waste Disposal: Comply with the requirements of Section 01 7419 - Construction Waste Management and Disposal.
  - 1. Comply with applicable regulations.
  - 2. Do not burn scrap on project site.
  - 3. Do not burn scraps that have been pressure treated.
  - 4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or "waste-to-energy" facilities.
- B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.
- C. Prevent sawdust and wood shavings from entering the storm drainage system.

**END OF SECTION**

**SECTION 06 2000**  
**FINISH CARPENTRY**

**PART 1 GENERAL**

**1.01 RELATED REQUIREMENTS**

- A. Section 06 1000 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- B. Section 09 9113 - Exterior Painting: Painting of finish carpentry items.
- C. Section 09 9123 - Interior Painting: Painting of finish carpentry items.

**1.02 REFERENCE STANDARDS**

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
- B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.0; 2016.
- C. AWPA U1 - Use Category System: User Specification for Treated Wood; 2012.
- D. BHMA A156.9 - American National Standard for Cabinet Hardware; 2010.
- E. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.
- F. PS 20 - American Softwood Lumber Standard; 2010.
- G. WI (CCP) - Certified Compliance Program (CCP); current edition at [www.woodworkinstitute.com/certification](http://www.woodworkinstitute.com/certification).

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

**1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data:
  - 1. Provide data on fire retardant treatment materials and application instructions.
- C. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.

**1.05 MOCK-UPS**

- A. Provide mock-up, full size, illustrating finish and construction.
- B. Mock-up may remain as part of the work.

**PART 2 PRODUCTS**

**2.01 FINISH CARPENTRY ITEMS**

- A. Exterior Woodwork Items:
  - 1. Window Casings and Moldings: Trim as specified in Section 07 4649.
  - 2. Soffit Spaces: T&G wood, size as indicated in drawings; Species to be Douglas Fir, prepare for stain finish.
- B. Interior Woodwork Items:
  - 1. Shelving: As detailed in drawings.
  - 2. Wood ceiling:T&G wood, size as indicated in drawings; Species to be Douglas Fir, prepare for stain finish.

**2.02 LUMBER MATERIALS**

- A. Lumber to be Painted: Species to be poplar, quarter sawn, maximum moisture content of 6 percent; with vertical grain, of quality suitable for painted finish.
- B. Lumber to be Stained: Species to match solid sawn timber columns, quarter sawn, maximum moisture content of 6 percent; with vertical grain, of quality suitable for stained finish.

## **2.03 SHEET MATERIALS**

### **2.04 FASTENINGS**

- A. Fasteners: Of size and type to suit application; galvanized finish in concealed locations and stainless steel finish in exposed locations.
- B. Concealed Joint Fasteners: Threaded steel.

### **2.05 ACCESSORIES**

- A. Wood Filler: Solvent base, tinted to match surface finish color.

### **2.06 HARDWARE**

- A. Hardware: Comply with BHMA A156.9.
- B. Shelf Brackets: As detailed on drawings.

### **2.07 FABRICATION**

- A. Shop assemble work for delivery to site, permitting passage through building openings.
- B. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

### **2.08 SHOP FINISHING**

- A. Apply wood filler in exposed nail and screw indentations.
- B. On items to receive transparent finishes, use wood filler that matches surrounding surfaces and is of type recommended for the applicable finish.
- C. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
  1. Transparent:
    - a. System - 4, Latex Acrylic, Water-based.
    - b. Stain: As selected by Architect.
    - c. Sheen: Semigloss.
  2. Opaque:
    - a. System - 4, Latex Acrylic, Water-based.
    - b. Color: As selected by Architect.
    - c. Sheen: Gloss.
- D. Back prime woodwork items to be field finished, prior to installation.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify adequacy of backing and support framing.
- B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

### **3.02 INSTALLATION**

- A. Set and secure materials and components in place, plumb and level.
- B. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch (0.79 mm). Do not use additional overlay trim to conceal larger gaps.

### **3.03 PREPARATION FOR SITE FINISHING**

- A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.
- B. Site Finishing: See Section 09 9113 and 09 9123.

**END OF SECTION**

**SECTION 06 6510**  
**SOLID SURFACE FABRICATIONS**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

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

**1.02 SUMMARY**

- A. This Section includes the following horizontal and trim solid surface product types:
1. Countertops with undermount sinks
  2. Countertop
  3. Lavatory tops with integral bowls
  4. Cove backsplashes
- B. Related Sections include the following:
1. Division 6 Section "Rough Carpentry" for Blocking.
  2. Division 15 Section "Plumbing Fixtures."
- C. Alternates:
1. Refer to Division 1 Section "Submittals" for description of work in this Section affected by alternates.

**1.03 DEFINITION**

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

**1.04 SUBMITTALS**

- A. Product data:
1. For each type of product indicated.
- B. Shop drawings:
1. Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices and other components.
    - a. Show full-size details, edge details, thermoforming requirements, attachments, etc.
    - b. Show locations and sizes of furring, blocking, including concealed blocking and reinforcement specified in other Sections.
    - c. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers and other items installed in solid surface.
- C. Samples:
1. For each type of product indicated.
    - a. Submit minimum 6-inch by 6-inch sample in specified gloss.
    - b. Cut sample and seam together for representation of inconspicuous seam.
    - c. Indicate full range of color and pattern variation.
  2. Approved samples will be retained as a standard for work.
- D. Product data:
1. Indicate product description, fabrication information and compliance with specified performance requirements.
- E. Product certificates:
1. For each type of product, signed by product manufacturer.
- F. Fabricator/installer qualifications:
1. Provide copy of certification number.
- G. Manufacturer certificates:
1. Signed by manufacturers certifying that they comply with requirements.

- H. NSF/ANSI standards:
  - 1. Refer to [www.nsf.org](http://www.nsf.org) for the latest compliance to NSF/ANSI Standard 51 for food zone - all food types.
- I. Maintenance data:
  - 1. Submit manufacturer's care and maintenance data, including repair and cleaning instructions.
    - a. Maintenance kit for finishes shall be submitted.
  - 2. Include in project closeout documents.

## **1.05 QUALITY ASSURANCE**

- A. Qualifications:
  - 1. Shop that employs skilled workers who custom fabricate products similar to those required for this project and whose products have a record of successful in-service performance.
- B. Fabricator/installer qualifications:
  - 1. Work of this section shall be by a certified fabricator/installer, certified in writing by the manufacturer.
- C. Applicable standards:
  - 1. Standards of the following, as referenced herein:
    - a. American National Standards Institute (ANSI)
    - b. American Society for Testing and Materials (ASTM)
    - c. National Electrical Manufacturers Association (NEMA)
    - d. NSF International
  - 2. Fire test response characteristics:
    - a. Provide with the following Class A (Class I) surface burning characteristics as determined by testing identical products per UL 723 (ASTM E84) or another testing and inspecting agency acceptable to authorities having jurisdiction:
      - 1) Flame Spread Index: 25 or less.
      - 2) Smoke Developed Index: 450 or less.
- D. Coordination drawings:
  - 1. Shall be prepared indicating:
    - a. Plumbing work.
    - b. Electrical work.
    - c. Miscellaneous steel for the general work.
    - d. Indicate location of all walls (rated and non-rated), blocking locations and recessed wall items, etc.
  - 2. Content:
    - a. Project-specific information, drawn accurately to scale.
    - b. Do not base coordination drawings on reproductions of the contract documents or standard printed data.
    - c. Indicate dimensions shown on the contract drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements.
    - d. Provide alternate sketches to designer for resolution of such conflicts.
      - 1) Minor dimension changes and difficult installations will not be considered changes to the contract.
- E. Drawings shall:
  - 1. Be produced in 1/2-inch scale for all fabricated items.
- F. Drawings must be complete and submitted to the architect within 60 days after award of contract for record only.
  - 1. No review or approval will be forthcoming.

- 2. Coordination drawings are required for the benefit of contractor's fabricators/installers as an aid to coordination of their work so as to eliminate or reduce conflicts that may arise during the installation of their work.
- G. Job mock-up:
  - 1. Prior to fabrication of architectural millwork, erect sample unit to further verify selections made under sample submittals and to demonstrate the quality of materials and execution.
  - 2. Mock-up shall be of lavatory top with integral bowl.
  - 3. Build the mock-up to comply with the contract documents and install in a location as directed by the architect.
  - 4. Notify the architect two weeks in advance of the date of when the mock-up will be delivered.
  - 5. Should mock-up not be approved, re-fabricate and reinstall until approval is secured.
    - a. Remove rejected units from project site.
  - 6. After approval, the mock-up may become a part of the project.
  - 7. This mock-up, once approved, shall serve as a standard for judging quality of all completed units of work.
- H. Pre-installation conference:
  - 1. Conduct conference at project site to comply with requirements in Division 1.

## **1.06 DELIVERY, STORAGE AND HANDLING**

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

## **1.07 WARRANTY**

- A. Provide manufacturer's warranty against defects in materials.
  - 1. Warranty shall provide material and labor to repair or replace defective materials.
  - 2. Damage caused by physical or chemical abuse or damage from excessive heat will not be warranted.
- B. Optional Installed Warranty:
  - 1. To qualify for the optional Installed Warranty, fabrication and installation must be performed by a DuPont Certified Fabrication/Installation source who will provide a brand plate for the application.
  - 2. This warranty covers all fabrication and installation performed by the certified/approved source subject to the specific wording contained in the Installed Warranty Card.
- C. Manufacturer's warranty period:
  - 1. Ten years from date of substantial completion.

## **1.08 MAINTENANCE**

- A. Provide maintenance requirements as specified by the manufacturer.

## **PART 2 - PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Manufacturers:
  - 1. Subject to compliance with requirements, provide products by one of the following:
    - a. Corian® surfaces from the DuPont company (basis of design).
    - b. Or approved equal.

### **2.02 MATERIALS**

- A. Solid polymer components

1. Cast, nonporous, filled polymer, not coated, laminated or of composite construction with through body colors meeting ANSI Z124.3 or ANSI Z124.6, having minimum physical and performance properties specified.
  2. Superficial damage to a depth of 0.010 inch (.25 mm) shall be repairable by sanding and/or polishing.
- B. Thickness:
1. 1 1/2 inch
- C. Edge treatment:
1. Even Receding
- D. Integral sink:
1. Model number:
    - a. 810; Accessible
  2. Color:
    - a. Architect to select color from manufacturer's full range of standard colors.
  3. Mounting:
    - a. Seamed undermount.
- E. Backsplash:
1. Coved.
  2. Height: 4 inches, unless otherwise indicated.
- F. Performance characteristics:

<b>Property</b>	<b>Typical Result</b>	<b>Test</b>
Tensile Strength	6,000 psi	ASTM D 638
Tensile Modulus	1.5 x 10-6 psi	ASTM D 638
Tensile Elongation	0.4% min	ASTM D 638
Flexural Strength	10,000 psi	ASTM D 790
Flexural Modulus	1.2 x 10-6 psi	ASTM D 790
Hardness	>85	Rockwell "M" Scale ASTM D 785
Thermal Expansion	56 3.02 x 10-5 in./in./°C (1.80 x 10-5 in./in./°F)	Barcol Impressor ASTM D 696
Gloss (60° Gardner)	5-75 (matte—highly polished)	ANSI Z124
Light Resistance	(Xenon Arc) No effect	NEMA LD 3-2000 Method 3.3
Wear and Cleanability	Passes	ANSI Z124.3 & Z124.6
Stain Resistance: Sheets	Passes	ANSI Z124.3 & Z124.6
Fungus and Bacteria	Does not support microbial growth	ASTM G21&G22
Resistance	No visible change	
Boiling Water Resistance	No change	NEMA LD 3-2000 Method 3.5
High Temperature Resistance	0.28 ft.-lbs./in. of notch	NEMA LD 3-2000 Method 3.6
Izod Impact (Notched Specimen)	No fracture—1/2 lb. ball: 1/4" slab—36" drop 1/2" slab—144" drop	ASTM D 256 (Method A) NEMA LD 3-2000 Method 3.8
Ball Impact Resistance: Sheets	?E*94<5 in 1,000 hrs 1.7 Long-term 0.4% (3/4") 0.8% (1/4")	ASTM G 155 ASTM D 570
Weatherability	0	
Specific Gravity †	Pittsburgh Protocol	
Water Absorption	Test ("LC50" Test)	
Toxicity	99 (solid colors) 66 (patterned colors)	

<b>Property</b>	<b>Typical Result</b>	<b>Test</b>
Flammability	All colors (Class I and Class A)	ASTM E 84, NFPA 255 & UL 723
Flame Spread Index	<25	
Smoke Developed Index	<25	

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

## 2.03 ACCESSORIES

- A. Joint adhesive:
  1. Manufacturer's standard one- or two-part adhesive kit to create inconspicuous, nonporous joints.
- B. Sealant:
  1. Manufacturer's standard mildew-resistant, FDA-compliant, NSF 51-compliant (food zone - any type), UL-listed silicone sealant in colors matching components.
- C. Sink/lavatory mounting hardware:
  1. Manufacturer's standard bowl clips, panel inserts and fasteners for attachment of undermount sinks/lavatories.
- D. Conductive tape:
  1. Manufacturer's standard aluminum foil tape, with required thickness, for use with cutouts near heat sources.
- E. Insulating felt tape:
  1. Manufacturer's standard for use with conductive tape in insulating solid surface material from adjacent heat source.

## 2.04 FACTORY FABRICATION

- A. Shop assembly
  1. Fabricate components to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and manufacturer's printed instructions and technical bulletins.
  2. Form joints between components using manufacturer's standard joint adhesive without conspicuous joints.
    - a. Reinforce with strip of solid polymer material, 2" wide.
  3. Provide factory cutouts for plumbing fittings and bath accessories as indicated on the drawings.
  4. Rout and finish component edges with clean, sharp returns.
    - a. Rout cutouts, radii and contours to template.
    - b. Smooth edges.
    - c. Repair or reject defective and inaccurate work.
- B. Thermoforming:
  1. Comply with manufacturer's data.
  2. Heat entire component.
    - a. Material shall be uniform, between 275 and 325 degrees Fahrenheit during forming.
  3. Form pieces to shape prior to seaming and joining.
  4. Cut pieces to finished dimensions.
  5. Sand edges and remove nicks and scratches.

## **2.05 FINISHES**

- A. Select from the manufacturer's standard color chart.
  - 1. Color:
    - a. Architect to choose color from Dupont 2019 price range of 2, 3, or 4, or equal.
- B. Finish:
  - 1. Provide surfaces with a uniform finish.
    - a. Matte; gloss range of 5-20.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

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

### **3.02 INSTALLATION**

- A. Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data.
  - 1. Provide product in the largest pieces available.
  - 2. Form field joints using manufacturer's recommended adhesive, with joints inconspicuous in finished work.
    - a. Exposed joints/seams shall not be allowed.
  - 3. Reinforce field joints with solid surface strips extending a minimum of 1 inch on either side of the seam with the strip being the same thickness as the top.
  - 4. Cut and finish component edges with clean, sharp returns.
  - 5. Rout radii and contours to template.
  - 6. Anchor securely to base cabinets or other supports.
  - 7. Align adjacent countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop.
  - 8. Carefully dress joints smooth, remove surface scratches and clean entire surface.
  - 9. Install countertops with no more than 1/8-inch (3 mm) sag, bow or other variation from a straight line.
- B. Coved backsplashes and sidesplashes:
  - 1. Provide coved backsplashes and sidesplashes at all walls and adjacent millwork.
  - 2. Fabricate radius cove at intersection of counters with backsplashes to dimensions shown on the drawings.
  - 3. Adhere to countertops using manufacturer's standard color-matched Joint Adhesive.
- C. Integral sinks/vanities:
  - 1. Provide solid surface materials bowls and/or lavatories sinks with overflows in locations shown on the drawings.
  - 2. Secure sinks and lavatory bowls to tops using manufacturer's recommended sealant, adhesive and mounting hardware to maintain warranty.

### **3.03 REPAIR**

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

### **3.04 CLEANING AND PROTECTION**

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

**END OF SECTION**

**SECTION 07 2500**  
**WEATHER BARRIERS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Water-resistive barriers.

**1.02 RELATED REQUIREMENTS**

- A. Section 06 1000 - Rough Carpentry: Water-resistive barrier under exterior cladding.
- B. Section 07 6200 - Sheet Metal Flashing and Trim: Metal flashings installed in conjunction with weather barriers.
- C. Section 361 - Joint Sealers: Sealant materials and installation techniques.

**1.03 REFERENCE STANDARDS**

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- B. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- C. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials; 2013.

**1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on material characteristics.

**PART 2 PRODUCTS**

**2.01 WEATHER BARRIER ASSEMBLIES**

- A. Air Barrier:

**2.02 AIR BARRIER MATERIALS (WATER VAPOR PERMEABLE AND WATER-RESISTIVE)**

- A. Air Barrier Sheet, Mechanically Fastened:
  1. Air Permeance: 0.004 cfm/sq ft (0.02 L/(s sq m)), maximum, when tested in accordance with ASTM E2178.
  2. Water Vapor Permeance: 5 perms (286 ng/(Pa s sq m)), minimum, when tested in accordance with ASTM E96/E96M Procedure A (Desiccant Method) at 73.4 degrees F (23 degrees C).
  3. Ultraviolet (UV) and Weathering Resistance: Approved in writing by manufacturer for up to 180 days of weather exposure.
  4. Surface Burning Characteristics: Flame spread index of 25 or less, and smoke developed index of 50 or less, when tested in accordance with ASTM E84.
  5. Seam and Perimeter Tape: Polyethylene self adhering type, mesh reinforced, 2 inches (50 mm) wide, compatible with sheet material; unless otherwise specified.
  6. Manufacturers:
    - a. DuPont de Nemours, Inc; Tyvek Commercial Wrap with Tyvek Fluid Applied Flashing - Brush Formulation, Tyvek Fluid Applied Flashing and Joint Compound, FlexWrap NF, StraightFlash, StraightFlash VF, Tyvek Wrap Caps, and Tyvek Tape: [www.dupont.com/#sle](http://www.dupont.com/#sle).

**2.03 VAPOR RETARDER MATERIALS (AIR BARRIER AND WATER-RESISTIVE)**

- A. Water Resistive Barrier: Vapor Retarder Sheet: Butyl, black color.
  1. Thickness: 45 mil, 0.045 inch (1.143 mm).
  2. Water Vapor Permeance: 0.1 perm (5.7 ng/(Pa s sq m)), maximum, when tested in accordance with ASTM E96/E96M.
  3. Seam Lap and Perimeter Adhesive: Elastomeric, same composition as sheet or other compatible material.

## **2.04 ACCESSORIES**

- A. Sealants, Tapes, and Accessories for Sealing Weather Barrier and Sealing Weather Barrier to Adjacent Substrates: As specified or as recommended by weather barrier manufacturer.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install materials in accordance with manufacturer's installation instructions.
- B. Air Barriers: Install continuous air tight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.
- C. Vapor Retarders: Install continuous air tight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.
- D. Mechanically Fastened Sheets - On Exterior:
  1. Install sheets shingle-fashion to shed water, with seams aligned horizontal.
  2. Overlap seams as recommended by manufacturer, 6 inches (152 mm), minimum.
  3. Overlap at outside and inside corners as recommended by manufacturer, 12 inches (305 mm), minimum.
  4. For applications specified to be air tight, seal seams, laps, penetrations, tears, and cuts with self-adhesive tape; use only large-headed, gasketed fasteners recommended by the manufacturer.
  5. Install head flashings under water-resistive barrier.
  6. At framed openings with frames having nailing flanges, extend sheet into opening and over flanges; at head of opening, seal sheet over flange and flashing.
- E. Openings and Penetrations in Exterior Weather Barriers:
  1. Install flashing over sills, covering entire sill framing member, and extend at least 5 inches (127 mm) onto water-resistive barrier and at least 6 inches (152 mm) up jambs; mechanically fasten stretched edges.
  2. At openings filled with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with sealing tape at least 4 inches (100 mm) wide; do not seal sill flange.
  3. At openings filled with nonflanged frames, seal water-resistive barrier to each side of framing at opening using flashing at least 9 inches (230 mm) wide, and covering entire depth of framing.
  4. At head of openings, install flashing under water-resistive barrier extending at least 2 inches (50 mm) beyond face of jambs; seal water-resistive barrier to flashing.
  5. At interior face of openings, seal gaps between window and door frames and rough framing using appropriate joint sealant over backer rod.
  6. Service and Other Penetrations: Form flashing around penetrating items and seal to surface of water-resistive barrier.

**END OF SECTION**

**SECTION 07 4113**  
**STANDING SEAM METAL ROOF PANELS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section includes architectural standing-seam metal roof panels.
- B. Furnish and install concealed clip metal panel roofing system, including
  1. Roofing manufacturer's requirements for the specified warranty.
  2. Preparation of roofing substrates.
  3. Wood nailers for roofing attachment.
  4. Self adhering underlayment.
  5. Metal roof edging and copings.
  6. Flashings.
  7. Other roofing-related items specified or indicated on the drawings or otherwise necessary to provide a complete roofing system.

**1.02 RELATED SECTIONS**

- A. Section 06 1000 - Rough Carpentry.
- B. Section 07 6200 - Sheet Metal Flashing and Trim: Formed metal flashing and trim items associated with non-metal roofing.

**1.03 REFERENCES**

- A. Referenced Standards: These standards form part of this specification only to the extent they are referenced as specification requirements.
  1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; American Society of Civil Engineers; 2011.
  2. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2011.
  3. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2008.
  4. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2013.
  5. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2013.
  6. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2013a.
  7. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings; American Society for Testing and Materials; 2011.
  8. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 2012.
  9. ASTM E1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference; American Society for Testing and Materials; 2005 (Reapproved 2012)
  10. ASTM E1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference; American Society for Testing and Materials; 1995 (Reapproved 2011).
  11. ASTM E1680 - Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems; American Society for Testing and Materials; 2011.
  12. MBMA - Metal Roofing Systems Design Manual; Metal Building Manufacturers Association; 2012.
  13. PS 1 - Construction and Industrial Plywood; 2009.
  14. PS 20 - American Softwood Lumber Standard; 2010.
  15. UL 580 - Standard for Tests for Uplift Resistance of Roof Assemblies; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

16. UL 2218 - Standard for Impact Resistance of Prepared Roof Covering Materials; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

#### **1.04 ACTION SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation layouts of metal roof panels; details of edge conditions, side-seam and endlap joints, panel profiles, corners, anchorages, trim, flashings, closures, and accessories; and special details specific to project. Distinguish between factory- and field-assembled work.
- C. Delegated-Design Submittal: For metal roof panel assembly indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the metal roof panel manufacturer's qualified professional engineer responsible for their preparation.
- D. 12 inch (300mm) long sample of roof panel.
- E. Samples for Initial Selection: For each product requiring color selection, 2 sets of manufacturer's color charts representing full range of colors and finishes available.
- F. After selection of finish color, provide two 3 by 5 inch (75 by 125 mm) metal samples finished in color selected.

#### **1.05 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For manufacturer, Installer, and manufacturer's technical representative.
  1. Submit Installer qualifications in the form of an original letter on manufacturer's letterhead signed by authorized manufacturer representative.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product. Indicate compliance with requirements in Performance Requirements Article:
  1. Air Infiltration.
  2. Water Penetration.
  3. Hydrostatic-Head Resistance.
  4. Wind-Uplift Resistance.
- C. Manufacturer Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance requirements.
- D. Installer Certificates: Letter from manufacturer certifying that installer is approved to install specified manufacturer's metal roofing system.
- E. Manufacturer's Instructions: Manufacturer's installation instructions to be provided to installing contractor.
- F. Field Quality Control Reports.
- G. Sample Warranties: For manufacturer and contractor warranties as specified.

#### **1.06 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For metal roof panels to include in maintenance manuals.

#### **1.07 PERFORMANCE REQUIREMENTS**

- A. Performance Requirements: Provide sheet metal roofing which has been manufactured, fabricated and installed to withstand structural and thermal movement, wind loading and weather exposure to maintain manufacturer's performance criteria without defects, damage, failure or infiltration of water.
- B. General Performance: Metal roof panels shall comply with performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.
- C. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.
  1. Uplift Rating: UL 90.

- D. Hail Resistance: Provide metal roof panel assemblies listed with UL as Class 4 hail resistant panels.
- E. Air Infiltration: Air leakage through assembly of not more than the following when tested according to ASTM E 1680, based upon 16 inch wide panel:
  - 1. Maximum 0.005 cfm/sq. ft. of roof area at test-pressure difference of -1.57 lbf/sq. ft.
  - 2. Maximum 0.016 cfm/sq. ft. of roof area at test-pressure difference of -12.00 lbf/sq. ft.
- F. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 1646 at the following test-pressure difference:
  - 1. Test-Pressure Difference: 12.00 lbf/sq. ft.
- G. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E 2140.
- H. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. Temperature Change (Range): 120 deg F.

## **1.08 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: A manufacturer of plant-fabricated metal roof panel systems listed in this Section and meeting performance requirements.
- B. Installer Qualifications: An employer of workers trained and certified by manufacturer, qualified by the manufacturer to furnish warranty of type specified.
- C. Source Limitations: Obtain metal roof panels and accessories from a single source supplied or approved by metal roof panel manufacturer.

## **1.09 PREINSTALLATION MEETINGS**

- A. Pre-installation Conference: Conduct conference at Project site.
  - 1. Meet with Owner, Architect, metal roof panel Installer, metal roof panel manufacturer's representative, substrate 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 instructions.
  - 4. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
  - 5. Review structural loading limitations of substrate during and after roofing.
  - 6. Review flashings, special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect metal roof panels.
  - 7. Review governing regulations and requirements for insurance, certificates, and testing and inspecting if applicable.
  - 8. Review temporary protection requirements for metal roof panel assembly during and after installation.
  - 9. Review roof observation and repair procedures after metal roof panel installation.
  - 10. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

## **1.10 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: A manufacturer of plant-fabricated metal roof panel systems listed in this Section and meeting performance requirements, with a minimum of five years experience providing metal roof panel systems for projects of similar type and scope, offering engineering, warranty, technical inspection, and maintenance inspection services specified.
- B. Installer Qualifications: Engage an experienced installer to perform Work of this Section who has specialized in installing cold process roofing systems; who is approved, authorized, or

licensed by the roofing system manufacturer to install manufacturer's product; and who is eligible to receive and issue the standard roofing manufacturer's warranty.

- C. Inspection Reports: Provide copies of the roofing system manufacturer's inspection reports noted during and at the completion of the new roof installation. Manufacturer's Technical (non-sales). Provide progress photos for application of each operation of roofing system. In addition to regular inspections, Manufacturer's Technical (non-sales) Representative shall be present for roof work starts at each section. Manufacturer's Technical Representative shall provide proof of no less than 10 years experience in the Roofing Industry.
- D. Roofing Inspector Qualifications: A full time technical representative of manufacturer (non-sales) experienced in the installation and maintenance of the specified roofing system, qualified to perform roofing observation and inspection specified in Field Quality Control Article, to determine Installer's compliance with the requirements of this Project, and approved by the manufacturer to issue warranty certification.
  - 1. The presence and activity of the manufacturer's technical representative, independent representative and/or Owner's representative shall in no way relieve the contractor of contract responsibilities or duties.
  - 2. It is the sole responsibility of the installing Contractor to contact the roofing manufacturer's inspector by phone on the morning of each day that roofing materials are being installed.
  - 3. The Roofing Inspector shall be one of the following:
    - a. An authorized full-time technical employee of the manufacturer with 10 years experience in commercial roofing.
    - b. If manufacturer does not employ full time technical personnel, inspection personnel shall be certified as a Registered Roof Observer by the Roof Consultants Institute, and shall be experienced in the installation and maintenance of the specified roofing system and qualified to determine Installer's compliance with the requirements of this Project.
- E. Provide installer's field supervision. Installer must maintain full-time supervisor/foreman on job-site during times that roofing work is in progress. Supervisor must have a minimum of 5 years experience in roofing work similar to nature and scope of specified roofing.
- F. Source Limitations: Obtain roofing system components from or approved in writing by roofing system manufacturer.

#### **1.11 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver components, sheets, 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 on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal roof panels to ensure dryness. Do not store metal roof panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Protect strippable protective covering on metal roof panels from exposure to sunlight and high humidity, except to extent necessary for period of metal roof panel installation.
- E. Protect foam-plastic insulation as follows:
  - 1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
  - 2. Protect against ignition at all times. Do not deliver foam-plastic insulation materials to Project site before installation time.
  - 3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

## **1.12 PROJECT CONDITIONS**

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit metal roof panel work to be performed according to manufacturer's written instructions and warranty requirements.
- B. Field Measurements: Contractor to verify actual dimensions of metal roofing construction panels by field measuring project before signing off on manufacturer's final shop drawings, placing order and requesting that the manufacturer begin panel fabrication.

## **1.13 COORDINATION**

- A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.
- B. Coordinate metal roof panels with rain drainage work, flashing, trim, and construction of substrate, parapets, walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

## **1.14 WARRANTY**

- A. Warranty, General: Warranties specified 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.
- B. Roof System Warranty, General: Warranties specified in this Section include the following components and systems specified in other sections supplied by the metal roof panel manufacturer:
  1. Metal copings, roof edge, counter flashings, and reglets.
  2. Roof curbs, hatches, and penetration flashings.
  3. Roof expansion joint assemblies.
  4. Metal wall and soffit panels and trim.
  5. Penetration flashings.
  6. Wall expansion joint assemblies.
- C. Special System Weathertightness Warranty for Metal Roof Panels: Written warranty in which Manufacturer agrees to repair or replace metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.
  1. Warranty Period: 20 years from date of Substantial Completion.
  2. Limit of Warranty Coverage: Not to exceed original installed cost of metal roof panel assembly including labor and materials.
  3. Contractor to provide a sample copy of standard roofing manufacturer's warranty, stating obligations, remedies, limitations, and exclusions of warranty as specified, with bid.
  4. Warranty shall run for a continuous 20 years.
  5. Warranty will not be accepted that contains any requirement(s) for Owner to renew the warranty at any time during the 20 year period.
  6. Qualified Installer Requirement: Installer must meet requirements in Quality Assurance Article.
  7. Installation Inspection Requirement: By manufacturer's technical representative in accordance with requirements of Part 3 Field Quality Control Article.
  8. Annual Manufacturer Inspection Requirement: By qualified manufacturer's technical representative, to report maintenance responsibilities to Owner necessary for preservation of Owner's warranty rights. The cost of manufacturer's annual inspections is included in the Contract Sum. Inspections to occur in Years 2, 5, 10, and 15 following Substantial Completion.
- D. Special Warranty on Panel Finishes: Written warranty in which Manufacturer agrees to repair finish or replace metal roof panels that show evidence of deterioration of factory-applied finishes under normal atmospheric conditions within specified warranty period.
  1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
    - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.

- b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
  - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. Finish Warranty Period: 20 years from date of Substantial Completion.
- E. Applicator/Roofing Contractor Warranty: Submit roofing installer's written warranty, signed by the installer, covering work of this section, including but not limited to, substrate boards, vapor retarder, insulation layers, metal flashings, wood components, fasteners, and all metal roof system components for two years from the date of substantial completion.
1. The warranty shall guarantee material and workmanship for watertightness, and against all leaks for a period of two (2) years. During the two-year period, the contractor shall respond and fix all reported leaks within 24 hours from time of notification, and fix all leaks without any cost to the Owner.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

- A. Basis of Design Manufacturers/Products: Subject to compliance with requirements, provide the named product by one of the following manufacturers comparable to the Basis of Design product specified:
1. TremLock VP, by Tremco, Inc. (Basis of Design)
  2. R-Mer Span, by Garland Co.
  3. ERS-9000 Eco-Clad, by Ecology Roof Systems
  4. Or approved equal.

### 2.02 ARCHITECTURAL STANDING-SEAM METAL ROOF PANELS

- A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.
1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1514.
- B. Vertical-Rib, Seamed-Joint, Standing-Seam Metal Roof & Wall Panels: Factory-formed with vertical ribs at panel edges and intermediate stiffening ribs symmetrically spaced between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels, and mechanically seaming panels together.
1. Basis-of-Design Product: Tremco, Inc., TremLock VP.
  2. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 50 structural quality.
    - a. Thickness: 0.028-inch/24 gauge nominal thickness.
    - b. Surface: Smooth, flat finish.
    - c. Exposed Coil-Coated Finish: 2-Coat Fluoropolymer.
    - d. Color: As selected by Architect from manufacturer's standard colors.
  3. Clips: Low-movement floating clips to accommodate thermal movement; fixed where design permits.
    - a. Material: 0.064-inch nominal thickness, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.
  4. Bearing Plates: Steel bearing plates, size and thickness per design criteria.
  5. Joint Type: Field mechanically seamed 90 deg.
  6. Panel Pan Configuration: Striated.
  7. Panel Seam Height and Coverage: 2 inches by 16 inches.

### 2.03 ROOF PANEL SYSTEM ACCESSORIES

- A. Roof Panel System Accessories, General: Provide components approved by roof panel manufacturer and as required for a complete metal roof panel assembly including trim, copings, fasciae, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal roof panels.
  2. Bearing Plates: Manufacturer's steel bearing plates to support panel clips over rigid insulation.
  3. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
- B. Panel Sealants: Provide one of the following identical to that used in test panels meeting performance requirements:
1. Sealant Tape: Pressure-sensitive, 99 percent solids, gray polyisobutylene or butyl rubber compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1 inch wide and 1/8 inch thick, with nylon spacer beads to prevent overcompression of the sealant tape.
  2. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311, with nylon spacer beads to prevent overcompression of the sealant tape.
- C. Flashing and Trim: Formed from same material as roof panels, prepainted with coil coating, minimum 0.028 inch thick. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, copings, end walls, side walls, counter flashings, peaks, eaves, sill trim, outside closures, inside closures, z-closures, j-channels, 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 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 according to SMACNA's "Architectural Sheet Metal Manual." Furnish gutter supports spaced a maximum of 36 inches o.c., fabricated from same metal as gutters. Provide wire ball strainers of compatible metal at outlets. Finish gutters to match metal roof panels.
1. Profile and Size: As indicated on drawings.
- E. Downspouts: Formed from same material as roof panels. Fabricate in 10-foot-long sections, complete with formed elbows and offsets, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Finish downspouts to match gutters.
- F. Pipe Penetration Flashing: Premolded EPDM pipe collar with flexible aluminum ring bonded to base and stainless steel pipe clamp to secure collar to pipe.
- G. Roof Curbs: Fabricated from aluminum sheet, minimum 0.080 inch thick; with bottom of skirt profiled to match roof panel profiles, and welded top box, integral internal fastener flange, and water diverter. Fabricate curb subframing of minimum 0.0598-inch-thick, angle-, C-, or Z-shaped galvanized steel sheet. Fabricate curb and subframing to withstand indicated loads, of size and height indicated. Finish roof curbs to match metal roof panels.
1. Insulate roof curb with 1-inch thick, rigid insulation.

## **2.04 MISCELLANEOUS MATERIALS**

- A. Panel Sealants: Sealant tape or butyl-rubber-based, solvent-release sealant.
- B. Panel Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads, with heads matching color of metal roof panels by means of factory-applied coating, and EPDM, PVC, or neoprene sealing washers.
- C. Ice and Water Shield - Self-Adhering, High-Temperature Sheet: 40 mils thick minimum, consisting of slip-resisting, polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by vapor retarder manufacturer.
  1. Thermal Stability: Stable after testing at 240 deg F; ASTM D 1970.
  2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D 1970.
- D. Underlayment (Slip Sheet): Manufacturer's recommended slip sheet, of type required for application.

- E. Miscellaneous Metal Framing, General: ASTM C 645, cold-formed metallic-coated steel sheet, ASTM A 653/A 653M, G60 hot-dip galvanized or coating with equivalent corrosion resistance unless otherwise indicated.
- F. Zee Clips: 0.079-inch nominal thickness.
- G. Base or Sill Channels: 0.079-inch nominal thickness.
- H. Hat-Shaped, Rigid Furring Channels:
  - 1. Nominal Thickness: As required to meet performance requirements, but not less than 0.025 inch.
  - 2. Depth: 1-1/2 inches.
- I. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, and depth required to fit insulation thickness indicated.
  - 1. Nominal Thickness: As required to meet performance requirements.
- J. Fasteners for Miscellaneous Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten miscellaneous metal framing members to substrates.

## **2.05 FABRICATION**

- A. Fabricate and finish metal roof panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes and as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.
  - 1. Site-rolled fabrication of panels or shop-rolling of panels using fixed equipment designed for site-rolling applications does not meet the requirements of this Section.
- B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- C. Fabricate metal roof panel side laps with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will seal weathertight and minimize noise from movements within panel assembly.
- D. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.
  - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
  - 2. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
  - 3. Fabricate cleats and attachment devices of size and metal thickness recommended by SMACNA's "Architectural Sheet Metal Manual" or by metal roof panel manufacturer for application, but not less than thickness of metal being secured.

## **2.06 FINISHES**

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Steel Panels and Accessories:
  - 1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to

- exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
- 2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

## **PART 3 - EXECUTION**

### **3.01 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 substrate to verify that substrate joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.
  - 3. 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 metal roof panel installation.

### **3.02 PREPARATION**

- A. Clean substrates of substances harmful to insulation, including removing projections capable of interfering with insulation attachment.
- B. Miscellaneous Framing: Install subpurlins, eave angles, furring, and other miscellaneous roof panel support members and anchorage according to metal roof panel manufacturer's written instructions.

### **3.03 UNDERLayment INSTALLATION**

- A. Self-Adhering Sheet Vapor Retarder: Install self-adhering sheet vapor retarder, wrinkle free, to fastened substrate board. Apply primer if required by vapor retarder manufacturer.
  - 1. Comply with temperature restrictions of vapor retarder manufacturer for installation; use primer and fasteners for installing vapor retarder at low temperatures.
  - 2. Apply per manufacturers recommended instructions, over entire roof, in shingle fashion to shed water with end laps of not less than 6 inches staggered 24 inches between courses.
  - 3. Overlap side edges not less than 3-1/2 inches. Roll laps with roller.
  - 4. Wrap vapor retarder up and over, to envelope wood blocking, and extend 4 inches onto existing modified bitumen roofing at low transition of metal roofing to modified roofing. Fasten vapor retarder membrane six inches on center staggered through existing modified roofing and into wood blocking. Install separate self-adhering vapor retarder stripping to cover fasteners if additional flashing is not completed in one day.
- B. Apply slip sheet over underlayment before installing metal roof panels.

### **3.04 METAL ROOF PANEL INSTALLATION, GENERAL**

- A. Provide metal roof panels of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations.
- B. Thermal Movement. Rigidly fasten metal roof panels to structure at one and only one location for each panel. Allow remainder of panel to move freely for thermal expansion and contraction. Predrill panels for fasteners.
  - 1. Point of Fixity: Fasten each panel along a single line of fixing located at eave.
  - 2. Avoid attaching accessories through roof panels in a manner that will inhibit thermal movement.
- C. Install metal roof panels as follows:
  - 1. Commence metal roof panel installation and install minimum of 300 sq. ft. in presence of factory-authorized representative.

2. Field cutting of metal panels by torch or abrasive saw is not permitted.
  3. Locate and space fastenings in uniform vertical and horizontal alignment.
  4. Provide metal closures at rake edges, rake walls, and each side of ridge and hip caps.
  5. Flash and seal metal roof panels with weather closures at eaves, rakes, and perimeter of all openings.
  6. Install ridge and hip caps as metal roof panel work proceeds.
  7. End Splices: Locate panel end splices over, but not attached to, structural supports. Stagger panel end splices to avoid a four-panel splice condition.
  8. Install metal flashing to allow moisture to run over and off metal roof panels.
- D. Fasteners:
1. Steel Roof Panels: Use stainless-steel fasteners for surfaces exposed to the exterior and galvanized-steel fasteners for surfaces exposed to the interior.
- E. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners, bearing plates and clips according to manufacturers' written instructions.
- F. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt vapor retarder to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.
1. Use slip sheet or self adhering membrane where roof panels will contact wood, ferrous metal, or cementitious construction.
- G. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal roof panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal roof panel manufacturer.
1. Seal metal roof panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal roof panel manufacturer.
  2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."

### **3.05 METAL ROOF PANEL INSTALLATION**

- A. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended by manufacturer.
1. Install clips to supports with self-tapping fasteners.
  2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
  3. Erection Tolerances: Shim and align metal roof panel units within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of splices and alignment of matching profiles.
  4. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
  5. Watertight Installation:
    - a. Apply a continuous ribbon of sealant or tape to seal joints of metal 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.

### **3.06 ACCESSORY INSTALLATION**

- A. General: 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 assembly including trim, copings, metal closures, z-flashing metal closures, counter flashings, side wall flashing,

- end wall flashing, rakes, eaves, peak flashing, gutters, end caps, downspouts, elbows, seam covers, sealants, gaskets, fillers, closure strips, and similar items.
- B. 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. Form trim and transition joints using compressed joints with captive butyl sealant capable of resisting static water pressure. Cleated joints and exposed joint sealants do not meet this requirement.
    - 2. Install exposed flashing and trim that is without excessive oil canning, 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 to result in waterproof and weather-resistant performance.
    - 3. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
  - C. Gutters: Join sections with riveted and soldered or lapped, riveted, 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.
  - D. 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. Connect downspouts to underground drainage system indicated.
  - E. Roof Curbs: Install curbs at locations indicated on Drawings. Install flashing around bases where they meet metal roof panels.

### **3.07 FIELD QUALITY CONTROL**

- A. Manufacturer's Technical Representative: Engage a qualified manufacturer's technical representative acceptable to Director's Representative for a minimum of 7 full-time days on site to perform substrate examination, interim observations, and final roof inspections, and to prepare reports.
- B. Roofing Inspector Qualifications: A full time technical representative of manufacturer (non-sales) experienced in the installation and maintenance of the specified roofing system, qualified to perform roofing observation and inspection to determine Installer's compliance with the requirements of this Project, and approved by the manufacturer to issue warranty certification.
  - 1. The presence and activity of the manufacturer's technical representative, independent representative and/or Director's Representative shall in no way relieve the contractor of contract responsibilities or duties.
  - 2. It is the sole responsibility of the installing Contractor to contact the roofing manufacturer's inspector by phone on the morning of each day that roofing materials are being installed.
  - 3. The Roofing Inspector shall be one of the following:
    - a. An authorized full-time technical employee of the manufacturer with 10 years experience in commercial roofing.
    - b. If manufacturer does not employ full time technical personnel, inspection personnel shall be certified as a Registered Roof Observer by the Roof Consultants Institute, and shall be experienced in the installation and maintenance of the specified roofing system and qualified to determine Installer's compliance with the requirements of this Project.

- C. Remove and replace applications of metal roof panels where inspections indicate that they do not comply with specified requirements.
- D. Notify Architect 24 hours in advance of final inspection.
- E. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

### **3.08 CLEANING**

- 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. Cleaning: Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products.
  1. Remove construction debris from project site and legally dispose of debris.
  2. Remove strippable coating and perform dry wipe-down cleaning of panels as erected.
- C. Protection: Protect installed product's finish surfaces from damage during construction:
  1. Protect installed products from damage by subsequent construction activities.
  2. Replace products having damage other than minor finish damage.
  3. Repair products having minor damage to finish in accordance with panel manufacturer's recommendations.
  4. Architect shall be sole judge of acceptability of repair to damaged finishes; replace products having rejected repairs.
- D. 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 4233**  
**PHENOLIC WALL PANELS**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Exterior solid phenolic cladding panel system and accessories as required for a complete drained and back-ventilated rainscreen system.
  - 1. Wall panels.

**1.02 RELATED SECTIONS**

- A. Section 05 5000 - Metal Fabrications; additional sub framing
- B. Section 09 2900 - Gypsum Board.

**1.03 REFERENCES**

- A. ASTM International (ASTM):
  - 1. ASTM B 117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.
  - 2. ASTM D 635 - Standard Test Method for Small Scale Burning.
  - 3. ASTM D 1929 - Standard Test Method for Ignition Temperature.
  - 4. ASTM D 2244 - Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates.
  - 5. ASTM D 2247 - Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.
  - 6. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
  - 7. ASTM E 119 - Standard Test Method for Fire Rated or Fire Resistive Construction.
  - 8. ASTM E 330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors Under the Influence of Wind Loads.
- B. European Standards (EN):
  - 1. EN 438-2 - Decorative High Pressure Laminate (HPL) Sheets Based on Thermosetting Resins - Determination of Properties.
  - 2. EN 12524 - Building Materials and Products, Hygrothermal Properties, Tabulated Design Values.
- C. International Organization for Standardization (ISO):
  - 1. ISO 105 A02-93 - Tests for Color Fastness -- Part A02: Grey scale for assessing change in color.
  - 2. ISO 178 - Determination of Flexural Properties.
  - 3. ISO 527-3 - Determination of Tensile Properties.
  - 4. ISO 846 - Evaluation of the Action of Organisms.
- D. National Fire Protection Association (NFPA):
  - 1. NFPA 268 - Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Energy Source.
  - 2. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components

**1.04 SUBMITTALS**

- A. Submit under provisions of Section 01 30 00.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Installation methods.
- C. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

- D. Verification Samples: For each finish product specified, two samples a minimum of 3.5 inches by 3.5 inches (89 mm by 89 mm) representing actual product, color, and patterns. Sample edges may vary from field panel edges.

## **1.05 QUALITY ASSURANCE**

- A. Mock-Up: Provide a mock-up for evaluation of the product and application workmanship.
  - 1. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.

## **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Storage:
  - 1. Store products in an enclosed area protected from direct sunlight, moisture and heat. Maintain a consistent temperature and humidity.
  - 2. Store products in manufacturer's unopened packaging until ready for installation.
  - 3. Stack panels using protective dividers to avoid damage to decorative surface.
  - 4. For horizontal storage, store sheets on pallets of equal or greater size as the sheets with a protective layer between the pallet and sheet and on top of the uppermost sheet.
  - 5. Do not store sheets, or fabricated panels vertically.
- B. Handling:
  - 1. When moving sheets, lift evenly to avoid dragging panels across each other and scratching the decorative surface.
  - 2. Remove all labels and stickers immediately after installation.

## **1.07 WARRANTY**

- A. Warranty: At project closeout, provide manufacturer's limited ten year warranty covering defects in materials. Warranty only available when material installed by an installation contractor trained and approved by the manufacturer's representative.

## **PART 2 - PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Basis of Design Manufacturer: Trespa International B.V.; P.O. Box 110, 6000 AC Weert Wetering 20, 6002 SM Weert The Netherlands; [www.trespa.com](http://www.trespa.com).

### **2.02 WALL PANELS**

- A. Solid Phenolic Wall Panels:
  - 1. Material: Solid panel manufactured using a combination of high pressure and temperature to create a flat panel created from thermosetting resins, homogenously reinforced with wood-based fibers and an integrated decorative surface or printed décor.
  - 2. Color on Primary Face: as noted with black reverse.
  - 3. Color: As selected by the Architect from manufacturer's standard color palette.
    - a. Assume percentages of the following colors:
      - 1) Powder Blue: 25%
      - 2) Brilliant Blue: 10%
      - 3) Dark Denim: 25%
      - 4) Steel Blue: 25%
      - 5) Aquamarine: 15%
  - 4. Finish: Rock.
  - 5. Panel Thickness: 3/8 inch (10 mm).
  - 6. Custom Pattern:
    - a. 6 x 33, 10 x 60, 8 x 51
    - b. Pattern Tool ID: [https://design.app.universecorp.com/#?design\\_id=1659619771](https://design.app.universecorp.com/#?design_id=1659619771)
  - 7. Physical Properties:
    - a. Modulus of Elasticity: 1,300,000 psi (9000 N/mm<sup>2</sup>) minimum, ISO 178.
    - b. Tensile Strength: 10,100 psi (70 N/mm<sup>2</sup>) minimum, ISO 527-2.
    - c. Flexural Strength: 14,500psi (120 N/mm<sup>2</sup>) minimum, ISO 178.

- d. Thermal Conductivity: 2.1 BTU/inch/ft<sup>2</sup>.hr.°F, EN 12524.
- e. Structural Performance (ASTM E330):
  - 1) Panels shall be designed to withstand the Design Wind Load based upon the local building code, but in no case less than 15 pounds per square foot (psf). Wind load testing shall be done in accordance with this standard to obtain the following results:
  - 2) Normal to the plane of the wall, the maximum panel deflection shall not exceed L/175
  - 3) Normal to the plane of the wall between supports, deflection of the aluminum sub-framing members shall not exceed L/175 or 3/4 inch, whichever is less
    - (a) At 1-1/2 times design pressure, permanent deflection of framing members shall not exceed L/100 of span length and components shall not experience failure or gross permanent distortion.
    - (b) If system tests are not available, mock ups shall be constructed and tests performed under the direction of an independent third party laboratory which show compliance to the minimum standards listed above.
- B. Mounting System:
  - 1. TS210 - Concealed fastening over fixed depth aluminum sub-framing.
- C. Extruded Aluminum Trim: Color as specified in the finish schedule.
- D. Fasteners (Concealed/Exposed): Fasteners shall be non-corrosive and as recommended by panel manufacturer. Exposed fasteners shall be colored to match panels.
- E. Panel Corner Profile:
  - 1. Dimensions: 143.70 inches by 11.81 inches by 11.81 inches (3650 by 300 by 300 mm) with a 5/16 inch (8 mm) thick by 3/4 inch (19 mm) radius.

## **2.03 2.3 FABRICATION**

- A. Panels: Solid phenolic impregnated kraft paper wall panels with no voids, air spaces or foamed insulation in the core material. Accessory items in accordance with manufacturer's recommendations and approved submittals
- B. Panel Weight: 8 mm (2.4 lb/ft<sup>2</sup>), 10 mm (3 lb/ ft<sup>2</sup>), 13 mm (3.8 lb/ ft<sup>2</sup>).
- C. Panel Bow: = 2 mm / m (= 0.079 inch/39.38 inches).
- D. Panel Dimensions: Field fabrication shall be allowed where necessary, but shall be kept to an absolute minimum. All fabrication shall be done under controlled shop conditions when possible.
- E. Appearance: Panel lines, breaks, and angles shall be sharp, true, and surfaces free from warp and buckle

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Do not begin installation until substrates have been properly prepared.
- B. Surfaces to receive panels shall be even, smooth, dry, and free from defects detrimental to the installation of the panel system. Notify Contractor in writing of conditions detrimental to proper and timely completion of the work.
- C. Confirm exterior sheathing is plumb and level, with no deflection greater than 1/4 inch (6 mm) in 20 feet (6096 mm).
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding. Do not proceed with installation until unsatisfactory conditions have been corrected.

### **3.02 PREPARATION**

- A. Clean surfaces thoroughly prior to installation.

- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

### **3.03 INSTALLATION**

- A. Install solid phenolic wall panels and sub-frame system in accordance with manufacturer's instructions.
- B. Install solid phenolic wall panels plumb and level and accurately spaced in accordance with manufacturer's recommendations and approved submittals and drawings.
- C. Anchor panels and sub-framing securely per engineering recommendations and in accordance with approved shop drawings to allow for necessary movement and structural support.
- D. Fasten solid phenolic wall panels with fasteners approved for use with supporting substrate.
- E. Do not install panels or component parts which are observed to be defective or damaged including, but not limited to: warped, bowed, abraded, scratched, and broken members.
- F. Do not cut or trim component parts during installation in a manner that would damage the finish, decrease the strength, or result in visual imperfection or a failure in performance. Return component parts with require alteration to the shop for re-fabrication or replacement.
- G. Install corner profiles and trim with fasteners appropriate for use with adjoining construction as indicated on the Contract Drawings and as recommended by manufacturer.

### **3.04 ADJUSTING AND CLEANING**

- A. Remove masking or panel protection as soon as possible after installation. Any masking intentionally left in place after panel installation on an elevation, shall become the responsibility of the General Contractor to remove.
- B. Adjust final panel installation so that all joints are true and even throughout the installation. Panels out of plane shall be adjusted with the surrounding panels to minimize any imperfection.
- C. Repair panels with minor damage. Remove and replace panels damaged beyond repair as a direct result of the panel installation. After installation, panel repair and replacement shall become the responsibility of the General Contractor.
- D. Clean finished surfaces as recommended by panel manufacturer. After installation cleaning, cleaning during construction shall become the responsibility of the General Contractor.

**END OF SECTION**

**SECTION 07 4649**  
**POLY-ASH SIDING AND TRIM**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Exterior synthetic (poly-ash) trim.

**1.02 RELATED REQUIREMENTS**

- A. Section 09 9113 - Exterior Painting: Field painting poly-ash trim with topcoat.

**1.03 REFERENCE STANDARDS**

- A. American Wood Protection Association (AWPA) ([www.awpa.com](http://www.awpa.com)):
  1. AWPA E1 - Standard Method for Laboratory Evaluation to Determine Resistance to Subterranean Termites.
  2. AWPA E10 - Standard Method of Testing Wood Preservatives by Laboratory Soil-Block Cultures
- B. ASTM International (ASTM) ([www.astm.org](http://www.astm.org)):
  1. ASTM D 570 - Standard Test Method for Water Absorption of Plastics.
  2. ASTM D 1037 - Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials.
  3. ASTM D 1761 – Standard Test Methods for Mechanical Fasteners in Wood.
  4. ASTM D 1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics.
  5. ASTM C 1185 – Standard Test Methods for Sampling and Testing Non-Asbestos Fiber-Cement
  6. ASTM D 6109 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastic Lumber and Related Products.
  7. ASTM D 6341 - Standard Test Method for Determination of the Linear Coefficient of thermal Expansion of Plastic Lumber and Plastic Lumber Shapes Between -30 and 140°F (-34.4 and 60°C).
  8. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- C. California Department of Forestry and Fire Protection (CAL FIRE) ([www.fire.ca.gov](http://www.fire.ca.gov)):
  1. Wildland-Urban Interface (WUI) CA SFM 12.7A-1 - Exterior Wall Siding and Sheathing.
- D. Progressive Engineering Inc. (PEI) ([www.p-e-i.com](http://www.p-e-i.com)):
  1. Pei Evaluation Service - Report PER-13069.

**1.04 SUBMITTALS**

- A. Comply with Section 01 33 00 - Submittal Procedures.
- B. Product Data: Submit manufacturer's product data, including installation instructions.
- C. Samples: Submit manufacturer's sample of poly-ash siding and trim at Director's Representative's request.
  1. Sample Size: Minimum 6 inches by 6 inches.
- D. Manufacturer's Certification: Submit manufacturer's certification that materials comply with specified requirements and are suitable for intended application.
- E. Test Reports: Submit manufacturer's test reports from testing performed by qualified, independent testing laboratories.
- F. Product Evaluation Reports: Submit manufacturer's product evaluation reports from accredited, evaluation service.
- G. Warranty Documentation: Submit manufacturer's standard warranty.

**1.05 STORAGE AND HANDLING**

- A. Storage and Handling Requirements:
  1. Store and handle materials in accordance with manufacturer's instructions.

2. Store poly-ash siding and trim on flat, level surface, raised above floor or ground, with adequate support to prevent sagging.
3. Keep poly-ash siding and trim covered and free of dirt and debris until installation.
4. Protect materials and finish during storage, handling, and installation to prevent damage.

## **1.06 WARRANTY**

- A. Warranty Period for Poly-Ash Siding: 20 years.
- B. Warranty Period for Exterior Synthetic Trim: 20-year limited warranty.
  1. No decay due to rot.
  2. No excess swelling from moisture.
  3. Resist termite damage.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Acceptable Manufacturer: Boral Composites Inc., 200 Mansell Court East, Suite 305, Roswell, Georgia 30076. Toll Free 888-926-7259. Website [www.boraltruexterior.com](http://www.boraltruexterior.com). E-mail [info@truexterior.com](mailto:info@truexterior.com).

### **2.02 POLY-ASH SIDING AND TRIM**

- A. Poly-Ash Trim: Basis of Design: "Boral TruExterior"
  1. Size: 5/4 inch thick, see drawings for widths required.
  2. Exposed Texture: As selected by Owner's Representative.
- B. Listings and Reports:
  1. Cal Fire (WUI), CA SFM 12.7A-1: Listing No. 8140-2134:0103.
  2. Product Evaluation Report: Pei Evaluation Service, Report PER-13069.
- C. Recycled Content:
  1. Post-Industrial Recycled Content: Minimum 70 percent, by weight.
  2. Post-Consumer Recycled Content: Minimum 2 percent, by weight.
- D. Properties:
  1. Density, ASTM D 1622: 40 to 50 pcf.
  2. Flexural Strength, ASTM D 6109: Greater than 1,600 psi.
  3. Coefficient of Linear Expansion, ASTM D 6341: Less than 1.40 E-05 in/in/degree F.
  4. Impact Resistance, ASTM D 1037: Greater than 50 inches.
  5. Trim: Nail Withdrawal, ASTM D 1761: Greater than 40 lbf/in.
- E. Performance:
  1. Fungi Rot, AWPA E10:
    - a. Brown Rot: Negligible loss.
    - b. White Rot: Negligible loss.
  2. Termite Resistance, AWPA E1: Greater than 9.0 (10 being best).
  3. Water Absorption, ASTM D 570: Less than 1.5 percent.
  4. Surface Burning Characteristics, ASTM E 84:
    - a. Flame Spread Index: Less than 35.
    - b. Smoke Developed Index: Less than 450.
    - c. Trim: Coefficient of Linear Expansion, ASTM D 6341, Typical: 1.40E-05 in/in/degree F, tested at minus 30 to 140 degrees F.

### **2.03 FABRICATION**

- A. Manufacturing Tolerances:
  1. Width: Plus or minus 1/16 inch.
  2. Thickness: Plus or minus 1/16 inch.
  3. Length: Plus 2 inches, minus 0 inch.

### **2.04 FINISHES**

- A. Primer:

1. Acrylic based.
2. Low VOC.
3. Factory applied.

## **2.05 ACCESSORIES**

- A. Fasteners:
  1. Minimum 8d by 2-1/2-inch-long stainless steel ring-shank nails.
  2. In accordance with local building code.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Examine wood framing members to receive poly-ash siding. Examine surfaces to receive exterior synthetic trim.
- B. Notify Owner's Representative of conditions that would adversely affect installation.
- C. Do not begin installation until unacceptable conditions are corrected.

### **3.02 INSTALLATION**

- A. Install poly-ash siding and trim in accordance with manufacturer's instructions at locations indicated on the Drawings.
- B. Do not install poly-ash siding or trim in structural or load-bearing applications.
- C. Install poly-ash siding and trim plumb, level, square, and true to line.
- D. Fastening: Install fasteners in accordance with local building code.
- E. Install Fasteners for trim:
  1. Maximum of 24 inches on center
  2. Within 2 inches of end boards.
- F. Fill nail and screw holes with acrylic caulk, wood filler, or auto body filler.
- G. Repair minor damages to exterior synthetic siding and trim in accordance with manufacturer's instructions and as approved by Owner's Representative.
- H. Remove and replace damaged exterior synthetic siding and trim that cannot be successfully repaired as determined by Owner's Representative.
- I. Painting:
  1. Apply topcoat of exterior paint over factory-applied primer:
    - a. Within 150 days of installing poly-ash siding.
    - b. As specified in Section 09 9113 - Exterior Painting.
  2. Ensure poly-ash siding is clean and dry before painting.

### **3.03 ADJUSTING**

- A. Repair minor damages to poly-ash siding in accordance with manufacturer's instructions and as approved by Owner's Representative.
  1. Remove and replace with new material, damaged poly-ash siding that cannot be successfully repaired, as determined by Owner's Representative.

### **3.04 PROTECTION**

- A. Protect installed poly-ash siding to ensure that, except for normal weathering, siding will be without damage or deterioration at time of Substantial Completion.

**END OF SECTION**

**SECTION 07 6200**  
**SHEET METAL FLASHING AND TRIM**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Fabricated sheet metal items, including flashings, counterflashings, sheet metal roofing, and exterior penetrations.

**1.02 RELATED REQUIREMENTS**

- A. Section 06 1000 - Rough Carpentry: Wood nailers for sheet metal work.
- B. Section 07 4113 - Standing Seam Metal Roof Panels.
- C. Section 07 9200 - Joint Sealants: Sealing non-lap joints between sheet metal fabrications and adjacent construction.
- D. Section 08 6300 - Metal Framed Skylights: Integral metal curbs.

**1.03 REFERENCE STANDARDS**

- A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2012.
- B. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2013.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- E. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2009.
- F. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2012).
- G. CDA A4050 - Copper in Architecture - Handbook; current edition.
- H. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

**1.04 SUBMITTALS**

- A. See Section 01 3300 - SUBMITTAL PROCEDURES, for submittal procedures.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

**1.05 QUALITY ASSURANCE**

- A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.
- B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with 3 years of documented experience.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- B. Prevent contact with materials that could cause discoloration or staining.

**PART 2 PRODUCTS**

**2.01 SHEET MATERIALS**

- A. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gauge, (0.0239) inch (0.61 mm) thick base metal, shop pre-coated with PVDF coating.
  - 1. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system.
  - 2. Color: As selected by Owner's Representative from manufacturer's standard colors.

## **2.02 ACCESSORIES**

- A. Fasteners: Galvanized steel, with soft neoprene washers.
- B. Primer: Zinc chromate type.
- C. Protective Backing Paint: Zinc molybdate alkyd.
- D. Sealant to be Concealed in Completed Work: Non-curing butyl sealant.
- E. Sealant to be Exposed in Completed Work: ASTM C920; elastomeric sealant, 100 percent silicone with minimum movement capability of plus/minus 25 percent and recommended by manufacturer for substrates to be sealed; clear.
- F. Plastic Cement: ASTM D4586, Type I.

## **2.03 FABRICATION**

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.
- C. Hem exposed edges on underside 1/2 inch (13 mm); miter and seam corners.
- D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- E. Fabricate corners from one piece with minimum 18 inch (450 mm) long legs; seam for rigidity, seal with sealant.
- F. Fabricate flashings to allow toe to extend 2 inches (50 mm) over roofing gravel. Return and brake edges.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.

### **3.02 PREPARATION**

- A. Install starter and edge strips, and cleats before starting installation.
- B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil (0.4 mm).

### **3.03 INSTALLATION**

- A. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..
- B. Apply plastic cement compound between metal flashings and felt flashings.
- C. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- D. Seal metal joints watertight.

### **3.04 FIELD QUALITY CONTROL**

- A. See Section 01 4000 - Quality Requirements, for field inspection requirements.

**END OF SECTION**

**SECTION 07 9200**  
**JOINT SEALANTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Nonsag gunnable joint sealants.
- B. Self-leveling pourable joint sealants.
- C. Joint backings and accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 08 7100 - Finish Hardware: Setting exterior door thresholds in sealant.
- B. Section 09 2116 - Gypsum Board Assemblies: Sealing acoustical and sound-rated walls and ceilings.

**1.03 REFERENCE STANDARDS**

- A. ASTM C794 - Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants; 2015a.
- B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- C. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems; 2016.
- D. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.
- E. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2008 (Reapproved 2012).
- F. ASTM C1311 - Standard Specification for Solvent Release Sealants; 2014.
- G. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2005 (Reapproved 2010).
- H. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition.

**1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
  - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
  - 2. List of backing materials approved for use with the specific product.
  - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
  - 4. Substrates the product should not be used on.
- C. Preconstruction Laboratory Test Reports: Submit at least four weeks prior to start of installation.

**1.05 QUALITY ASSURANCE**

- A. Preconstruction Laboratory Testing: Arrange for sealant manufacturer(s) to test each combination of sealant, substrate, backing, and accessories.
  - 1. Adhesion Testing: In accordance with ASTM C794.
  - 2. Compatibility Testing: In accordance with ASTM C1087.
  - 3. Allow sufficient time for testing to avoid delaying the work.
  - 4. Deliver to manufacturer sufficient samples for testing.
  - 5. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.
  - 6. Testing is not required if sealant manufacturer provides data showing previous testing, not older than 24 months, that shows satisfactory adhesion, lack of staining, and compatibility.

## PART 2 PRODUCTS

### 2.01 JOINT SEALANT APPLICATIONS

- A. Scope:
  - 1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
    - a. Wall expansion and control joints.
    - b. Joints between door, window, and other frames and adjacent construction.
    - c. Joints between different exposed materials.
    - d. Openings below ledge angles in masonry.
    - e. Other joints indicated below.
  - 2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
    - a. Joints between door, window, and other frames and adjacent construction.
    - b. Other joints indicated below.
  - 3. Do not seal the following types of joints.
    - a. Intentional weepholes in masonry.
    - b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
    - c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
    - d. Joints where installation of sealant is specified in another section.
    - e. Joints between suspended panel ceilings/grid and walls.
- B. Exterior Joints: Use non-sag non-staining silicone sealant, unless otherwise indicated.
  - 1. Lap Joints in Sheet Metal Fabrications: Butyl rubber, non-curing.
  - 2. Control and Expansion Joints in Concrete Paving: Self-leveling polyurethane "traffic-grade" sealant.
  - 3. Wiring Slots in Concrete Paving: Self-leveling epoxy sealant.
- C. Interior Joints: Use non-sag polyurethane sealant, unless otherwise indicated.
  - 1. Wall and Ceiling Joints in Wet Areas: Non-sag polyurethane sealant for continuous liquid immersion.
  - 2. Floor Joints in Wet Areas: Non-sag polyurethane "non-traffic-grade" sealant suitable for continuous liquid immersion.
  - 3. Joints between Fixtures in Wet Areas and Floors, Walls, and Ceilings: Mildew-resistant silicone sealant; white.
  - 4. Narrow Control Joints in Interior Concrete Slabs: Self-leveling epoxy sealant.
- D. Interior Wet Areas: Bathrooms, restrooms, and janitor closet; fixtures in wet areas include plumbing fixtures, countertops, and other similar items.

### 2.02 JOINT SEALANTS - GENERAL

- A. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168.
- B. Colors: As selected by Owner's Representative, to match adjacent material color.

### 2.03 NONSAG JOINT SEALANTS

- A. Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
  - 1. Movement Capability: Plus and minus 50 percent, minimum.
  - 2. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
  - 3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.

- B. Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
  - 1. Color: As selected by Owner's Representative, to match adjacent material color.
- C. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; not expected to withstand continuous water immersion or traffic.
  - 1. Movement Capability: Plus and minus \_\_\_\_ percent, minimum.
- D. Polyurethane Sealant for Continuous Water Immersion: ASTM C920, Grade NS, Uses M and A; single or multi-component; explicitly approved by manufacturer for continuous water immersion; suitable for traffic exposure when recessed below traffic surface.
  - 1. Movement Capability: Plus and minus 35 percent, minimum.
- E. Non-Curing Butyl Sealant: Solvent-based, single component, non-sag, non-skimming, non-hardening, non-bleeding; non-vapor-permeable; intended for fully concealed applications.

## **2.04 SELF-LEVELING SEALANTS**

- A. Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single or multi-component; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion .
  - 1. Movement Capability: Plus and minus 25 percent, minimum.
- B. Semi-Rigid Self-Leveling Epoxy Joint Filler: Epoxy or epoxy/polyurethane copolymer; intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.
  - 1. Composition: Multi-component, 100 percent solids by weight.
  - 2. Durometer Hardness: Minimum of 85 for Type A or 35 for Type D, after seven days when tested in accordance with ASTM D2240.
  - 3. Joint Width, Minimum: 1/8 inch (3 mm).

## **2.05 ACCESSORIES**

- A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
- B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
- C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.

### **3.02 PREPARATION**

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

### **3.03 INSTALLATION**

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.

- C. Install bond breaker backing tape where backer rod cannot be used.
- D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- E. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- F. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.
- G. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

#### **3.04 FIELD QUALITY CONTROL**

- A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.
- B. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

#### **3.05 POST-OCCUPANCY**

- A. Post-Occupancy Inspection: Perform visual inspection of entire length of project sealant joints at a time that joints have opened to their greatest width; i.e. at low temperature in thermal cycle. Report failures immediately and repair.

**END OF SECTION**

**SECTION 08 1113**  
**HOLLOW METAL DOORS AND FRAMES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Non-fire-rated hollow metal doors and frames.
- B. Fire-rated hollow metal doors and frames.

**1.02 RELATED REQUIREMENTS**

- A. Section 08 7100 - Finish Hardware
- B. Section 09 9113 - Exterior Painting: Field painting.
- C. Section 09 9123 - Interior Painting: Field painting.

**1.03 REFERENCE STANDARDS**

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.
- C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.
- D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- F. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2015.
- G. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2014.
- H. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.
- I. ITS (DIR) - Directory of Listed Products; current edition.
- J. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; 2007.
- K. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.
- L. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2012.
- M. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.
- N. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

**1.04 SUBMITTALS**

- A. See Division 01 - Submittals.
- B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Hollow Metal Frames:
1. Ceco Door, an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  2. Republic Doors: [www.republicdoor.com](http://www.republicdoor.com).
  3. Steelcraft, an Allegion brand: [www.allegion.com/us](http://www.allegion.com/us).
  4. Or approved equal.

### 2.02 PERFORMANCE REQUIREMENTS

- A. Requirements for Hollow Metal Doors and Frames:
1. Steel Sheet: Comply with one or more of the following requirements; galvannealed steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
  2. Accessibility: Comply with ICC A117.1 and ADA Standards.
- B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

### 2.03 HOLLOW METAL DOORS

- A. Exterior Doors:
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
    - a. Level 3 - Extra Heavy-duty.
    - b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
    - c. Model 1 - Full Flush.
    - d. Door Face Metal Thickness: 16 gage, 0.053 inch (1.3 mm), minimum.
  2. Door Thickness: 1-3/4 inches (44.5 mm), nominal.
  3. Weatherstripping: Refer to Section 08 7100.
  4. Door Finish: Factory primed and field finished.
- B. Interior Doors, Non-Fire Rated:
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
    - a. Level 3 - Extra Heavy-duty.
    - b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
    - c. Model 1 - Full Flush.
    - d. Door Face Metal Thickness: 16 gage, 0.053 inch (1.3 mm), minimum.
  2. Door Thickness: 1-3/4 inches (44.5 mm), nominal.
  3. Door Finish: Factory primed and field finished.
- C. Fire-Rated Doors:
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
    - a. Level 3 - Extra Heavy-duty.
    - b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
    - c. Model 1 - Full Flush.
    - d. Door Face Metal Thickness: 16 gage, 0.053 inch (1.3 mm), minimum.
  2. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
  3. Provide units listed and labeled by UL (DIR) or ITS (DIR).

- a. Attach fire rating label to each fire rated unit.
- 4. Door Thickness: 1-3/4 inches (44.5 mm), nominal.
- 5. Door Finish: Factory primed and field finished.

## **2.04 HOLLOW METAL FRAMES**

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. Frame Finish: Factory primed and field finished.
- C. Exterior Door Frames: Knock-down type.
  - 1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A60/ZF180 coating.
  - 2. Frame Metal Thickness: 12 gage, 0.093 inch (2.36 mm), minimum.
  - 3. Weatherstripping: Separate, see Section 08 7100.
- D. Interior Door Frames, Non-Fire Rated: Knock-down type.
  - 1. Frame Metal Thickness: 16 gage, 0.053 inch (1.3 mm), minimum.
- E. Door Frames, Fire-Rated: Knock-down type.
  - 1. Fire Rating: Same as door, labeled.
  - 2. Frame Metal Thickness: 12 gage, 0.093 inch (2.36 mm), minimum.

## **2.05 FINISHES**

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

## **2.06 ACCESSORIES**

- A. Silencers: Unless otherwise specified in Section 08 7100, provide resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.
- B. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

## **2.07 FINISHES**

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

### **3.02 INSTALLATION**

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Install fire rated units in accordance with NFPA 80.
- C. Coordinate frame anchor placement with wall construction.
- D. Install door hardware as specified in Section 08 7100.

### **3.03 TOLERANCES**

- A. Maximum Diagonal Distortion: 1/16 inch (1.6 mm) measured with straight edge, corner to corner.

### **3.04 ADJUSTING**

- A. Adjust for smooth and balanced door movement.

### **3.05 SCHEDULE**

- A. Refer to Door and Frame Schedule on the drawings.

## **END OF SECTION**

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HOLLOW METAL DOORS AND  
FRAMES

**SECTION 08 3100**  
**ACCESS DOORS AND PANELS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Wall and ceiling mounted access units.

**1.02 RELATED REQUIREMENTS**

- A. Section 09 9113 - Exterior Painting: Field paint finish.

**1.03 REFERENCE STANDARDS**

- A. ITS (DIR) - Directory of Listed Products; current edition.
- B. UL (FRD) - Fire Resistance Directory; current edition.

**1.04 SUBMITTALS**

- A. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
- B. Shop Drawings: Indicate exact position of each access door and/or panel unit.
- C. Manufacturer's Installation Instructions: Indicate installation requirements.

**PART 2 PRODUCTS**

**2.01 ACCESS DOORS AND PANELS ASSEMBLIES**

- A. Wall-Mounted Units in Wet Areas:
  - 1. Panel Material: Steel, hot-dipped zinc, or zinc-aluminum-alloy coated.
  - 2. Size: 12 by 12 inches (305 by 305 mm).
  - 3. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
  - 4. Tool-operated spring or cam lock; no handle.
  - 5. Masonry Mounting Criteria: Provide surface-mounted frame with door surface flush with frame surface.
- B. Fire-Rated Wall-Mounted Units:
  - 1. Wall Fire-Rating: As indicated on drawings.
  - 2. Panel Material: Steel.
  - 3. Size: 12 by 12 inches (305 by 305 mm).
  - 4. Door/Panel: Insulated double-surface panel, with tool-operated spring or cam lock and no handle.
- C. Ceiling-Mounted Units with Return Air Grille:
  - 1. Panel Material: Aluminum extrusion with gypsum board inlay.
  - 2. Size - Other Ceilings: 12 by 12 inches (305 by 305 mm).
  - 3. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
- D. Fire-Rated Ceiling-Mounted Units:
  - 1. Ceiling Fire-Rating: As indicated on drawings.
  - 2. Panel Material: Steel.
  - 3. Size: 12 by 12 inches (305 by 305 mm).
  - 4. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.

**2.02 WALL AND CEILING MOUNTED ACCESS UNITS**

- A. Manufacturers:
  - 1. ACUDOR Products Inc: [www.acudor.com/#sle](http://www.acudor.com/#sle).
    - a. Air-Tight, Water-Tight, Wall and Ceiling Mounted Units: ACUDOR ADWT.
    - b. Fire-Rated Wall-Mounted Units - 2 Hours or Less: ACUDOR FW-5015.
  - 2. Cendrex, Inc: [www.cendrex.com/#sle](http://www.cendrex.com/#sle).
    - a. Wall-Mounted Units: Cendrex CTA, contoured cover concealing frame, hingeless with magnetic cover attachments, adjustable frame size.
    - b. Fire-Rated Wall-Mounted Units - 2 Hours or Less: Cendrex PFI series, insulated.

- 3. Karp Associates, Inc: [www.karpinc.com/#sle](http://www.karpinc.com/#sle).
- 4. Milcor, Inc: [www.milcorinc.com/#sle](http://www.milcorinc.com/#sle).
- 5. Or approved equal.
- B. Wall and Ceiling Mounted Units: Factory fabricated door and frame, fully assembled units with corner joints welded, filled and ground flush; square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.
  - 1. Style: Exposed frame with door surface flush with frame surface.
    - a. Gypsum Board Mounting Criteria: Use drywall bead type frame.
  - 2. Door Style: Single thickness with rolled or turned in edges.
  - 3. Frames: 16 gauge, 0.0598 inch (1.52 mm), minimum thickness.
  - 4. Units in Fire-Rated Assemblies: Fire rating as required by applicable code for fire-rated assembly that access doors are being installed.
  - 5. Steel Finish: Primed.
  - 6. Primed and Factory Finish: Polyester powder coat; color as selected by Owner's Representative from manufacturer's standard colors.
  - 7. Hardware:
    - a. Hardware for Fire-Rated Units: As required for listing.
    - b. Hinges for Non-Fire-Rated Units: Concealed, constant force closure spring type.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that rough openings are correctly sized and located.
- B. Begin installation only after substrates have been properly prepared, and if the responsibility of another installer, notify Owner's Representative of unsatisfactory preparation before proceeding.

#### **3.02 PREPARATION**

- A. Clean surfaces thoroughly prior to proceeding with this work.
- B. Prepare surfaces using methods recommended by manufacturer for applicable substrates in accordance with project conditions.

#### **3.03 INSTALLATION**

- A. Install units in accordance with manufacturer's instructions.
- B. Install frames plumb and level in openings, and secure units rigidly in place.
- C. Position units to provide convenient access to concealed equipment when necessary.

**END OF SECTION**

## SECTION 08 3516

### FOLDING GATES

#### **PART 1 GENERAL**

##### **1.01 SUMMARY**

- A. Section Includes:
  - 1. Side-folding aluminum grilles.
  - 2. Operating hardware and supports.
- B. Related Sections:
  - 1. Division 01: Administrative, procedural, and temporary work requirements.
  - 2. Section 08 7100 - Finish Hardware.

##### **1.02 PERFORMANCE REQUIREMENTS**

- A. All locking posts shall allow for horizontal sway without pressure to side walls of track from trollies while opening and closing the curtain.
- B. All post's standard locking hardware and handles shall be flush within post with exceptions for exit hardware.

##### **1.03 REFERENCES**

- A. ASTM International (ASTM) B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

##### **1.04 SUBMITTALS**

- A. Submittals for Review:
  - 1. Shop Drawings: Indicate track layout and dimensions including types and locations of posts, required locking and hardware, options, finish and installation details.
  - 2. Product Data: Provide information on grille construction, components, materials, and finishes.
- B. Closeout Submittals:
  - 1. Operation and Maintenance Data

##### **1.05 WARRANTIES**

- A. Provide manufacturer's 2 year warranty against defects in materials and workmanship.

#### **PART 2 PRODUCTS**

##### **2.01 MANUFACTURERS**

- A. Basis of design: Dynamic Closures Corporation. ([www.dynamicclosures.com](http://www.dynamicclosures.com))
- B. Equivalent products by the following manufacturers are acceptable:
  - 1. CHI Overhead Doors. ([www.chiohd.com](http://www.chiohd.com))
  - 2. Overhead Door Corp. ([www.overheaddoor.com](http://www.overheaddoor.com))
  - 3. Wayne-Dalton Corp. ([www.wayne-dalton.com](http://www.wayne-dalton.com))
  - 4. Or approved equal.

##### **2.02 MATERIALS**

- A. Aluminum Extrusions: ASTM B221, 6063-T5 or T6 alloy and temper.

##### **2.03 COMPONENTS**

- A. EL 126 Straight curtain:
  - 1. 7 inches [178mm] wide with 4 inches [102mm] high bottom and 4 inches [102mm] high top plates, truss-like aluminum.
  - 2. Panels connected with one-piece vertical aluminum hinges and 7 inches [178mm] wide by 1 inch [25mm] high aluminum links vertically spaced 12 inches [305mm] apart on 5/16 inch [8mm] aluminum center rod covered with 1/2 inch [13mm] aluminum tubes.
  - 3. Pattern: Straight

- 4. Stacking depth: 8% of curtain length. Add 3 inches [76mm] per hookbolt post, intermediate post, top and bottom post, travelling post. Add 4 inches [102mm] per bi-part post.
- 5. Clearance width required: 8 inches [203mm] continuous on center of track.
- B. Operation: Manual push/pull. Provide pull straps on openings over 9 feet [2743mm] in height and countertop applications.
- C. Curtain Carriers: Dual bearing trolleys with 1.125 inches [29mm] diameter tires.
- D. Overhead Track: Extruded aluminum, 1.375 inches [35mm] wide x 1.675 inches [43mm] high, continuous profile seamed with alignment bars and track pins at splices.
- E. Locking Post: Extruded aluminum, all post's standard locking hardware and handles shall be flush within post with exceptions for exit hardware. Locks may be on the public side, secure side or both. All stainless-steel lock rods engage stainless steel floor or counter sockets. All locking posts shall allow for horizontal sway without pressure to side walls of track from trolleys while opening and closing the curtain. Refer to detailed drawing for location and type of posts. Post type and location detailed on drawing.
  - 1. Wall Channel: A floor to track extruded aluminum channel that the hookbolt fits and locks into. This channel is secured permanently to the wall.
  - 2. HookBolt Lead: This post has a hookbolt that secures it to the Wall Channel. Additional top locking or double hookbolt locking available.
    - a. Top & Bottom: Lead or Trailing End option. This post contains spring loaded stainless steel lock rods that engage a floor or counter socket with the bottom rod and the top rod engages into the track and header. They are unlocked with a keyed cylinder, thumb turn or paddle, both disengaging in one motion. A rubber bumper is the standard leading edge but may also have 4 inches [102mm] or 7 inches [178mm] flange.
      - 1) Intermediate: A middle post in a door located between door sections, containing a spring-loaded stainless steel lock rod that engages a floor or counter socket to keep the door in place and unlocked by a keyed cylinder or a thumb turn. Recommended straight line spacing of all posts is 10 feet [3048mm]. Curves and counter top applications will require closer spacing.
      - 2) Traveling End: The Traveling End post terminates a door inside of a pocket (storage area). It is free to travel back and forth inside of the pocket. The post self-locks into permanent header and floor stops that prevent the door from fully leaving the pocket. A rear flange attached to the back of the post prevents reaching around.
      - 3) Fixed End: Simply attaches the end of a door permanently to a wall or structure

## **2.04 FINISHES**

- A. Aluminum: Black anodized.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install assembly in accordance with manufacturer's instructions.
- B. Anchor to adjacent construction without distortion or stress, level and plumb, to provide smooth operation.

### **3.02 ADJUSTING**

- A. Adjust grilles for smooth operation throughout full operating range.

**END OF SECTION**

**SECTION 08 5113**  
**ALUMINUM WINDOWS**

**PART 1 GENERAL**

**1.01 WORK INCLUDED**

- A. Furnish and install aluminum architectural windows complete with hardware and related components as shown on drawings and specified in this section.
- B. Furnish and install window control systems
- C. All windows shall be EFCO® Series PX32 Thermal AW-PG-AP90AP Projected and AW-PG105-C Casement or approved equal.
  - 1. A sample window, 36" (914 mm) x 24" (610 mm) single unit, as per requirements of architect.
  - 2. Test reports documenting compliance with requirements of Section 1.05.
- D. Glass and Glazing
  - 1. All units shall be factory glazed
- E. Single Source Requirement
  - 1. All products listed in Section 1.02 shall be by the same manufacturer.

**1.02 RELATED WORK**

**1.03 LABORATORY TESTING AND PERFORMANCE REQUIREMENTS**

- A. Test Units
  - 1. Air, water, and structural test unit shall conform to requirements set forth in AAMA/WDMA/CSA 101/I.S.2/A440-08 and manufacturer's standard locking/operating hardware and insulated glazing configuration.
  - 2. Thermal test unit sizes shall be 59" (1499 mm) x 24" (609.6 mm). Unit shall consist of a projected vent.
- B. Test Procedures and Performances - PX32 or equal Only
  - 1. Windows shall conform to all AAMA/WDMA/CSA 101/I.S.2/A440-08 requirements for the window type referenced in 1.01.B. In addition, the following specific performance requirements shall be met.
    - 2. Life Cycle Testing
      - a. Test in accordance with AAMA 910. There shall be no damage to fasteners, hardware parts, support arms, activating mechanisms, or any other damage that would cause the window to be inoperable. Air infiltration and water resistance tests shall not exceed specified requirements.
    - 3. Air Infiltration Test
      - a. With ventilators closed and locked, test unit in accordance with ASTM E 283 at a static air pressure difference of 6.24 psf (299 Pa).
      - b. Air infiltration shall not exceed .10 cfm/SF (.50 l/s•m<sup>2</sup>) of unit.
    - 4. Water Resistance Test
      - a. With ventilators closed and locked, test unit in accordance with ASTM E 331/ASTM E 547 at a static air pressure difference of 12.0 psf (575 Pa).
      - b. There shall be no uncontrolled water leakage.
    - 5. Uniform Load Deflection Test
      - a. With ventilators closed and locked, test unit in accordance with ASTM E 330 at a static air pressure difference of 80 psf, positive and negative pressure.
      - b. No member shall deflect over L/175 of its span.
    - 6. Uniform Load Structural Test
      - a. With ventilators closed and locked, test unit in accordance with ASTM E 330 at a static air pressure difference of 120 psf, both positive and negative.
      - b. At conclusion of test there shall be no glass breakage, permanent damage to fasteners, hardware parts, support arms or actuating mechanisms, nor any other damage that would cause the window to be inoperable.

- 7. Forced Entry Resistance
    - a. Windows shall be tested in accordance to ASTM F 588 and meet the requirements of performance grade 40 .
  - 8. Thermal Transmittance Test (Conductive U-Factor)
    - a. With ventilators closed and locked, test unit in accordance with NFRC 100-2010.
    - b. Conductive thermal transmittance (U-Factor) shall not be more than .39 BTU/hr·ft<sup>2</sup>·°F
    - c. when glazed with .24 center of glass U-Factor. (See chart at end of section).
- C. Project Wind Loads
- 1. The system shall be designed to withstand the following loads normal to the plane of the wall:
    - a. Positive pressure of 20 psf at non-corner zones.
    - b. Negative pressure of 20 psf at non-corner zones.
    - c. Negative pressure of 20 psf at corner zones.

#### **1.04 QUALITY ASSURANCE**

- A. Provide test reports from AAMA accredited laboratories certifying the performance as specified in 1.05.
- B. Test reports shall be accompanied by the window manufacturer's letter of certification, stating the tested window meets or exceeds the referenced criteria for the appropriate window type.

#### **1.05 SUBMITTALS**

- A. Contractor shall submit shop drawings; finish samples, test reports, and warranties.
  - 1. Samples of materials as may be requested without cost to owner, i.e., metal, glass, fasteners, anchors, frame sections, mullion section, corner section, etc.
- B. An NFRC Component Modeling Approach (CMA) generated label certificate shall be provided by the manufacturer. The label certificate shall be project specific and will contain the thermal performance ratings of the manufacturer's framing combined with the specified glass, and the glass spacer used in the fabrication of the glass, at NFRC standard test size as defined in table 4-3 in NFRC 100-2010.

#### **1.06 WARRANTIES**

- A. Total Window Installation
  - 1. The responsible contractor shall assume full responsibility and warrant for one year the satisfactory performance of the total window installation which includes that of the windows, hardware, glass (including insulated units), glazing, anchorage and setting system, sealing, flashing, etc., as it relates to air, water, and structural adequacy as called for in the specifications and approved shop drawings.
  - 2. Any deficiencies due to such elements not meeting the specifications shall be corrected by the responsible contractor at their expense during the warranty period.
- B. Window Material and Workmanship
  - 1. Provide written guarantee against defects in material and workmanship for 5 years from the date of final shipment.
- C. Glass
  - 1. Provide written warranty for insulated glass units that they will be free from obstruction of vision as a result of dust or film formation on the internal glass surfaces caused by failure of the hermetic seal due to defects in material and workmanship.
  - 2. Warranty period shall be for 10 (ten) years.
- D. Finish
  - 1. Warranty period shall be for 10 years from the date of final shipment.
  - 2. Provide organic finish warranty based on AAMA standard 2605.

### **PART 2 PRODUCTS**

#### **2.01 MATERIALS**

- A. Aluminum

1. Extruded aluminum shall be 6063-T6 alloy and tempered.
- B. Weather-Strip
  1. All weather-strip shall be Santoprene® or equal.
- C. Glass
  1. Forced Entry / Ballistic Resistant - Triple Insulating Glass-Clad Polycarbonate Laminate
    - a. Exterior Lite - 5/16" Glass, 0.060" PVB, 5/16" Glass, 0.060" PVB, 5/16" Glass
    - b. 3/8" Spacer
    - c. Middle Lite - 3/16" Glass, 0.050" Polyurethane, 1/4" Polycarbonate, 0.025" Polyurethane, 1/4" Polycarbonate, 0.050" Polyurethane, 3/16" Glass
    - d. 3/8" Spacer
    - e. Interior Lite - 3/16" Glass, 0.060" PVB, 3/16" Glass

## **2.02 FABRICATION**

- A. General
  1. All aluminum frame and vent extrusions shall have a minimum wall thickness of .080" (2 mm).
  2. Mechanical fasteners, welded components, and hardware items shall not bridge thermal barriers. Thermal barriers shall align at all frame and vent corners.
  3. Depth of frame and vent shall not be less than 3 1/4" (82 mm).
  4. All frame and vent members shall be able to accommodate separate interior and exterior finishes and colors.
- B. Frame & Subframe
  1. Frame components shall be mechanically fastened.
  2. Perimeter Subframe at head, jamb and sill
  3. Subframe shall utilize thermal struts. Poured and debridged urethane thermal barriers shall not be permitted
- C. Ventilator
  1. All vent extrusions shall be tubular.
  2. Each corner shall be mitered, reinforced with an extruded corner key, hydraulically crimped, and "cold welded" with epoxy adhesive.
  3. Each vent shall utilize two rows of weather stripping installed in specifically designed dovetail grooves in the extrusion. The exterior gasket will be omitted at the vent bottom rail for project-out vents and at the vent top rail for project-in vents, allowing air to pressure equalize the void between the vents and frame.
- D. Glazing
  1. All units shall be glazed with the manufacturer's standard sealant process provided the glass is held in place by a removable, extruded aluminum, glazing bead. The glazing bead must be isolated from the glazing material by a gasket.
    - a. All units shall be glazed with a minimum of 1/2" glass bit.
- E. Finish
  1. Organic
    - a. Finish all exposed areas of aluminum windows and components with Aluminum Association Designation AA-M12-C42-R1X
      - 1) Color shall be selected by Director's Representative.

<b>AA Description</b>	<b>Description</b>	<b>AAMA Guide Spec.</b>
AA-M12-C42-RX1	70% PVDF 3-Coat Kynar	2605-98

## **PART 3 EXECUTION**

### **3.01 INSPECTION**

- A. Job Conditions

1. Verify that openings are dimensionally within allowable tolerances, plumb, level, clean, provide a solid anchoring surface, and are in accordance with approved shop drawings.
2. Provide for manufacturer representation to conduct pre-installation site meeting.

### **3.02 INSTALLATION**

- A. Use only skilled tradesmen with work done in accordance with approved shop drawings and specifications.
- B. Plumb and align window faces in a single plane for each wall plane, and erect windows and materials square and true. Adequately anchor to maintain positions permanently when subjected to normal thermal movement, specified building movement, and specified wind loads.
- C. Adjust windows for proper operation after installation.
- D. Furnish and apply sealants to provide a weather tight installation at all joints and intersections and at opening perimeters. Wipe off excess material and leave all exposed surfaces and joints clean and smooth.

### **3.03 ANCHORAGE**

- A. Adequately anchor to maintain positions permanently when subjected to normal thermal movement, specified building movement, and specified wind loads.

### **3.04 PROTECTION AND CLEANING**

- A. After completion of window installation, windows shall be inspected, adjusted, put into working order and left clean, free of labels, dirt, etc. Protection from this point shall be the responsibility of the general contractor.

**END OF SECTION**

**SECTION 08 6300**  
**METAL FRAMED SKYLIGHTS**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Section Includes: Custom fabricated fixed metal framed skylights.
- B. Related Sections:
  - 1. Division 01 - Administrative, procedural, and temporary work requirements.
  - 2. Section 07 4113 - Standing Seam Metal Roofing.

**1.02 REFERENCES**

- A. American Architectural Manufacturers Association (AAMA):
  - 1. 501.1 - Standard Test Method for Metal Curtain Walls for Water Penetration Using Dynamic Pressure.
  - 2. 501.2 - Field Check of Metal Curtain Walls for Water Leakage.
  - 3. 501.3 - Field Check of Water Penetration Through Installed Exterior Windows, Curtain Walls and Doors by Uniform Air Pressure Difference.
  - 4. 603.8 - Performance Requirements and Test Procedures for Pigmented Organic Coatings on Extruded Aluminum.
  - 5. 605.2 - Specifications for High Performance Organic Coatings on Architectural Extrusions and Panels.
  - 6. 606.1 - Voluntary Guide Specification and Inspection Methods for Integral Color Anodic Finishes for Architectural Aluminum.
  - 7. 607.1 - Voluntary Guide Specifications and Inspection Methods for Clear Anodize Finishes for Architectural Aluminum.
  - 8. Sloped Glazing literature.
- B. American National Standards Institute (ANSI) Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Material Used in Buildings.
- C. ASTM International (ASTM):
  - 1. A193 - Standard Specifications for Alloy-Steel and Stainless Steel Materials for High Temperature Service.
  - 2. A307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
  - 3. B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
  - 4. B221 - Standard Specification for Aluminum-Alloy Bar, Rod, and Wire.
  - 5. B316 - Standard Specification for Aluminum and Aluminum-Alloy Rivet and Cold-Heading Wire and Rods.
  - 6. C719 - Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cycle Movement.
  - 7. C794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants.
  - 8. C1036 - Standard Specification for Flat Glass.
  - 9. C1048 - Standard Specification for Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass.
  - 10. D395 - Standard Test Methods for Rubber-Property - Compression Set.
  - 11. D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension.
  - 12. D1171 - Standard Test Method for Rubber Deterioration - Surface Ozone Cracking Outdoors or Chamber (Triangular Specimens).
  - 13. D2240 - Standard Test Method for Rubber Property - Durometer Hardness.
  - 14. E283 - Standard Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.
  - 15. E330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

- 16. E331 - Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
- 17. E773 - Standard Test Method for Accelerated Weathering of Sealed Insulating Glass Units.
- 18. E774 - Standard Specification for Classification of Durability of Sealed Insulating Glass Units.
- 19. E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors.
- D. Glass Association of North America (GANA) - Glazing Manual.
- E. Insulating Glass Certification Council (IGCC) - Classification of Insulating Glass Units.

### **1.03 SYSTEM DESCRIPTION**

- A. Complete, weather and air tight skylight assembly.
- B. Performance Requirements:
  - 1. Structural members: Sufficient size to support design loads in accordance with Building Code.
  - 2. Deflection of framing members: Maximum L/175 when subject to uniform load deflection test in accordance with ASTM E330 under specified loading.
  - 3. Water penetration: No water penetration when system is tested in accordance with ASTM E331.
  - 4. Water penetration; defined as appearance of uncontrolled water other than condensation on interior surface of any part of skylight.
    - a. Drain water entering at joints or glazing reveals and all condensation occurring within unit construction to exterior.
    - b. Air Infiltration: Maximum 0.06 cubic feet per minute per square foot of fixed area when tested in accordance with ASTM E283.
    - c. Thermal movement: Design, fabricate, and install skylight assembly to be free from objectionable distortion and stresses in fastening and joinery due to expansion and contraction when subjected to temperature variance.

### **1.04 SUBMITTALS**

- A. Submittals for Review:
  - 1. Shop Drawings: Submit plan, section, elevation, and perspective drawings as necessary to depict each specified skylight. Include flashing, connection, and termination details.
  - 2. Product Data: Manufacturer's data sheets on each product to be used, including:
    - a. Preparation instructions and recommendations.
    - b. Storage and handling requirements and recommendations.
    - c. Installation methods.
  - 3. Samples:
    - a. 12 x 12 inch glass samples.
    - b. 6 inch long extrusions samples showing specified finish.
- B. Quality Control Submittals:
  - 1. Manufacturer's certification that skylight system was designed, fabricated, installed in accordance with specified requirements.
  - 2. Certificate of Compliance from Professional Structural Engineer performing system design.

### **1.05 QUALITY ASSURANCE**

- A. Include design, engineering, fabrication glazing, and erection under single manufacturer.
- B. Manufacturer Qualifications:
  - 1. Regularly engaged in work of this Section for minimum 10 years.
  - 2. Satisfactory completion of projects of similar scope and complexity.
- C. Mockup:

1. As required by Owner's Representative.
2. Include attachments, framing, glazing, trim, and sealers.
3. Locate where directed.
4. Approved mockup may remain as part of the Work.

## **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local authorities having jurisdiction.

## **1.07 WARRANTIES**

- A. Provide manufacturer's standard warranty against defective materials, delamination, seal failure, and defects in manufacture.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Basis of Design: Kingspan Light + Air, LLC, 401 Goetz, Ave, Santa Ana, CA 92707, phone 714.540.8950, fax 714.540.5415, [www.kingspanlightandair.us](http://www.kingspanlightandair.us).

### **2.02 MATERIALS**

- A. Aluminum Extrusions:
  1. ASTM B221, 6063-T5, 6061-T6, or 6063-T6 alloy and temper.
- B. Insulating Units: Nominally 1-1/16 inches thick, consisting of 1/4 inch thick tempered clear glass exterior lite, 1/2 inch air space, and 1/2 inch thick clear annealed laminated interior lite with 0.030 PVB interlayer.

### **2.03 FABRICATION**

- A. Factory fabricate and preassemble skylights in largest size assemblies consistent with shipping and handling.
- B. Fabricate flashings, trim, closures, and other accessory items from minimum 0.032 inch thick aluminum.
- C. Attach cap retainers using stainless steel fasteners located so that glazing strips are compressed to provide uniform compression seal, maximum 12 inches on center.
- D. Clips for attachment of rafter bars: Aluminum or stainless steel, shop-riveted, bolted, or welded to rafter bars to attain fully rated structural loading.
- E. Welding: Heliarc process. Dress exposed welds where practical.
- F. Waterproofing not reliant on additional continuous exterior silicone sealant beads. Horizontal flush butt joints may rely on continuous silicone seal.
- G. Use silicone or neoprene setting blocks for support of glass, sized and located in accordance with glass manufacturer's recommendations. At no point shall glass contact metal.
- H. Provide properly designed weep system for drainage to exterior without excessive air infiltration.

### **2.04 FINISHES**

- A. Aluminum: Standard color organic coating to AAMA [603.8.] [605.2.] 3-Coat.
  1. Color selection by Owner's Representative from manufacturer's standard colors.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. If not originally coated, coat aluminum surfaces in contact with masonry, concrete, or dissimilar materials with heavy coat of zinc chromate or bituminous paint.

### **3.02 INSTALLATION**

- A. Install skylights in accordance with manufacturer's instructions and approved Shop Drawings.

- B. Install skylights plumb and true without warping or racking of panels.
- C. Anchor system in accordance with approved Shop Drawings.
- D. During erection, provide for thermal movement from minimum ambient air temperature range of 100 degrees F without creating undue stresses.
- E. Apply sealant where indicated on Shop Drawings. Before application, clean surfaces as recommended by sealant manufacturer.
- F. Allowable Tolerances:
  - 1. Maximum variation from plane or location shown on Shop Drawings: 1/8 inch in 12 feet or 1/2 inch in total length.
  - 2. Maximum offset from true alignment between two members abutting end-to-end, edge-to-edge in line, or separated by less than 3 inches: 1/32 inch.

### **3.03 FIELD QUALITY CONTROL**

- A. Water Penetration:
  - 1. Field test in accordance with AAMA 501.3 at air pressure difference equal to 20 percent of positive design wind pressure with minimum of 6.24 PSF and maximum of 12 PSF in areas Selected by Owner's Representative.
  - 2. Acceptable results: No uncontrolled water penetration as defined in AAMA 501.3.

### **3.04 PROTECTION**

- A. Protect installed products until Final Completion.

### **3.05 ADJUSTING**

- A. Touch-up, repair, or replace damaged products prior to Substantial Completion.

**END OF SECTION**

## **SECTION 087100 FINISH HARDWARE**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Section includes:
  - 1. Mechanical and electrified door hardware
- B. Section excludes:
  - 1. Windows
  - 2. Cabinets (casework), including locks in cabinets
  - 3. Signage
  - 4. Toilet accessories
  - 5. Overhead doors
- C. Related Sections:
  - 1. Division 01 Section "Alternates" for alternates affecting this section.
  - 2. Division 06 Section "Rough Carpentry"
  - 3. Division 06 Section "Finish Carpentry"
  - 4. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
  - 5. Division 08 Sections:
    - a. "Metal Doors and Frames"

#### **1.02 REFERENCES**

- A. DHI - Door and Hardware Institute
  - 1. Sequence and Format for the Hardware Schedule
  - 2. Recommended Locations for Builders Hardware
  - 3. Keying Systems and Nomenclature
  - 4. Installation Guide for Doors and Hardware
- B. ANSI - American National Standards Institute
  - 1. ANSI A117.1 – 2017 Edition – Accessible and Usable Buildings and Facilities
  - 2. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
  - 3. ANSI/BHMA A156.28 - Recommended Practices for Keying Systems
  - 4. ANSI/WDMA I.S. 1A - Interior Architectural Wood Flush Doors
  - 5. ANSI/SDI A250.8 - Standard Steel Doors and Frames

#### **1.03 SUBMITTALS**

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
2. Prior to forwarding submittal:
  - a. Review drawings and Sections from related trades to verify compatibility with specified hardware.
  - b. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.

B. Action Submittals:

1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.
  - a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.
3. Door Hardware Schedule:
  - a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.
  - b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.
  - c. Indicate complete designations of each item required for each opening, include:
    - 1) Door Index: door number, heading number, and Architect's hardware set number.
    - 2) Quantity, type, style, function, size, and finish of each hardware item.
    - 3) Name and manufacturer of each item.
    - 4) Fastenings and other pertinent information.
    - 5) Location of each hardware set cross-referenced to indications on Drawings.
    - 6) Explanation of all abbreviations, symbols, and codes contained in schedule.
    - 7) Mounting locations for hardware.
    - 8) Door and frame sizes and materials.
    - 9) Degree of door swing and handing.
4. Key Schedule:
  - a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
  - b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.

- c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
- d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
- e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
- f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.

**C. Informational Submittals:**

- 1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.
- 2. Provide Product Data:
  - a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
  - b. Include warranties for specified door hardware.

**D. Closeout Submittals:**

- 1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
  - a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
  - b. Catalog pages for each product.
  - c. Final approved hardware schedule edited to reflect conditions as installed.
  - d. Final keying schedule
  - e. Copy of warranties including appropriate reference numbers for manufacturers to identify project.
  - f. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.

**E. Inspection and Testing:**

- 1. Submit written reports to the Owner and Authority Having Jurisdiction (AHJ) of the results of functional testing and inspection for:
  - a. Fire door assemblies, in compliance with NFPA 80.
  - b. Required egress door assemblies, in compliance with NFPA 101.

**1.04 QUALITY ASSURANCE**

**A. Qualifications and Responsibilities:**

1. Supplier: Recognized architectural hardware supplier with a minimum of 5 years documented experience supplying both mechanical and electromechanical door hardware similar in quantity, type, and quality to that indicated for this Project. Supplier to be recognized as a factory direct distributor by the manufacturer of the primary materials with a warehousing facility in the Project's vicinity. Supplier to have on staff, a certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
3. Architectural Hardware Consultant: 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 meets these requirements:
  - a. For door hardware: DHI certified AHC or DHC.
  - b. Can provide installation and technical data to Architect and other related subcontractors.
  - c. Can inspect and verify components are in working order upon completion of installation.
  - d. Capable of producing wiring diagram and coordinating installation of electrified hardware with Architect and electrical engineers.
4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.

B. Certifications:

1. Accessibility Requirements:

- a. Comply with governing accessibility regulations cited in "REFERENCES" article 087100, 1.02.D3 herein for door hardware on doors in an accessible route. This project must comply with all Federal Americans with Disability Act regulations and all Local Accessibility Regulations.

C. Pre-Installation Meetings

1. Keying Conference

- a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
  - 1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
  - 2) Preliminary key system schematic diagram.
  - 3) Requirements for key control system.
  - 4) Address for delivery of keys.

2. Pre-installation Conference

- a. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
- b. Inspect and discuss preparatory work performed by other trades.
- c. Review required testing, inspecting, and certifying procedures.

- d. Review questions or concerns related to proper installation and adjustment of door hardware.

#### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping.
- B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer's original packaging.
- C. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
- D. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.
- E. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.
- F. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

#### 1.06 COORDINATION

- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.
- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop 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.
- C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

#### 1.07 WARRANTY

- A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.
  - 1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.
  - 2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.
    - a. Mechanical Warranty
      - 1) Locks
        - a) Falcon: 10 years
      - 2) Closers
        - a) LCN 4050 Series: 25 years

#### 1.08 MAINTENANCE

- A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

- B. Turn over unused materials to Owner for maintenance purposes.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

- A. Approval of manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category shall be in accordance with QUALITY ASSURANCE article, herein.
- B. Approval of products from manufacturers indicated in "Acceptable Manufacturers" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.
- C. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

### 2.02 MATERIALS

#### A. Fabrication

1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. provide screws according to manufacturer's recognized installation standards for application intended.
  2. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
  3. Provide concealed fasteners wherever possible for hardware units exposed when door is closed. Coordinate with "Metal Doors and Frames", "Flush Wood Doors", "Stile and Rail Wood Doors" to ensure proper reinforcements. Advise the Architect where visible fasteners, such as thru bolts, are required.
- B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.
1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

### 2.03 HINGES

#### A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
  - a. Ives 5BB series
2. Acceptable Manufacturers and Products:
  - a. Hager BB1191/1279 series
  - b. McKinney TB series

#### B. Requirements:

Schenectady – Central Park

Pool and Spray Park

08 7100 - 6

FINIISH HARDWARE

1. Provide hinges conforming to ANSI/BHMA A156.1.
2. Provide five knuckle, ball bearing hinges.
3. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
  - a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
  - b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
4. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
  - a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
  - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
5. 2 inches or thicker doors:
  - a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
  - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
6. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.
7. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
8. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
  - a. Steel Hinges: Steel pins
  - b. Non-Ferrous Hinges: Stainless steel pins
  - c. Out-Swinging Exterior Doors: Non-removable pins
  - d. Out-Swinging Interior Lockable Doors: Non-removable pins
  - e. Interior Non-lockable Doors: Non-rising pins
9. Provide hinges with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component. Provide mortar guard for each electrified hinge specified.

## 2.04 CONTINUOUS HINGES

### A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Ives
2. Acceptable Manufacturers:
  - a. Select
  - b. Roton

### B. Requirements:

1. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.
2. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum.

3. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
4. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
5. On fire-rated doors, provide aluminum geared continuous hinges classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
6. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
7. Provide hinges 1 inch (25 mm) shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

## 2.05 FLUSH BOLTS

### A. Manufacturers:

#### 1. Scheduled Manufacturer:

a. Ives

#### 2. Acceptable Manufacturers:

a. Burns  
b. DCI

### B. Requirements:

1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless-steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

## 2.06 MORTISE LOCKS

### A. Manufacturers and Products:

#### 1. Scheduled Manufacturer and Product:

a. Falcon MA series

#### 2. Acceptable Manufacturers and Products:

a. Accurate 9000/9100 series  
b. Sargent 8200 series

### B. Requirements:

1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1, and UL Listed for 3-hour fire doors.

2. Provide locks manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance.
3. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to "KEYING" article, herein.
4. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1-inch (25 mm) throw, constructed of stainless steel.
5. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
6. Provide electrified options as scheduled in the hardware sets. Where scheduled, provide a request to exit (RX) switch that is actuated with rotation of inside lever.
7. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.
  - a. Lever Design: Dane (DG).

## 2.07 CYLINDERS

### A. Manufacturers:

1. Scheduled Manufacturer and Product:
  - a. Match Owner's existing Sargent system

### B. Requirements:

1. Provide cylinders/cores to match Owner's existing key system, compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset, manufacturer's series as indicated. Refer to "KEYING" article, herein.

## 2.08 KEYING

### A. Scheduled System:

1. Existing factory registered system:
  - a. Provide cylinders/cores keyed into Owner's existing factory registered keying system. Comply with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

### B. Requirements:

1. Construction Keying:
  - a. Replaceable Construction Cores.
    - 1) Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
      - a) 3 construction control keys
      - b) 12 construction change (day) keys.
    - 2) Owner or Owner's Representative will replace temporary construction cores with permanent cores.

2. Permanent Keying:
  - a. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
    - 1) Master Keying system as directed by the Owner.
  - b. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
  - c. Provide keys with the following features:
    - 1) Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
  - d. Identification:
    - 1) Mark permanent cylinders/cores and keys with applicable blind code for identification. Do not provide blind code marks with actual key cuts.
    - 2) Identification stamping provisions must be approved by the Architect and Owner.
    - 3) Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
    - 4) Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
    - 5) Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
  - e. Quantity: Furnish in the following quantities.
    - 1) Change (Day) Keys: 3 per cylinder/core.
    - 2) Permanent Control Keys: 3.
    - 3) Master Keys: 6.

## 2.09 DOOR CLOSERS

- A. Manufacturers and Products:
  1. Scheduled Manufacturer and Product:
    - a. LCN 4050A series
  2. Acceptable Manufacturers and Products:
    - a. Falcon SC70A series
    - b. Norton 7500 series
- B. Requirements:
  1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
  2. Provide door closers with fully hydraulic, full rack and pinion action with cast aluminum cylinder.
  3. Closer Body: 1-1/2-inch (38 mm) diameter with 11/16-inch (17 mm) diameter heat-treated pinion journal and full complement bearings.

4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and all weather requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and back check.
7. Pressure Relief Valve (PRV) Technology: Not permitted.
8. Provide stick on templates, special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

## 2.10 DOOR TRIM

### A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Ives
2. Acceptable Manufacturers:
  - a. Trimco
  - b. Burns

### B. Requirements:

1. Provide push plates, push bars, pull plates, pulls, and hands-free reversible door pulls with diameter and length as scheduled.

## 2.11 PROTECTION PLATES

### A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Ives
2. Acceptable Manufacturers:
  - a. Burns
  - b. Trimco

### B. Requirements:

1. Provide protection plates with a minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
2. Sizes plates 1 1/2 inches (38 mm) less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch (25 mm) less width of door on pairs without a mullion or edge guards.
3. At fire rated doors, provide protection plates over 16 inches high with UL label.

## 2.12 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

### A. Manufacturers:

#### 1. Scheduled Manufacturers:

a. Glynn-Johnson

#### 2. Acceptable Manufacturers:

- a. Rixson
- b. Sargent

### B. Requirements:

1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.
2. Provide friction type at doors without closer and positive type at doors with closer.

## 2.13 DOOR STOPS AND HOLDERS

### A. Manufacturers:

#### 1. Scheduled Manufacturer:

a. Ives

#### 2. Acceptable Manufacturers:

- a. Trimco
- b. Burns

### B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide concave type where lockset has a push button or thumbturn.
2. Where a wall stop cannot be used, provide universal floor stops.
3. Where wall or floor stop cannot be used, provide overhead stop.
4. Provide roller bumper where doors open into each other and overhead stop cannot be used.

## 2.14 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

### A. Manufacturers:

#### 1. Scheduled Manufacturer:

a. Zero International

#### 2. Acceptable Manufacturers:

- a. National Guard
  - b. Reese
- B. Requirements:
1. Provide thresholds, weather-stripping, and gasketing systems as specified and per architectural details. Match finish of other items.
  2. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
  3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.
  4. Size thresholds 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width unless otherwise specified in the hardware sets or detailed in the drawings.

## 2.15 SILENCERS

- A. Manufacturers:
1. Scheduled Manufacturer:
    - a. Ives
  2. Acceptable Manufacturers:
    - a. Burns
    - b. Trimco
- B. Requirements:
1. Provide "push-in" type silencers for hollow metal or wood frames.
  2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
  3. Omit where gasketing is specified.

## 2.16 FINISHES

- A. FINISH: As noted in hardware sets:

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Prior to installation of hardware, 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. Verify doors, frames, and walls have been properly reinforced for hardware installation.
- B. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

### 3.02 INSTALLATION

- A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
  - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
  - B. Install door hardware in accordance with NFPA 80, NFPA 101 and provide post-install inspection, testing as specified in section 1.03.E unless otherwise required to comply with governing regulations.
  - C. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.
  - D. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.
  - E. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
  - F. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
  - G. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
  - H. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.
  - I. Lock Cylinders:
    - 1. Install construction cores to secure building and areas during construction period.
    - 2. Replace construction cores with permanent cores as indicated in keying section.
    - 3. Furnish permanent cores to Owner for installation.
  - J. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.
  - K. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
  - L. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.
  - M. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
  - N. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
  - O. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

### 3.03 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.

- B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

### 3.04 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items per manufacturer's instructions to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

### 3.05 DOOR HARDWARE SCHEDULE

- A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.
- B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.
- C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.
- D. Hardware Sets:

75937 OPT0285612 Version 2

Legend:

- Link to catalog cut sheet
- Electrified Opening

Hardware Group No. 01

For use on Door #(s):

1011            1061            1091

Provide each SGL door(s) with the following:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA CONT. HINGE	224HD		628 IVE
1	EA CLASSROOM LOCK	MA561L DG		626 FAL
1	EA SFIC MORTISE CYLINDER	AS REQUIRED TO MATCH EXISTING SYSTEM		626
1	EA SURFACE CLOSER	4050A SCUSH		689 LCN
1	EA KICK PLATE	8400 10" X 1 1/2" LDW B-CS		630 IVE
1	SET GASKETING	429AA-S		AA ZER
1	EA DOOR SWEEP	8198AA		AA ZER
1	EA THRESHOLD ASSEMBLY	68 x 673 x 269 x 674 x 68		AL ZER

Hardware Group No. 02

For use on Door #(s):

1012            1062

Provide each SGL door(s) with the following:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA CONT. HINGE	224HD	628	IVE
1	EA CYL O/S, BLANK I/S	MA921L SECTIONAL	626	FAL
1	EA SFIC MORTISE CYLINDER	AS REQUIRED TO MATCH EXISTING SYSTEM	626	
1	EA PUSH PLATE	8200 4" X 16"	630	IVE
1	EA PULL PLATE	8305 6" 4" X 16"	630	IVE
1	EA SURFACE CLOSER	4050A EDA	689	LCN
1	EA KICK PLATE	8400 10" X 1 1/2" LDW B-CS	630	IVE
1	EA WALL STOP	WS406/407CVX	630	IVE
3	EA SILENCER	SR64	GRY	IVE

Hardware Group No. 03

For use on Door #(s):

1041            1051

Provide each SGL door(s) with the following:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA CONT. HINGE	224HD	628	IVE
1	EA DORMITORY/EXIT LOCK	MA571L OCCUPIED/VACANT DGM	626	FAL
1	EA SFIC MORTISE CYLINDER	AS REQUIRED TO MATCH EXISTING SYSTEM	626	
1	EA OH STOP	100S	630	GLY
1	EA SURFACE CLOSER	4050A REG	689	LCN
1	EA KICK PLATE	8400 10" X 1 1/2" LDW B-CS	630	IVE
1	SET GASKETING	429AA-S	AA	ZER
1	EA DOOR SWEEP	8198AA	AA	ZER
1	EA THRESHOLD ASSEMBLY	68 x 673 x 269 x 674 x 68	AL	ZER

Hardware Group No. 04 - Not Used

Hardware Group No. 05

For use on Door #(s):

1021            1081            1092

Provide each SGL door(s) with the following:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA HINGE	5BB1 4.5 X 4.5	630	IVE
1	EA STOREROOM LOCK	MA581L DG	626	FAL
1	EA SFIC MORTISE CYLINDER	AS REQUIRED TO MATCH EXISTING SYSTEM	626	
1	EA SURFACE CLOSER	4050A REG	689	LCN
1	EA KICK PLATE	8400 10" X 1 1/2" LDW B-CS	630	IVE
1	EA WALL STOP	WS406/407CVX	630	IVE
1	EA SILENCER	SR64	GRY	IVE

Hardware Group No. 06

For use on Door #(s):

1101            1121            1132

Provide each PR door(s) with the following:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA CONT. HINGE	224HD	628	IVE
2	EA MANUAL FLUSH BOLT	FB458	626	IVE
1	EA STOREROOM LOCK	MA581L DG	626	FAL
1	EA SFIC MORTISE CYLINDER	AS REQUIRED TO MATCH EXISTING SYSTEM	626	
1	EA OH STOP & HOLDER	90H	630	GLY
1	EA SURFACE CLOSER	4050A SHCUSH	689	LCN
2	EA KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
1	SET GASKETING	429AA-S	AA	ZER
1	EA ASTRAGAL	47A	A	ZER
2	EA DOOR SWEEP	8198AA	AA	ZER
1	EA THRESHOLD ASSEMBLY	68 x 673 x 269 x 674 x 68	AL	ZER

Hardware Group No. 07 – Not Used

Hardware Group No. 08

For use on Door #(s):

1131

Provide each SGL door(s) with the following:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA CONT. HINGE	224HD	628	IVE
1	EA STOREROOM LOCK	MA581L DG	626	FAL
1	EA SFIC MORTISE CYLINDER	AS REQUIRED TO MATCH EXISTING SYSTEM	626	
1	EA SURFACE CLOSER	4050A SCUSH	689	LCN
1	EA KICK PLATE	8400 10" X 1 1/2" LDW B-CS	630	IVE
1	SET GASKETING	429AA-S	AA	ZER
1	EA DOOR SWEEP	8198AA	AA	ZER
1	EA THRESHOLD ASSEMBLY	68 x 673 x 269 x 674 x 68	AL	ZER

Hardware Group No. 09

For use on Door #(s):

1071

Provide each SGL door(s) with the following:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA CONT. HINGE	224HD	628	IVE
1	EA DORMITORY/EXIT LOCK	MA571L OCCUPIED/VACANT DGM	626	FAL
1	EA SFIC MORTISE CYLINDER	AS REQUIRED TO MATCH EXISTING SYSTEM	626	
1	EA OH STOP	100S	630	GLY
1	EA SURFACE CLOSER	4050A REG	689	LCN
1	EA KICK PLATE	8400 10" X 1 1/2" LDW B-CS	630	IVE
3	EA SILENCER	SR64	GRY	IVE

**END OF SECTION**

**SECTION 09 2116**  
**GYPSUM BOARD ASSEMBLIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Gypsum wallboard.
- B. Joint treatment and accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 06 1000 - Rough Carpentry: Building framing and sheathing.
- B. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.
- C. Section 07 9200 - Joint Sealants

**1.03 REFERENCE STANDARDS**

- A. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.
- B. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing; 2003 (Reapproved 2009).
- C. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2015.
- D. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.
- E. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.
- F. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel; 2013.
- G. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014.
- H. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.
- I. GA-216 - Application and Finishing of Gypsum Board; 2013.

**1.04 SUBMITTALS**

- A. See Section 01 3300 - SUBMITTAL PROCEDURES, for submittal procedures.
- B. Product Data: Provide data on gypsum board, accessories, and joint finishing system.
- C. Test Reports: For stud framing products that do not comply with ASTM C645 or ASTM C754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.

**1.05 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum 5 years of experience.
- B. Copies of Documents at Site: Maintain at the project site a copy of each referenced document that prescribes execution requirements.

**PART 2 PRODUCTS**

**2.01 BOARD MATERIALS**

- A. Manufacturers - Gypsum-Based Board:
  - 1. CertainTeed Corporation: [www.certainteed.com](http://www.certainteed.com).
  - 2. Georgia-Pacific Gypsum: [www.gpgypsum.com](http://www.gpgypsum.com).
  - 3. Lafarge North America Inc: [www.lafargenorthamerica.com](http://www.lafargenorthamerica.com).
  - 4. National Gypsum Company: [www.nationalgypsum.com](http://www.nationalgypsum.com).
  - 5. USG Corporation: [www.usg.com](http://www.usg.com).
  - 6. Or Approved Equal

- B. Ceiling Board: Special sag resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
  - 1. Application: Ceilings, unless otherwise indicated.
  - 2. Thickness: 5/8 inch (15.875 mm).
  - 3. Edges: Tapered.

## **2.02 GYPSUM WALLBOARD ACCESSORIES**

- A. Finishing Accessories: ASTM C1047, galvanized steel or rolled zinc, unless noted otherwise.
  - 1. Types: As detailed or required for finished appearance.
- B. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
  - 1. Paper Tape: 2 inch (50 mm) wide, creased paper tape for joints and corners, except as otherwise indicated.
  - 2. Ready-mixed vinyl-based joint compound.
- C. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inches (0.84 mm) in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion-resistant.
- D. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.
- E. Adhesive for Attachment to Metal:
  - 1. Products:
    - a. Franklin International, Inc; Titebond PROvantage Professional Drywall Adhesive: [www.titebond.com/#sle](http://www.titebond.com/#sle).
    - b. Liquid Nails, a brand of PPG Architectural Coatings; \_\_\_\_: [www.liquidnails.com/#sle](http://www.liquidnails.com/#sle).

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that project conditions are appropriate for work of this section to commence.

### **3.02 FRAMING INSTALLATION**

- A. Studs: Space studs at 16 inches on center (at 406 mm on center).
  - 1. Extend partition framing to structure where indicated and to ceiling in other locations.
  - 2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
- B. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.
- C. Blocking: Install wood blocking for support of:
  - 1. Framed openings.
  - 2. As indicated on drawings

### **3.03 BOARD INSTALLATION**

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Exposed Gypsum Board in Interior Wet Areas: Seal joints, cut edges, and holes with water-resistant sealant.

### **3.04 INSTALLATION OF TRIM AND ACCESSORIES**

- A. Control Joints: Place control joints consistent with lines of building spaces and as follows:
  - 1. Not more than 30 feet (10 meters) apart on walls and ceilings over 50 feet (16 meters) long.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

### **3.05 JOINT TREATMENT**

- A. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.
- B. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
  - 1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
  - 2. Level 1: Fire-resistance-rated wall areas above finished ceilings, whether or not accessible in the completed construction.
- C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
  - 1. Feather coats of joint compound so that camber is maximum 1/32 inch (0.8 mm).
  - 2. Taping, filling, and sanding are not required at surfaces behind adhesive applied ceramic tile and fixed cabinetry.
- D. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

### **3.06 TOLERANCES**

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet (3 mm in 3 m) in any direction.

**END OF SECTION**

**SECTION 09 6513**  
**RESILIENT WALL BASE**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 09 2116 - Gypsum Board Assemblies

**1.02 SUMMARY**

- A. Section Includes:
  - 1. Resilient Wall Base (VCB).

**1.03 SUBMITTALS**

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

**1.04 QUALITY ASSURANCE**

- A. Mockups: Provide resilient products with mockups specified in other Sections.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by Johnsonite, but not less than 55 deg F (13 deg C) or more than 85 deg F (29 deg C).

**1.06 PROJECT CONDITIONS**

- A. Install resilient products after other finishing operations, including painting, have been completed.
- B. Maintain ambient temperatures within range recommended by Johnsonite, but not less than 65 deg F (18 deg C) or more than 85 deg F (29 deg C) in spaces to receive resilient products during the following time periods:
  - 1. 48 hours before installation.
  - 2. During installation.
  - 3. 48 hours after installation.
  - 4. Maintain the ambient relative humidity between 40% and 60% during installation.
  - 5. Until Substantial Completion, maintain ambient temperatures within range recommended by Johnsonite, but not less than 55 deg F (13 deg C) or more than 85 deg F (29 deg C).

**PART 2 - PRODUCTS**

**2.01 RESILIENT WALL BASE**

- A. Traditional Wall Base
  - 1. Johnsonite traditional Wall Base specify - Traditional Wall Base with the following physical characteristics:
  - 2. Traditional Vinyl Wall Base
    - a. Manufactured from a homogeneous composition of polyvinyl chloride (PVC).
    - b. Meets performance requirements for ASTM F 1861 Standard Specification for Resilient Wall Base, Type TV, Group 1.
    - c. ASTM E 648, Standard Test Method for Critical Radiant Flux of 0.45 watts/cm<sup>2</sup> or greater, Class I.
    - d. ASTM E 84, Standard Test Method for Surface Burning Characteristics of Building Materials, Class B, Smoke <450.
    - e. Flexibility: Does not crack, break, or show any signs of fatigue when bent around a 1 1/4" diameter cylinder when tested according to ASTM F 137 Standard Test Method for Flexibility of Resilient Flooring Materials protocols.
    - f. Color Stability: Meets or exceeds ASTM F 1861 requirements for color stability when tested to ASTM F 1515 Standard Test Method for Measuring Light Stability of Resilient Flooring protocols.

- g. Contains at least 14% pre consumer recycled content.
- h. Phthalate free except for recycled materials.
- i. 100% Recyclable.
- j. SCS FloorScore® Certified and meets California Specifications Section 01350.
- k. Johnsonite facilities are ISO 9001 and ISO 14001 Certified.
- l. For Traditional Vinyl Wall Base 1/8" or .080" thick
  - 1) Profile: CB (Toe)
  - 2) Color - As selected by Owner's Representative
  - 3) Height - 4"
  - 4) Length - Provide longest length possible for fewest splices possible.
  - 5) Thickness - 1/8" or .080"

## **2.02 INSTALLATION MATERIALS**

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based formulation manufactured and warranted by a reputable manufacturer.
- B. Adhesives: as recommended by Johnsonite to meet site conditions.
  - 1. Johnsonite 960 Cove Base Adhesive
  - 2. Johnsonite 946 Premium Contact Bond Adhesive

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the work.
- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.02 PREPARATION**

- A. Prepare substrates according to Johnsonite's written instructions to ensure adhesion of resilient wall base.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- C. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- D. Vacuum clean substrates to be covered by resilient products immediately before installation.

### **3.03 RESILIENT BASE INSTALLATION**

- A. Comply with Johnsonite's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. Preformed corners: Install preformed corners if available before installing straight pieces.
- G. Job-formed corners:
  - 1. Outside corners: Form by bending without producing discoloration (whitening) at bends.
  - 2. Inside corners: Butt one piece to corner then scribe next piece to fit.

### **3.04 CLEANING AND PROTECTION**

- A. Comply with Johnsonite's written instructions for cleaning and protection of resilient products.
- B. Perform the following operations immediately after completing resilient product installation:
  1. Remove adhesive and other blemishes from exposed surfaces.
  2. Damp-mop surfaces to remove marks and soil.
  3. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

**END OF SECTION**

**SECTION 09 9113**  
**EXTERIOR PAINTING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
  - 1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
  - 2. Mechanical and Electrical:
    - a. On the roof and outdoors, paint equipment, exposed vents, piping, and conduit that is exposed to weather or to view, including factory-finished materials.
- D. Do Not Paint or Finish the Following Items:
  - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
  - 2. Items indicated to receive other finishes.
  - 3. Items indicated to remain unfinished.
  - 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
  - 5. Non-metallic roofing and flashing.
  - 6. Stainless steel, anodized aluminum, bronze, terne coated stainless steel, zinc, and lead.
  - 7. Ceramic and other types of tiles.
  - 8. Brick.
  - 9. Phenolic Wall Panels.
  - 10. Glass.
  - 11. Concealed pipes, ducts, and conduits.

**1.02 RELATED REQUIREMENTS**

- A. Section 06 2000 - Finish Carpentry.
- B. Section 07 4649 - Poly-ash Siding.
- C. Section 09 9123 - Interior Painting.

**1.03 REFERENCE STANDARDS**

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.
- C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition, [www.paintinfo.com](http://www.paintinfo.com).
- D. SSPC-SP 1 - Solvent Cleaning; 2015.

**1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
  - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
  - 2. MPI product number (e.g. MPI #47).
  - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.

- C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches (216 by 279 mm) in size, illustrating range of colors available for each finishing product specified.
  - 1. Where sheen is specified, submit samples in only that sheen.
- D. Samples: Submit two painted samples for each paint system as requested by Owner's Representative, illustrating selected colors and textures for each color and system selected with specified coats cascaded. Submit on samples of the material to receive coating, minimum size 3 inches wide x 6 inches long.
- E. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 6000 - Product Requirements, for additional provisions.
  - 2. At Director's Representative's request, Extra Paint and Finish Materials: 1 gallon (4 L) of each color; from the same product run, store where directed.
  - 3. Label each container with color in addition to the manufacturer's label.

#### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 3 years experience and approved by manufacturer.

#### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

#### **1.07 FIELD CONDITIONS**

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply exterior paint and finishes during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- D. Minimum Application Temperatures for Latex Paints: 50 degrees F (10 degrees C) for exterior; unless required otherwise by manufacturer's instructions.
- E. Minimum Application Temperature for Stain Finishes: 65 degrees F (18 degrees C) for exterior, unless required otherwise by manufacturer's instructions.
- F. Provide lighting level of 80 ft candles (860 lx) measured mid-height at substrate surface.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.
- B. Paints:
  - 1. Base Manufacturer: Benjamin Moore: <https://www.benjaminmoore.com>.

- C. Transparent Finishes:
  - 1. Base Manufacturer: Benjamin Moore: <https://www.benjaminmoore.com>.
- D. Stains:
  - 1. Base Manufacturer: Benjamin Moore: <https://www.benjaminmoore.com>.
- E. Primer Sealers: Same manufacturer as top coats.
- F. Or approved equal.

## **2.02 PAINTS AND FINISHES - GENERAL**

- A. Paints and Finishes: Ready mixed, unless required to be a field-catalyzed paint.
  - 1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
  - 2. Supply each paint material in quantity required to complete entire project's work from a single production run.
  - 3. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Colors: To be selected from manufacturer's full range of available colors.
  - 1. Selection to be made by Owner's Representative after award of contract.

## **2.03 PAINT SYSTEMS - EXTERIOR**

- A. Paint E-OP - Exterior Surfaces to be Painted, Unless Otherwise Indicated: Including exposed conduit and piping.
  - 1. Two top coats and one coat primer.
    - a. Prime Coat: One Coat of Benjamin Moore Fresh Start 100% Acrylic All Purpose Primer #023
    - b. Finish Coats: Two Coats of Benjamin Moore Regal Select Exterior High Build Low Lustre #401
- B. Paint E-OP-SS - Paint system on structural steel.
  - 1. Three step minimum system
    - a. Surface Preparation includes specification SSPC-SP 16: Brush-Off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals
    - b. Primer: PPG PMC Amerlock 2 Fast Dry, Surface Rolerant, High Solids Epoxy Coating (AK2-23)
    - c. Cleaner: PPG PMC Prep 88 Water Based Alkaline Cleaner
    - d. Finish Coat: PPG PMC PSX 700 Engineered Siloxane; Satin Sheen
    - e. Color of Finish coat: As selected by Owner's representative from manufacturer's standard range.
- C. Paint E-OP-FL - Concrete Floors to be Painted.
  - 1. Two top coats and one coat primer.
  - 2. Top Coat(s): Prosoco Consolideck® LS® Concrete Sealer & Densifier, or approved equal.
- D. Paint E-OP: Paint on Poly-ash trim and window trim
  - 1. Two top coats and one coat primer.
    - a. Prime Coat: One Coat of Benjamin Moore Fresh Start 100% Acrylic All Purpose Primer# 023
    - b. Finish Coats: Two Coats of Benjamin Moore Regal Select Exterior High Build Soft Gloss #403
- E. Paint E-TR-W- Transparent stain on wood soffit
  - 1. Refer to Section 09 9123 Interior Paint I-TR-W
- F. Paint E-OP-M - Paint on metal door frames.
  - 1. Two top coats and one coat primer.
    - a. Prime Coat: One Coat of Benjamin Moore UltraSpec HP Acrylic Metal Primer #HP04

- b. Finish Coat: Two Coats of Benjamin Moore UltraSpec HP D.T.M. Acrylic Low Lustre #HP25

## **2.04 ACCESSORY MATERIALS**

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Do not begin application of paints and finishes until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- E. Test shop-applied primer for compatibility with subsequent cover materials.
- F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
  1. Poly-ash Siding: 12 percent, or per manufacturer's instructions.
  2. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.
  3. Concrete Floors and Traffic Surfaces: 8 percent.

### **3.02 PREPARATION**

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- F. Poly-ash Siding: Remove dirt, dust and other foreign matter with a stiff fiber brush. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
- G. Concrete Floors and Traffic Surfaces: Prepare surface per manufacturer's instructions. Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.
- H. Galvanized Surfaces:
  1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
- I. Exterior Wood to Receive Transparent Finish: Remove dust, grit, and foreign matter; seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes with tinted exterior caulk compound after sealer has been applied. Back prime concealed surfaces before installation.

### **3.03 APPLICATION**

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

- C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- D. Apply each coat to uniform appearance.
- E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- F. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- G. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

#### **3.04 FIELD QUALITY CONTROL**

- A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection.

#### **3.05 CLEANING**

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

#### **3.06 PROTECTION**

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

**END OF SECTION**

**SECTION 09 9123**  
**INTERIOR PAINTING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
  - 1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
  - 2. Mechanical and Electrical:
    - a. In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
    - b. In finished areas, paint shop-primed items.
    - c. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.
- D. Do Not Paint or Finish the Following Items:
  - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
  - 2. Items indicated to receive other finishes.
  - 3. Items indicated to remain unfinished.
  - 4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
  - 5. Ceramic and other tiles.
  - 6. Brick.
  - 7. Phenolic Wall Panels.
  - 8. Glass.
  - 9. Concealed pipes, ducts, and conduits.

**1.02 RELATED REQUIREMENTS**

- A. Section 06 2000 - Finish Carpentry.
- B. Section 09 9113 - Exterior Painting.

**1.03 REFERENCE STANDARDS**

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.
- C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition, [www.paintinfo.com](http://www.paintinfo.com).

**1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
  - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
  - 2. MPI product number (e.g. MPI #47).
  - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.

- C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches (216 by 279 mm) in size, illustrating range of colors available for each finishing product specified.
  - 1. Where sheen is specified, submit samples in only that sheen.
- D. Samples: Submit two painted samples for each paint system as requested by Owner's Representative, illustrating selected colors and textures for each color and system selected with specified coats cascaded. Submit on samples of the material to receive coating, minimum size 3 inches wide x 6 inches long.
- E. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 6000 - Product Requirements, for additional provisions.
  - 2. Extra Paint and Finish Materials: 1 gallon (4 L) of each color; from the same product run, store where directed.
  - 3. Label each container with color in addition to the manufacturer's label.

## **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 3 years experience and approved by manufacturer.

## **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

## **1.07 FIELD CONDITIONS**

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply materials when relative humidity exceeds 85 percent; at temperatures less than 5 degrees F (3 degrees C) above the dew point; or to damp or wet surfaces.
- D. Minimum Application Temperatures for Paints: 50 degrees F (10 degrees C) for interiors unless required otherwise by manufacturer's instructions.
- E. Minimum Application Temperature for stain Finishes: 65 degrees F (18 degrees C) for interior, unless required otherwise by manufacturer's instructions.
- F. Provide lighting level of 80 ft candles (860 lx) measured mid-height at substrate surface.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.
- B. Paints:
  - 1. Base Manufacturer: Benjamin Moore: <https://www.benjaminmoore.com>.

- C. Transparent Finishes:
  - 1. Base Manufacturer: Benjamin Moore: <https://www.benjaminmoore.com>.
- D. Stains:
  - 1. Base Manufacturer: Benjamin Moore: <https://www.benjaminmoore.com>.
- E. Primer Sealers: Same manufacturer as top coats.
- F. Or approved equal.

## **2.02 PAINTS AND FINISHES - GENERAL**

- A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.
  - 1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
  - 2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
  - 3. Supply each paint material in quantity required to complete entire project's work from a single production run.
  - 4. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.
- C. Colors: To be selected from manufacturer's full range of available colors.
  - 1. Selection to be made by Architect after award of contract.
  - 2. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.

## **2.03 PAINT SYSTEMS - INTERIOR**

- A. Paint I-OP - Interior Surfaces to be Painted, Unless Otherwise Indicated: Including window trim.
  - 1. Two top coats and one coat primer.
    - a. Prime Coat: One Coat of Benjamin Moore Fresh Start 100% Acrylic High Hiding All Purpose Primer # 046
    - b. Finish Coat: Two coats of Benjamin Moore Regal Select Interior #551
      - 1) Window trim sheen to be Semi-gloss
- B. Paint I-OP-2 - Paint at CMU walls, Graffiti resistant.
  - 1. One top coat, once coat block filler and one coat primer.
    - a. Block Filler: Benjamin Moore Corotech V163 Waterborne Epoxy Block Filler
    - b. Primer: One coat of Benjamin Moore Corotech® V400 Polyamide Epoxy
    - c. Top Coat: One coat of Benjamin Moore Corotech® V500 Aliphatic Acrylic Urethane
- C. Paint I-OP-3 - Paint at Gypsum Wallboard
  - 1. Two top coats and one coat primer.
    - a. Primer: One Coat of Benjamin Moore Fresh Start All Purpose Interior/Exterior Alkyd Primer #024
    - b. Finish Coat: Two Coats of Benjamin Moore UltraSpec ScuffX Interior Matte Finish #484
- D. Paint I-OP-M - Paint at metal door frames.
  - 1. Refer to Section 09 9113 Exterior Paint E-OP-M
- E. Paint I-TR-W - Transparent Finish on T&G Wood Ceiling and Soffit
  - 1. Two coats clear sealer, one coat stain, one conditioner coat if required.
    - a. Conditioner Coat (if needed): Apply one coat of untinted Lenmar Interior Waterborne Wiping Wood Stain #1WB.1300
    - b. Stain: One Coat of Lenmar Interior Waterborne Wiping Wood Stain #1WB.1300

- c. Clear Sealer: Polyurethane – Two coats of Lenmar Aqua-Plastic Urethane Clear #1WB.14XX

## **2.04 ACCESSORY MATERIALS**

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Do not begin application of paints and finishes until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- E. Test shop-applied primer for compatibility with subsequent cover materials.
- F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
  1. Gypsum Wallboard: 12 percent.
  2. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
  3. Concrete Floors and Traffic Surfaces: 8 percent.

### **3.02 PREPARATION**

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- F. Masonry:
  1. Remove efflorescence and chalk. Do not coat surfaces if moisture content, alkalinity of surfaces, or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
  2. Prepare surface as recommended by top coat manufacturer.
- G. Concrete Floors and Traffic Surfaces: Remove contamination, acid etch and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.
- H. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.
- I. Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.
- J. Wood Surfaces to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.

### **3.03 APPLICATION**

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- C. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- E. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- F. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.
- G. Sand wood and metal surfaces lightly between coats to achieve required finish.
- H. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- I. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- J. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

### **3.04 FIELD QUALITY CONTROL**

- A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection.

### **3.05 CLEANING**

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

### **3.06 PROTECTION**

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

**END OF SECTION**

**SECTION 10 1400**  
**SIGNAGE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Room and door signs.
- B. Building identification signs.

**1.02 RELATED REQUIREMENTS**

- A. Division 26: Exit Signs

**1.03 REFERENCE STANDARDS**

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.
- B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- C. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.

**1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.
- C. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, other text to be applied, sign and letter sizes, fonts, and colors.
  - 1. When content of signs is indicated to be determined later, request such information from Director's Representative at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
  - 2. Submit for approval by Director's Representative prior to fabrication.
- D. Samples: Submit two samples of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.
- E. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.
- F. Verification Samples: Submit samples showing colors specified.
- G. Manufacturer's Installation Instructions: Include installation templates and attachment devices.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Package signs as required to prevent damage before installation.
- B. Package room and door signs in sequential order of installation, labeled by floor or building.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Flat Signs: Type ST-EX
  - 1. Cosco Industries (ADA signs): [www.coscoarchitecturalsigns.com/#sle](http://www.coscoarchitecturalsigns.com/#sle).
  - 2. Fossil Industries: [www.fossilinc.com](http://www.fossilinc.com).
  - 3. ASI Signage; Inform system: [www.asisignage.com](http://www.asisignage.com).
  - 4. Or Approved Equal.
- B. Building Identification Signage
  - 1. ASI Signage; Inform system: [www.asisignage.com](http://www.asisignage.com).
  - 2. Cosco Industries: [www.coscoarchitecturalsigns.com/#sle](http://www.coscoarchitecturalsigns.com/#sle)
  - 3. GNS Group: <https://gnsgroupltd.com/>
  - 4. Or approved equal.

## **2.02 SIGNAGE APPLICATIONS**

- A. Accessibility Compliance: Signs are required to comply with ADA Standards and ICC A117.1 and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.
- B. Room and Door Signs: Provide a sign for every doorway, whether it has a door or not, not including corridors, lobbies, and similar open areas.
  - 1. Sign Type: Flat signs with engraved panel media as specified.
  - 2. Provide "tactile" signage, with letters raised minimum 1/32 inch (0.8 mm) and Grade II braille.
  - 3. Character Height: 1 inch (25 mm).
  - 4. Sign Height: 2 inches (50 mm), unless otherwise indicated.
  - 5. Service Rooms: Identify with room names and numbers to be determined later, not those indicated on drawings.
  - 6. Rest Rooms: Identify with pictograms, the names "MEN" and "WOMEN", room numbers to be determined later, and braille.
- C. Building Identification Signs:
  - 1. Use individual metal letters.
  - 2. Mount as indicated on drawings.
  - 3. Letter Height: As indicated on drawings.
  - 4. Letter Thickness: As indicated on drawings.

## **2.03 SIGN TYPES**

- A. Flat Signs: Signage media without frame.
  - 1. Panels: Graphics are to be manufactured as digital high pressure laminate, composed of several layers of phenolic resin impregnated kraft filler paper, a digitally imaged graphic, surfaced by layers of translucent exterior UV / graffiti overlay protection. Panels, including exterior overlays, are to be bonded under heat and extreme pressure to form a composite panel. All cutting and finishing to be performed by CNC router. Graphics to consists of full 12 color high definition printing technology.
  - 2. Wall Mounting of One-Sided Signs: Concealed screws.
- B. Color and Font: Unless otherwise indicated:
  - 1. Character Font: Typeface as selected from the manufacturer's standard sans serif typefaces, upper case letters, minimum height 5/8", maximum height 2".
  - 2. Background Color: Color of Text and Raised Characters: To be selected from standard colors.

## **2.04 TACTILE SIGNAGE MEDIA**

- A. Engraved Panels: Laminated colored plastic; engraved through face to expose core as background color:
  - 1. Total Thickness: 1/16 inch (1.6 mm).

## **2.05 DIMENSIONAL LETTERS**

- A. Metal Letters:
  - 1. Metal: Aluminum sheet, flat.
  - 2. Finish: Brushed, satin.
  - 3. Color: To be selected by Owner's Representative from manufacturer's full standard color range.
  - 4. Mounting: Concealed screws.

## **2.06 ACCESSORIES**

- A. Concealed Screws: Stainless steel, galvanized steel, chrome plated, or other non-corroding metal.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that substrate surfaces are ready to receive work.

### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install neatly, with horizontal edges level.
- C. Locate signs where indicated:
  - 1. Room and Door Signs: Locate on wall at latch side of door with centerline of sign at 60 inches (1525 mm) above finished floor, unless otherwise indicated.
  - 2. If no location is indicated obtain Owner's instructions.
- D. Protect from damage until Date of Substantial Completion; repair or replace damaged items.

**END OF SECTION**

**SECTION 10 2116**  
**SOLID PLASTIC TOILET COMPARTMENTS**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Section Includes:
  1. Solid plastic toilet compartments and urinal screens.
- B. Related Sections:
  1. Division 01: Administrative, procedural, and temporary work requirements.

**1.02 REFERENCES**

- A. ASTM International (ASTM):
  1. A167 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
  2. B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
  3. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. National Fire Protection Association (NFPA) 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.

**1.03 SYSTEM DESCRIPTION**

- A. Compartment Configurations:
  1. Toilet partitions: Floor mounted, overhead braced.
  2. Urinal screens: Wall mounted.

**1.04 SUBMITTALS**

- A. Submittals for Review:
  1. Shop Drawings: Include dimensioned layout, elevations, trim, closures, and accessories.
  2. Product Data: Manufacturer's descriptive data for panels, hardware, and accessories.
  3. Samples: Per owner's request, provide 2 x 3 inch samples in each color.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Minimum 5 years experience in manufacture of solid plastic toilet compartments with products in satisfactory use under similar service conditions.
- B. Installer Qualifications: Minimum 5 years experience in work of this Section.

**1.06 WARRANTIES**

- A. Provide manufacturer's 25 year warranty against breakage, corrosion, and delamination under normal conditions.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Contract Documents are based on Hiny Hiders by Scranton Products.  
[www.scrantonproducts.com](http://www.scrantonproducts.com)
- B. Or approved equal.

**2.02 MATERIALS**

- A. Doors, Panels and Pilasters:
  1. High density polyethylene (HDPE), fabricated from polymer resins compounded under high pressure, forming single thickness panel.
  2. Waterproof and nonabsorbent, with self-lubricating surface, resistant to marks by pens, pencils, markers, and other writing instruments.
  3. 1 inch thick with edges rounded to 1/4 inch radius.
  4. Fire hazard classification: Not required.
  5. Color: As selected by Owner's Representative from manufacturer's standard colors.

- B. Aluminum Extrusions: ASTM B221, 6463-T5 alloy and temper.
- C. Stainless Steel: ASTM A167, Type 304.

## **2.03 HARDWARE**

- A. Hinges: Continuous 54" long, heavy duty aluminum
- B. Door Strike and Keeper:
  - 1. 6 inches long, fabricate from heavy-duty extruded aluminum with bright dip anodized finish, with wrap-around flanges secured to pilasters with stainless steel tamper resistant Torx head sex bolts.
  - 2. Bumper: Extruded black vinyl.
- C. Latch and Housing:
  - 1. Heavy-duty extruded aluminum.
  - 2. Latch housing: Bright dip anodized finish.
  - 3. Slide bolt and button: Black anodized finish.
- D. Coat Hook/Bumper:
  - 1. Combination type, chrome plated Zamak.
  - 2. Equip outswing handicapped doors with second door pull and door stop.
- E. Door Pulls: Chrome plated Zamak.

## **2.04 COMPONENTS**

- A. Doors and Dividing Panels: 55 inches high, mounted 14 inches above finished floor, with aluminum heat-sinc fastened to bottom edges.
- B. Pilasters: 82 inches high, fastened to pilaster sleeves with stainless steel tamper resistant Torx head sex bolt.
- C. Pilaster Sleeves: 3 inches high, 20 gage stainless steel, secured to pilaster with stainless steel tamper resistant Torx head sex bolt.
- D. Wall Brackets: Continuous 54 inches long, heavy-duty aluminum, bright dip anodized finish, fastened to pilasters and panels with stainless steel tamper resistant Torx head sex bolts.
- E. Headrail: Heavy-duty extruded aluminum, anti-grip design, clear anodized finish, fastened to headrail bracket with stainless steel tamper resistant Torx head sex bolt and at top of pilaster with stainless steel tamper resistant Torx head screws.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install compartments in accordance with manufacturer's instructions and approved Shop Drawings.
- B. Install rigid, straight, plumb, and level.
- C. Locate bottom edge of doors and panels 14 inches above finished floor.
- D. Provide uniform, maximum 3/8 inch vertical clearance at doors.
- E. Not Acceptable: Evidence of cutting, drilling, or patching.

### **3.02 ADJUSTING**

- A. Adjust doors and latches to operate correctly.

## **END OF SECTION**

**SECTION 10 2813**  
**TOILET AND BATH ACCESSORIES**

**PART 1 GENERAL**

**1.01 RELATED WORK SPECIFIED ELSEWHERE**

- A. Section 06 1000 - Rough Carpentry
- B. Section 10 2116 - Plastic Toilet Compartments

**1.02 SUBMITTALS**

- A. Shop Drawings: Details for grab bars.
- B. Product Data: Specifications or data sheets and installation instructions for each product required. Coordinate fixture model numbers with Owner's Representative to ensure Owner's refills fit products selected.
- C. Contract Closeout Submittals: Furnish the following, as applicable, for each product required:
  1. Operation and maintenance data.
  2. Parts list.
  3. Keys and tools.

**1.03 QUALITY ASSURANCE**

- A. Provide products from more than one manufacturer if necessary to meet the requirements of this Section.

**1.04 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver and store products in manufacturer's original protective packaging.
  1. Furnish items with protective wrappings or covers as required to protect finishes. Do not remove protective coverings until completion of other Work liable to damage accessory finish.
- B. Pack products with required trim, mounting devices, fasteners, service tools or keys, and complete installation instructions.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Stainless Steel: AISI Type 302/304 with No. 4 satin finish, unless otherwise indicated.
- B. Brass: Cast or forged quality alloy, FS WW-P-541D/GEN.
- C. Sheet Steel: Cold rolled, commercial quality, ASTM A 366.
  1. Galvanized: Zinc coated, ASTM A 123.
- D. Mounting Devices and Fasteners: Stainless steel, unless otherwise indicated.
- E. Chromium Plating: Nickel and chromium electro-deposited on metal; ASTM B 456, Type SC 2, satin finish unless otherwise indicated.

**2.02 FABRICATION**

- A. Fabricate dispenser and disposal units of one-piece welded construction with seamless corners, unless otherwise specified.
- B. Equip units with keyed vandal-resistant lock where key access is specified.
- C. Mounting Devices: If not indicated, furnish type and size compatible with accessory unit specified which will securely mount accessory to wall or partition construction indicated.
  1. Grab Bars: Furnish anchoring devices which will withstand minimum downward pull of 500 pounds.
- D. Exposed Mounting Devices and Fasteners:
  1. Type: Theft-resistant.
  2. Finish: Match accessory finish, unless otherwise indicated.

3. Concrete Construction: Furnish stainless steel machine screws in nonferrous expansion anchors except furnish stainless steel toggle bolts where anchorage occurs in concrete.

## 2.03 KEYS AND TOOLS

- A. Keys: Furnish minimum of 2 keys and an additional 2 keys for every 6 key operated accessories.
  1. Key similar key access units alike unless otherwise specified.
- B. Tools: Furnish socket wrenches compatible with set screws of concealed theft-resistant fastenings. Furnish minimum of 2 wrenches and an additional 2 wrenches for every 6 accessories having such fastenings.

## 2.04 ADA BENCHES

- A. Benches to be Tufftec Benches for Locker Rooms by Scranton Products or approved equal.
- B. Bench tops shall be 1-1/2 inches (38 mm) thick with all edges rounded to a 1/4 inch (6 mm) radius. Standard bench top size is 9-1/2 inches (241 mm) wide by length not to exceed 96 inches (2438 mm) for one single piece.
- C. Steel pedestals shall be 16-1/4 inches (413 mm) high, secured to bench tops with stainless steel tamper resistant Torx head screws and secured to the floor using lead expansion shields with 2 inches (51 mm) stainless steel Phillips head machine bolts.
- D. Size: As indicated on drawings.
- E. Color to be chosen by Owner's Representative from manufacturer's standard colors.

## 2.05 LOCKERS

- A. Design: locker
  1. Basis of Design: Tufftec Solid Plastic Locker by Scranton Products of approved equal.
  2. Lockable vented storage with lockable lift-up lid and open storage compartments as indicated on drawings.
  3. Hanging storage with 4-hanging storage hooks.
  4. Size: 12" Deep x 15" Wide
  5. Construction:
    - a. Locker doors and frames shall be made from high impact, high density polyethylene (HDPE) formed under high pressure into solid plastic components 1/2 inch (13 mm) thick with homogeneous color throughout.
    - b. Sides, tops, bottoms, backs, and shelves shall be made from high impact, high density, polyethylene (HDPE) formed under pressure into solid plastic components 3/8 inch (9.5 mm) thick with homogenous natural color throughout. Out sides, insides, tops, bottoms, backs, dividers and shelves shall be natural in color.
    - c. Provide end panels and filler panels of plastic material in color of locker unless noted otherwise as an accent color.
    - d. Continuous latch shall be made from high impact HDPE plastic and capable of accepting various locking mechanisms. The spring-loaded latch shall be securely fastened to the entire length of the door providing a quiet positive latching function.
    - e. Coat hooks shall be two-prong and made from high impact plastic. Hooks shall be mounted to bottom of the shelf or divider, one each per door opening. (Standard on Single, Double and Triple tier lockers only).
  6. Materials:
    - a. Lockers shall be constructed from High Density Polyethylene (HDPE) resins. Material shall be fabricated from polymer resins compounded under high pressure, forming a single component which is waterproof, nonabsorbent and has a self-lubricating surface that resists marks from pens, pencils, markers and other writing instruments.
    - b. Plastic components shall resist deterioration and discoloration when subjected to any of the following: acetic acid 80%, acetone, ammonia 12%, ammonium phosphate, bleach 12%, borax, brine, caustic soda, chlorine water, citric acid, copper chloride, core oils, hydrochloric acid 40%, hydrogen peroxide 30%, isopropyl alcohol, lactic

- acid 25%, lime sulfur, nicotine, potassium bromide; soaps, sodium bicarbonate, trisodium phosphate, urea, urine and vinegar. (Testing in accordance with corrosion testing procedure established by the United States Plastic Corporation.)
7. Color to be chose by Owner's Representative from manufacturer's standard colors.
  8. Fabrication:
    - a. Locker components shall be fabricated square and rigid with a finish free of scratches and chips.
    - b. Solid plastic locker components shall snap together at profile connections or slide together at dovetail connections for easy assembly and shall provide a solid and secure anti-racking book case component construction for clean lines and precise reveals. Adjacent lockers shall share a common side panel. Locker units shall be manufactured for assembly in a group of no more than three adjacent lockers.

## **2.06 MIRRORS**

- A. Types:
  1. Unless otherwise indicated: Mirror by Bobrick, Model# B-165 2436 & B-165 2460.
    - a. Description: Type 430 stainless steel with bright-polished finish. Mitered corners. Frame screw permits replacement of glass. No. 1 quality, 1/4" (6mm) glass mirror; warranted against silver spoiling for 15 years. Galvanized steel back. Secured to concealed wall hanger with theft-resistant mounting.
    - b. Size: Width: 24 inches, Height: 36 inches, Depth: 1/2 inch
    - c. Size: Width: 24 inches, Height: 60 inches, Depth: 1/2 inch

## **2.07 TOILET TISSUE DISPENSERS - SURFACE MOUNTED (TTD-SM)**

- A. Georgia Pacific, Pacific Blue Ultra. Owner to furnish, contractor to install.

## **2.08 SOAP DISPENSER**

- A. Soap Dispenser by Georgia Pacific, Pacific Blue Ultra. Owner to furnish, contractor to install.

## **2.09 GRAB BARS (GB)**

- A. Grab bar assemblies consisting of stainless steel tubing with integrally welded mounting flanges secured to concealed tenon plates with theft-resistant fasteners, and complying with the following requirements:
  1. Sizes as indicated on drawings.
  2. Tubing: Stainless steel, 1-1/2 inch od x 18 gage wall thickness. Bend tubing at each end and join to flanges by concealed welding. Total projection from wall line (including bar diameter): 3 inches.
  3. Flanges: Stainless steel, 3 inch diameter, 11 gage wall thickness, not less than 1/2 inch deep.
  4. Finish: Brush satin finish, unless otherwise indicated.
  5. Tenon Plates: Stainless steel, 13 gage discs. Tenon plates shall be designed to allow plate location adjustment.
  6. Fasten grab bar flanges to tenon plates with not less than 3 concealed fasteners equally spaced around flange.

## **2.10 SANITARY NAPKIN DISPOSAL UNIT:**

- A. Scsensibles Sanitary Napkin Receptacle with Bag Dispenser: Wall-Mounted, 8 inches Wide, 11 inches High, 4 inches Deep. Rectangular, wall mounted Sanitary Napkin Receptacle with Bag Dispenser with hinged lid. Stainless Steel finish.
- B. For use with: Sensible polyethylene personal disposal bags from Staples, [https://www.staples.com/scsensibles-polyethylene-personal-disposal-bag-for-sanitary-pads-and-tampons-pink-50-box-sbx50/product\\_1023362](https://www.staples.com/scsensibles-polyethylene-personal-disposal-bag-for-sanitary-pads-and-tampons-pink-50-box-sbx50/product_1023362)

## **2.11 BABY CHANGING STATION-SURFACE MOUNTED**

- A. Baby changing station shall be constructed of polypropylene and has a unibody steel chassis for superior strength. The steel-on-steel hinge has greater resistance to wear and improved

durability and the gas spring mechanism ensures smooth open and close of the unit. The dual liner cavity with lock minimizes operator refills and discourages potential vandalism. The product includes child protection straps and bag hooks. Bed surface exclusively contains Microban® antimicrobial, reducing odor causing bacteria.

1. Product: Koala Kare KB200
2. Color to be chosen by Owner's Representative from manufacturer's standard colors.

## **2.12 COMBINATION UTILITY SHELF/MOP AND BROOM HOLDER**

- A. 0.05 inch (1.3 mm) thick stainless steel, Type 304, with 1/2 inch (12 mm) returned edges, 0.06 inch (1.6 mm) steel wall brackets.
  1. Mop/broom holders: 3 spring-loaded rubber cam holders at shelf front.
  2. Length: 36 inches (900 mm).
  3. Product: B-223 manufactured by Bobrick or approved equal.

## **2.13 HAND DRYER**

- A. Electric Hand Dryers: High intensity single port nozzle.
  1. Operation: Automatic, sensor-operated on and off.
  2. Mounting: ADA-Compliant Recess Kit. Final installation shall be ADA compliant.
  3. Cover: Stainless steel with brushed finish.
    - a. Tamper-resistant screw attachment of cover to mounting plate.
  4. Velocity: 12,000 - 20,000 LFM @ air outlet
  5. Sound: 62-75 db(a) Average
  6. Dry Time: 8 Seconds
  7. Warranty: 5 years.
  8. Certified to Underwriters Laboratories, Inc. standards for safety
  9. Basis of design:
    - a. Xlerator, Model XL-SB with ADA-Compliant Recess Kit 40502

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Unless otherwise indicated, install Work of this Section in strict accordance with the manufacturer's instructions.
  1. Install all attachments, anchorage devices, and fasteners as required to securely mount accessory units to types of wall or partition construction indicated.
- B. Lockers:
  1. Install lockers at the location shown in accordance with the manufacturers' instructions for plumb, level, rigid and flush installations.
  2. Anchor the units to the wall studs through the locker back and to the floor using 1-1/2 inches (38 mm) tapcon screws.
  3. Lockers shall be floor-mounted as scheduled or indicated. Floor shall be level for proper installation.

### **3.02 CLEANING AND POLISHING**

- A. Remove protective wrappings from installed accessories after completion of other Work liable to damage accessory finish. Remove residue, if any, and polish exposed surfaces.

### **3.03 PROTECTION**

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

## **END OF SECTION**

**SECTION 10 4400**  
**FIRE PROTECTION SPECIALTIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Fire extinguishers.
- B. Fire extinguisher cabinets.
- C. Accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.

**1.03 REFERENCE STANDARDS**

- A. NFPA 10 - Standard for Portable Fire Extinguishers; 2013.
- B. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

**1.04 PERFORMANCE REQUIREMENTS**

- A. Conform to NFPA 10.
- B. Provide extinguishers classified and labeled by Underwriters Laboratories Inc., for the purpose specified and indicated.

**1.05 SUBMITTALS**

- A. See Section 01 3300 - SUBMITTAL PROCEDURES, for submittal procedures.
- B. Shop Drawings: Indicate locations of cabinets and cabinet physical dimensions.
- C. Product Data: Provide materials and finish.
- D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

**1.06 FIELD CONDITIONS**

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Fire Extinguishers, cabinets and accessories:
  - 1. Ansul, a Tyco Business; Cleanguard: [www.ansul.com/#sle](http://www.ansul.com/#sle).
  - 2. Larsen's Manufacturing Co: [www.larsensmfg.com](http://www.larsensmfg.com).
  - 3. JL Industries: [www.activarcpg.com](http://www.activarcpg.com)
  - 4. Or approved equal.

**2.02 FIRE EXTINGUISHERS**

- A. Gaseous Agent: "Cleanguard" by Ansul Incorporated
  - 1. Agent: DuPont FE-36
  - 2. Steel tank with pressure gauge
  - 3. Class: 2-A 10-BC
  - 4. Finish: powder coated with polyester urethane top coat

**2.03 FIRE EXTINGUISHER CABINETS**

- A. Metal: Formed primed steel sheet; 0.036 inch (0.9 mm) thick base metal.
- B. Cabinet Configuration: Surface (S) and Recessed (R) type.
  - 1. Locations: As indicated on drawings.
  - 2. Size to accommodate accessories.

- 3. Trim: Flat face with minimum projection required to fit within wall without the addition of a chase.
- C. Door Glazing: Float glass, clear, 1/8 inch (3 mm) thick, and set in resilient channel glazing gasket.
- D. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.
- E. Fabrication: Weld, fill, and grind components smooth.
- F. Finish of Cabinet Exterior Trim and Door: No.4 - Brushed stainless steel.
- G. Finish of Cabinet Interior: White colored enamel.

#### **2.04 ACCESSORIES**

- A. Extinguisher Brackets: Formed steel, chrome-plated.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify rough openings for cabinet are correctly sized and located.

#### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install cabinets plumb and level in wall openings, 15 inches (381 mm) from finished floor to inside bottom of cabinet.
- C. Secure rigidly in place.
- D. Place extinguishers in cabinets.

**END OF SECTION**

**SECTION 10 8113**  
**BIRD CONTROL DEVICES**

**PART 1 – GENERAL**

**1.01 SUMMARY**

- A. This Section includes:
  - 1. PE-Plus Premium Grade BirdNet to prevent birds from entering, roosting and nesting in areas where they are unwanted, and prevent damage from droppings and nesting materials.

**1.02 CONFORMANCE SUBMITTALS**

- A. Substitute Products: No substitute products will be accepted.
- B. Product Data: Submit manufacturer's samples, catalog cuts, shop sketches and other descriptive materials.

**1.03 CLOSEOUT SUBMITTALS**

- A. Maintenance Data

**1.04 QUALITY ASSURANCE**

- A. Single Source Responsibility: Netting and all parts specified in this section will be supplied by a single manufacturer.
- B. Obtain technical literature from the specified manufacturer, telephone consultation and plan/photograph evaluation.
- C. Utilize labor or Bird-X authorized installers who are certified in Bird-X Product installations. Proof of certification required.

**1.05 PRODUCT HANDLING**

- A. Protect PE-Plus Premium Grade BirdNet and hardware system from damage before, during and after installation.
- B. If damage occurs to PE-Plus Premium Grade BirdNet, make all replacements immediately.

**1.06 WARRANTY**

- A. 10-year minimum warranty against material defects and workmanship.

**PART 2 – PRODUCTS**

**2.01 ACCEPTABLE MANUFACTURER**

- A. Bird-X, Inc. (Basis of Design)  
300 N. Oakley Blvd., Chicago, IL. 60612  
Phone: 800.662.5021, Fax: 312.226.2480;  
Email: [solutions@bird-X.com](mailto:solutions@bird-X.com)  
[www.bird-x.com](http://www.bird-x.com)
- B. Or approved equal.

**2.02 PRODUCT DESCRIPTION**

- A. Model Designation:
  - 1.  $\frac{3}{4}$ " PE-Plus Premium Grade BirdNet (NET-PE)
  - 2. Color: Black

**2.03 MATERIAL**

- A. Material: U.V. Stabilized knotted HDPE net. Non-conductive, flame resistant, rot resistant, waterproof, and stable in subzero temperatures.
- B. Construction: 12/6 construction – 6 strands of UV protected HDPE yarn, each 0.012 inch in diameter.
- C. Sizes: As required

- D. Break strength: 52 lbs. per strand
- E. ISO 1806 Mesh Strength Test: Peak Load 575 lbs force
- F. 24" Wide Span Orthogonal Strength Test: Peak load 575 lbs force
- G. Electrical Properties: Non-conductive
- H. UV Stability: UV protection system of Hindered Amine Light Stabilizers (HALS), Anti-oxidants and weather resistant pigments formulated exclusively for Bird-X.
- I. Thermal Properties: Melting point in excess of 250 degrees F. Flame resistant. Can be heated for short periods of time in excess of 500 degrees F.
- J. Flammability: Burns slowly in air. Fine filaments tend to melt and drop away before propagating flame.

## **2.04 MOUNTING SYSTEMS**

- A. Hardware: stainless steel recommended for all exterior applications
  - 1. Corner/Primary Attachments
  - 2. Intermediate Attachments
  - 3. Stringing Wire/Cable
  - 4. Ferrules (Copper or Aluminum)
  - 5. Turnbuckles
  - 6. Net Rings

## **PART 3 – EXECUTION**

### **3.01 EXAMINATION**

- A. Examine installation area. Notify Owner's Representative of detrimental work conditions.
- B. Do not proceed until conditions are corrected.

### **3.02 AREA AND SURFACE PREPERATION**

- A. Remove existing bird droppings in a safe manner. Large quantities shall be removed and disposed. Work areas shall be cleaned, and repair work shall be done in areas which will be excluded by the PE-plus premium grade BirdNet.
- B. Remove or repair articles that may damage the PE-plus premium grade BirdNet after installation.

### **3.03 INSTALLATION**

- A. Install as recommended by the manufacturer.
- B. Correct mesh sizes shall be specified to ensure exclusion of the correct pest bird.
- C. Shall be installed tightly and securely to ensure a long-lasting installation that is visually hard to see.

### **3.04 INSPECTION**

- A. Visually inspect PE-plus premium grade BirdNet for poor adherence to mounting surfaces, or other problems related to poor installation or surface preparation.
- B. Repair as necessary immediately.

**END OF SECTION**

**SECTION 13 1100**  
**POOL GENERAL REQUIREMENTS**

**PART 1 - GENERAL**

**1.1 SECTION INCLUDES**

- A. This section of the specifications describes general requirements for swimming pool construction, swimming pool equipment installation, and service. Only contractors capable of meeting the qualifications and furnishing all work called for in this section shall be considered. All work called for in this section shall be, and remain throughout the warranty periods, the sole responsibility of this contractor.

**1.2 RELATED DOCUMENTS**

- A. Drawings and General Provisions of Contract, including General Conditions and Division 1 of Specifications Sections, apply to work of this Section.

**1.3 CODES & REFERENCES**

- A. All work in this division shall be according to applicable local, state and national codes and regulations.
- B. Applicable requirements of the following Specifications and Codes apply to Work of This Section.
  1. All state and local building and health codes.
  2. National Electrical Code (NEC).
  3. National Sanitation Foundation (NSF) Seal of Approval program.
  4. American Society for Testing and Materials (ASTM).

**1.4 SUBSTITUTIONS:**

- A. The Owner and the Architect have made a detailed investigation before selecting the specified swimming pool recirculation, filtration and other special pool equipment. All base bids shall include this equipment without substitution or equipment that has been pre-approved as an equal (See Substitutions Item A), since the operation and maintenance of this swimming pool facility has been predicated upon the specified equipment.
- B. The materials, products and equipment described in these specifications establish a standard of required function, dimension, appearance, quality, and quantity.
  1. Refer to specification section 00200, item 3.3 for more information regarding equivalents and substitutions. Substitutions will not be allowed after the time bid unless specified products are discontinued.
  2. Any product offered as an equivalent must be a proven design with at least ten (10) installations in service for five (5) years.
  3. Such equivalent shall clearly indicate the product, manufacturer, and manufacturer model number.
  4. Substitutes submitted post bid will not be considered.

5. All costs incurred due to re-designs, agency submittals, or approvals required, because of substitute equipment or materials shall be the sole responsibility of the Swimming Pool Contractor.
6. Alternate equipment and or designs are not acceptable.

## **1.5    QUALITY ASSURANCE**

- A. Contractor Qualifications:
  1. The Contractor must have had at least five (5) years' experience in the construction of the type of swimming pool work herein specified and must list at least ten (10) pools of this type, each with a water surface area of not less than this pool which the Contractor has constructed and which, upon investigation, would be found to have been completed in a satisfactory manner and in operation at least three (3) years.
  2. Contractors wishing to bid this project, in addition to the list and information required in the preceding paragraph, shall submit, prior to entering into contract and if requested from the Owner/Architect/Engineer or Construction Manager:
    - a. Complete evidence that the Contractor has the facilities, equipment, personnel, etc., to complete all phases of this trade division.
    - b. Certification that the plans and specifications have been reviewed and that his bid will conform thereto.
- B. Performance Criteria: Certain sections of the specifications contain performance criteria rather than product descriptions.
  1. It shall be the obligation of the Contractor to ensure that all criteria are satisfied and the burden of proof of conformance shall rest with the Contractor. The Architect/Engineer shall require complete calculations, past performance records and, if required, inspection trips of similar facilities to substantiate conformance with these criteria. The Architect/Engineer shall be the sole judge of conformance and the Contractor is cautioned that he will be required to bid and provide a finished product meeting all the stated criteria and meeting or exceeding Department of Public Health requirements.

## **1.6    SUMMARY OF WORK INCLUDED**

- A. The work of this section includes, but is not necessarily limited to the following:
  1. Provide instruction manuals and/or operating charts for all equipment.
  2. Provide three (3) days of start-up supervision and instruction upon project's completion.

## **1.7    RELATED WORK SPECIFIED ELSEWHERE**

- A. Provide access to filter room for filter equipment.
- B. Unless noted otherwise, power connections and pool & equipment grounding and bonding shall be by the Electrical Contractor. Controls and associated control wiring shall be provided by the pool contractor. The Electrical Contractor shall install electrical equipment indicated to be furnished by the Pool Contractor and shall provide disconnect switches as indicated or as required by the NEC.
- C. Grounding pool structures and all pool and deck equipment as per current N.E.C. Provide certificate of inspection when complete.

## **1.8 DEFINITIONS:**

- A. The term "pool" as used in this Section shall refer to the following:
  - 1. New gunite pool structure and all associated piping, equipment and systems.
- B. The term gunite as used in this Section shall refer to gunite for swimming pool construction only.

## **1.9 QUALITY OF MATERIALS**

- A. Special attention is directed to the materials, products and equipment described in these specifications. They establish a standard of required function, dimension, appearance and quality.
- B. Where only one manufacturer's name is mentioned for a particular item of equipment or material, the Contractor's base bid shall be on that item.
- C. Where references are made to Federal Specifications, American Society for Testing and Materials, American Standards Association, American Institute of Steel Construction, Steel Institute, and similar associations, organizations and standards, it shall be construed to mean their current specifications and designations as amended as of the date of bid opening.

## **1.10 SUBMITTALS**

- A. Submittals Required.
  - 1. Furnish to the Owner/Architect/Engineer the following:
    - a. Product Data:
      - 1) Gunite Mix Design, if required
      - 2) Non-Shrink Grouts.
      - 3) PVC Water Stop, if required.
      - 4) Expansion/Construction Joint Materials.
      - 5) Caulking.
      - 6) Pumps and Strainers.
      - 7) Chemical Controller(s), and Feeders.
      - 8) Valves.
      - 9) Gauges and Flow Meters.
      - 10) Pool Water Test Kit.
      - 11) Each piece of Deck Equipment.
      - 12) Inlets, Main Drain Grating.
      - 13) Each piece of Safety Equipment.
      - 14) Each piece of Filtration equipment
      - 15) Each piece of Sanitation & Maintenance Equipment.
      - 16) Piping Materials.
      - 17) Wall sleeves And Seals for Piping.
      - 18) Tile Setting Materials and Joint fillers.
      - 19) UV Lamp spectral certificate: A spectral certificate shall be provided with each lamp to demonstrate spectral accuracy.
    - b. Test Results:
      - 1) Dry gunite/shotcrete testing.
      - 2) Compaction
      - 3) Piping Pressure Testing.
    - c. Training – arrange for a day of training covering all systems and equipment.

- d. Guarantees/Warranties:
  - 1) Standard (1) Year.
  - 2) Special (2) Year on Swimming Pool Structure.
  - 3) Special Equipment (1) Year
  - 4) Future (1) Day of Instruction and Operational Checkout.
- e. Close Out Documents:
  - 1) O & M Manuals.
  - 2) As Built Drawings.
  - 3) Owners Certification of Instruction.
  - 4) Extra Materials.

## **1.11 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver all materials and equipment to the work site in original packages fully identified, with manufacturer's label. Store off ground and protect from weather with a suitable covering.

## **1.12 WARRANTIES**

- A. General Warranty: Provide one (1) year warranty covering all pool workmanship, materials, and equipment. Refer to Division 1 of the Specifications for additional requirements.
- B. All standard manufacturer's warranties shall apply to all equipment and products provided by the Contractor.

## **PART 2 - PRODUCTS (NOT USED)**

## **PART 3 - EXECUTION**

### **3.1 GENERAL REQUIREMENTS**

- A. All systems and subsystems shall be installed in accordance with that systems manufacturer's recommendations and instructions.
  - 1. In the event of a discrepancy between these specifications and the manufacturer's recommendations, price the most stringent approach for the purpose of bidding but call the issue to the attention of the construction manager in the form of a Request for Information and wait for an answer.
  - 2. Provide all accessories and supplemental equipment necessary to provide a complete working installation of all materials, equipment and systems specified or shown on drawings, as part of the base bid.
- B. Utilize manufacturer's certified installers or have the work inspected by a manufacturer's technical representative, as called for in sub-sections of this specification.
- C. Existing Conditions: Each contractor is responsible for verifying that existing conditions meet the requirements for the installation of their materials or systems.
  - 1. Start of work signifies that the Contractor accepts existing conditions, substrates and working conditions and will be fully responsible for warranting their own work as required herein.
  - 2. Do not begin work if existing conditions cannot provide durable base for an acceptable permanent installation. Inform construction manager immediately of any defects requiring

correction, in writing, and wait for remedy or instructions on how to proceed, before beginning work.

- D. Ground all materials, equipment and systems as required by local codes and the most recent version of the National Electric Code.

END OF SECTION 131100

**SECTION 13 1105**  
**POOL MAINTENANCE & OPERATIONS TRAINING**

**PART 1 - GENERAL**

**1.1 SUMMARY OF WORK INCLUDED**

- A. The work of this section includes, but is not necessarily limited to the following:
  - 1. Pool maintenance equipment.
  - 2. Training of the Owner's personnel in pool operations procedures.
  - 3. Operations and maintenance manual.

**1.2 TESTING/FIELD QUALITY CONTROL**

- A. Water Treatment:
  - 1. Obtain a chemical analysis of the source/pool make-up water supply and submit to the Architect/Engineer prior to ordering water treatment systems.
  - 2. Include the following:
    - a. Total alkalinity/PPM;
    - b. Calcium hardness/PPM;
    - c. Chlorine/PPM;
    - d. pH;
    - e. Iron; and
    - f. Copper.
  - 3. Provide a list of required chemicals and an estimate of quantities required to the owner in sufficient time to allow the owner to purchase chemicals.
  - 4. Treat and balance pool water prior to turnover of pool to the Owner (using chemicals provided by this Contractor).
  - 5. Pool Water: balance to establish a total Alkalinity level of 60-125 PPM and calcium hardness level of 180-375 PPM (3 times alkalinity level).
  - 6. Stabilize pool water to 3 PPM

**1.3 SUBMITTALS**

- A. Operations and Maintenance Manual.
  - 1. Provide three complete sets, bound together in a 3-ring binder, of operating and maintenance instructions for the swimming pool structure, finishes, and all component equipment. O&M Manual shall include, but is not limited to, the following:
    - a. Table of contents.
    - b. Equipment cut sheets.
    - c. Parts lists.
    - d. Start-up, draining and winterization instructions.
    - e. Cleaning instructions.
    - f. Maintenance requirements.
      - 1) Daily.

- 2) Weekly.
  - 3) Monthly.
  - 4) Seasonally.
  - 5) Annually.
- g. Narrative on the pool operation through all sequences.
  - h. Piping schematic diagram.
  - i. Valve charts for each piping system, consisting of isometric drawings or piping layouts showing and identifying each valve and describing its function.
  - j. Record drawings.
  - k. Warranties.

#### **1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver all materials and equipment to the work site in original packages fully identified, with manufacturer's label. Store off ground and protect from weather with a suitable covering.

### **PART 2 - PRODUCTS**

#### **2.1 MAINTENANCE EQUIPMENT:**

- A. Provide the following equipment:
  - 1. Vacuum Hose Service King 1-1/2" Hose X 75 Foot long, 1 required.
  - 2. Vacuum Head 22" Commercial Pro Vac, 1 required.
  - 3. SP 1682-2-3, 2" MIP X 1-1/2" Hose Adaptor, 1 required.
  - 4. Pump, Model 3180-E, Portable Pump and Motor. 1/2HP, 115 Volt, 1 Phase, 1 required.
  - 5. Pool Brush and Holder, Paddock Model 3330, 1 required.
  - 6. Leaf Skimmer, Paddock Model 3348, 1 required.
  - 7. Telescopic Handle, Paddock Model 3367, 1 required.

### **PART 3 - EXECUTION**

#### **3.1 OPERATIONS & MAINTENANCE INSTRUCTION**

- A. Provide an experienced swimming pool operator-instructor (NSPI certified pool operator) for a period of not less than three days (two (2) full day's operations and start-up, and one (1) full day shut-down assistance) after the pool has been filled and initially placed into operation.
  - 1. During this period, the Owner's designated representatives shall be thoroughly instructed in all phases of the pool's operation, including start-up, and draining.
  - 2. Prior to this instructor leaving the site, instructor shall obtain written certification from the Owner's designated representative acknowledging that the instruction period has been completed and all necessary operating information provided.
- B. Include the cost of three (3) additional days of instruction and operational checkout/verification by an experienced swimming pool operator-instructor during the first year's operation. Written reports of each of these three (3) visits outlining the pool's operation, competence and performance of the pool's operating personnel and other pertinent comments shall be submitted to the Owner and Architect/Engineer within one week after each visit.

- C. In addition to initial pool instruction listed, the Pool Contractor shall provide the Owner with unit price for complete start-up and pool closing services, including all labor and material required.

### **3.2 WATER TREATMENT & BALANCING**

- A. Obtain a chemical analysis of the source/pool make-up water supply and submit to Architect/Engineer prior to ordering water treatment chemical. Include the following:
  1. Total Alkalinity (ppm).
  2. Calcium Hardness (ppm).
  3. Chlorine (ppm).

END OF SECTION 131105

**SECTION 13 1112**  
**POOL CONCRETE**

**PART 1 - GENERAL**

**1.1 SCOPE**

- A. This Section includes cast-in-place and pneumatically applied concrete for swimming pool wall and floor construction including formwork, reinforcement, concrete materials, mix design, placement procedures and finishing.
- B. Provide all labor, materials, tools, equipment necessary or incidental to furnish and place all concrete required for a complete installation as shown on the Drawings.
- C. Coordinate all work of this Section with the Work of all other trades.
- D. The work of this section includes, but is not necessarily limited to the following:
  - 1. Layout pools with benchmark and exact location supplied by the Owner/Architect.
  - 2. Perform bulk excavation of the pools and all required hand trimming.
  - 3. Provide and Install all required forms for pools construction.
  - 4. Furnish and install granular sub-base of #2 washed stone under each entire pool floor minimum 6" depth
  - 5. Construct monolithic gunite pool structure.

**1.2 RELATED WORK IN OTHER SECTIONS OR CONTRACTS**

- A. Documents affecting work of this Section include but are not necessarily limited to:
  - 1. All Sections in Divisions 00, 01, and 02 of these Specifications.
- B. Swimming Pools & Equipment - Section 131100.
- C. Work by General Contractor:
  - 1. Pool deck construction.
- D. Work by Electrical Contractor:
  - 1. Grounding and bonding of pool structures in accordance with the NEC.

**1.3 CODES AND STANDARDS**

- A. Comply with the provisions of the following codes, specifications and standards except where more stringent requirements are shown or specified:
  - 1. American Concrete Institute (ACI) 301, "Specifications for Structural Concrete for Buildings".
  - 2. ACI 506.2 "Specifications for Materials, Proportioning and Application of Shotcrete".
  - 3. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice".

- B. All work in this division shall be according to applicable local, state and national codes and regulations. Applicable requirements of the following Specifications and Codes apply to Work of This Section.
1. All state and local building and health codes.
  2. National Electrical Code (NEC).

#### **1.4 QUALITY ASSURANCE**

- A. Installer's Qualifications:
1. Prior to commencement of work, demonstrate that the proposed installers, materials, and equipment are capable of batching, mixing, conveying and uniformly applying shotcrete in accordance with the specified requirements.
  2. Use nozzlemen having current certification in accordance with the guidelines of ACI 506.3R for the type of shotcrete required and a minimum of 6 months continuous experience. Contractor shall show proof of successful completion of work similar to this project.
- B. The following tests shall be performed during construction of the project. Refer to General Conditions and Division 01 for further requirements.
1. Concrete
    - a. Tests to measure slump, entrained air content and compressive strength shall be conducted by independent testing laboratory employed by the Owner.
      - 1) Provide minimum of four (4) test cylinders per 50 cubic yard or fraction thereof for each class of concrete poured each day. Comply with ACI-318, Subsection 4.3 (samples secured - ASTM C172, cylinders prepared and cured - ASTM C31, and tested - ASTM C39). Identify samples moist cure at 70 degrees F for five (5) days and ship samples to laboratory.
    - b. Slump and Air Content Tests
      - 1) Perform on concrete from same batch as sampled for strength tests and whenever there is consistency of concrete. Slump tests shall be made in accordance with ASTM C143. Air content tests shall be made in accordance with ASTM C231. If measured slump or air content falls outside specified limits, check shall be made immediately on another portion of same sample. In event of second failure, concrete shall not be used in Work.
    - c. Compliance
      - 1) Average of any three (3) consecutive strength tests for each class of concrete shall be equal to or greater than specified strength, and no individual test shall fall more than 500 psi below specified strength.
      - 2) When tests results are below specified requirements or when tests of field cured cylinders indicate deficiencies in protection and curing, Architect/Engineer may require additional tests in accordance with ACI-318, Subsection 4.3.

#### **1.5 SUBMITTALS**

- A. Qualifications: Demonstrate compliance with experience requirements specified in this section including, but not limited to:
1. Shotcrete Nozzle Man Qualifications
  2. Pool Finish Experience/Qualification Requirements

- B. Product Data: For each type of manufactured material and product indicated or provided.
  - 1. Design Mixes: For each concrete mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments. Indicate amounts of mix water to be withheld for later addition at Project site.
  - 2. Non-Shrink Grouts
  - 3. Waterstop materials.
- C. Steel Reinforcement Shop Drawings: Details of fabrication, bending, and placement, prepared according to ACI 315. Include material, grade, bar schedules, stirrup spacing, bent bar diagrams, arrangement, and supports of concrete reinforcement. Include special reinforcement required for openings through concrete structures.
- D. Test Results:
  - 1. Dry gunite/shotcrete testing.
  - 2. Compaction.
- E. Guarantees/Warranties:
  - 1. Special (2) Year on Swimming Pool Structure.
- F. Close Out Documents:
  - 1. As Built Drawings.

## **1.6 FIELD QUALITY CONTROL**

- A. The Owner shall engage a laboratory to perform material evaluation tests, to design shotcrete mixes and to test installed work.
- B. Testing During Construction: Gunite will be tested for compressive and flexural strength by one or more of the following methods:
  - 1. Test Panels: Gunned by shotcrete nozzleman who will do production work. One test panel with minimum dimensions of 30 by 30 inches by 6 inches, gunned in the same position as work represented, complying with applicable provisions of ASTM C 1140. Make the test panels once each shift or once for each 50 cu. yds. of shotcrete placed through nozzle, whichever is more frequent. Moist cure panels unless otherwise directed by the Architect. A minimum of three 3-inch, nominal-diameter cores or three 3-inch cubes will be cut from each panel.
- C. Strength Evaluation: Shotcrete will be considered acceptable as follows:
  - 1. Mean compressive strength of any group of cores equals or exceeds specified compressive strength with no individual core less than 75 percent of specified compressive strength.
  - 2. Mean compressive strength of any group of cores equals or exceeds 118 percent of the specified compressive strength with no individual cube less than 106 percent of the specified compressive strength.

## **1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver all materials and equipment to the work site in original packages fully identified, with manufacturer's label. Store off ground and protect from weather with a suitable covering.

- B. Deliver cementsations materials to work site in manufacturer's standard packages. Immediately upon deliver to work site, store in waterproof sheds. The Contractor shall provide sheds that are required. Nor cementsations or other material that has become caked or hardened will be permitted in the work.

## **1.8 WARRANTIES**

- A. General Warranty: Provide one (1) year warranty covering all pool workmanship, materials, and equipment. Refer to Division 1 of the Specifications for additional requirements.
- B. Special Project Warranty on Swimming Pool Structure: The Contractor shall guarantee for two (2) years repair of the pool structure covering any defects, cracks, and/or leaking in the pool shell.
1. The warranty shall not cover damage to the pool attributable to corrosive action, excessive use of acid or other foreign materials during cleaning or for discoloration or other consequences resulting from improper or inadequate use of chemicals or other materials, or from neglect or misuse by the Owner, his agents or invitees.
  2. This warranty shall also be void unless pool is kept full of water at all times and if drained for cleaning purposes, does not remain empty for more than a 48-hour period, unless under supervision furnished by the Contractor.

## **1.9 JOB COORDINATION/PRECONSTRUCTION MEETING**

- A. Prior to a work start by either the Contractor or the General Contractor, a meeting will be held at the job site to establish work limits, job schedule and liaison among contractors and the Architect to ensure a coordinated construction process.
1. All prime contractors and all pool system subcontractors, or manufacturer's representatives will be present at this meeting.
  2. Bring to everyone's attention special considerations requiring care in coordinating the work of those elements or systems.
  3. Proposals regarding schedule shall be coordinated with the overall construction schedule to maintain the milestone dates established therein.

# **PART 2 - PRODUCTS**

## **2.1 DRY GUNITE SWIMMING POOL STRUCTURE**

- A. Site Clearing: Prior to the start of pool construction, the site shall have been cleared by the General Contractor.
- B. Layout of Work: Before any excavation or construction shall be commenced the Pool Contractor, under the supervision of the Architect/General Contractor, shall place batter boards permanently locating the perimeter of all structures. The site shall be excavated to an even grade by the General Contractor and templates installed demoting the exterior line of the pool shell.
- C. Dimension and Designs:
1. Structural designs shown on the pool drawings shall govern. Concrete surfaces against which new gunite is to be placed shall be thoroughly cleaned and slushed with neat cement. All horizontal or vertical steel shall pass through construction joints in such a manner that the full strength of the reinforcing will be developed.
  2. Tolerances: depth - 0 to 1"; vertical; walls - +/- ½" in 10 feet.

D. Excavation and Grading:

1. The machine excavation and hand trim by the Pool Contractor shall be carried on as one operation to aid in eliminating over excavation. In order to obtain an even wall line, radius templates shall be used. The floor area shall be fine graded by placing screeds at intervals.
  2. Any minor voids which may occur due to over-excavation or from boulders removed shall be filled in with a lean mixture of gunite or concrete. Any major deformations in the excavation caused by the removal of large boulders, collapse of earth or inadequate bearing capacity or cave ins caused by subsurface water conditions shall be repaired as required and filled with bank run gravel, crushed stone or a lean mix of gunite.
  3. Before completion of the pool excavation the beam at the top of the pool wall, which is a monolithic portion of the pool shell, shall be formed to the dimensions as shown on the drawings. A header shall be installed completely around the pool, the inside face of which shall be properly anchored in place. A taut cutting wire shall be anchored to ensure the dimensional integrity of the gunite structure. Cutting wires shall be placed at all intersections of pool radius and vertical walls and on floor elevation pins to ensure dimensional accuracy of the structure.
  4. In the event of any delay in the construction or need for any additional material and labor required for corrective measures necessitated by underground conditions including but not limited to the removal of or re-routing of underground pipe lines and conduits, removal of masonry; removal, refilling and compaction of hardpan, quicksand or the pumping, control of, diversion or sealing off of water seepage; or for changes or additions to the pool structure or other installations necessitated by such conditions, the Pool Contractor shall be allowed an extra for such work.
- E. Place Fittings: The Pool Contractor shall place, before commencing the gunite work, all special pool fittings and receptacles that are to be embedded in the gunite and shall be responsible for their positioning in accordance with the drawings.
- F. Steel Reinforcing: All reinforcing steel shall be standard size deformed bars equal to the requirements of the "Standard Specifications for Billet Steel, Concrete Reinforcement", Intermediate Grad, Serial Designation A15, steel reinforcing bars, equal in the requirement of Serial Designation A615, adopted by the ASTM.
- G. Cement: All cement for gunite shall conform to the requirements of the "Standard specifications for Portland Cement: Serial Designation C 150 of the ASTM and shall be Type I or II (except where transit mixed cement is to be employed) and shall be delivered to the job site in the original packages or bulk tanker and adequately protected from the weather during storage.

H. Dry Gunite:

1. Gunite sand shall consist of clean, hard, sharp particles and moisture content shall not exceed 5% and the sand shall be well graded in size. Portions shall be one-part cement to four parts gunite sand by volume mixed dry for a period of not less than one (1) minute after materials have been added. Hydration shall occur at the nozzle of the cement gun using just enough water so that no slump shall occur in the gunite.
2. Mix shall include 5% shrinkage reducing admixture; SikaControl NS or approval equal and 10% silica fume.
3. The cement gun shall be equipped with an air pressure gauge and the air pressure at the end of the gun shall not be less than forty-five (45) pounds nor more than seventy (70) pounds when the hose is two hundred (200) feet in length or less. Air pressure shall increase five (5) pounds for each additional fifty (50) feet of material hose used but not more than three hundred (300) feet of material hose shall be used unless approved by the Architect.

4. Water pressure at the nozzle shall be maintained at not less than fifteen (15) pounds greater than the air pressure at the gun. The structural gunite shall be applied against original undisturbed soil, thoroughly compacted earth or suitable forms that will not yield during applications of the gunite. Surfaces upon which the gunite is to be applied shall be shot at a right angle to the surface, starting at the bottom and continuing upward. It will be built up in layers of thicknesses that will not slump, allowing sufficient time between the placing of layers for initial set to take place. All loose fine aggregate or rebound shall be removed from the surface being gunited before placing succeeding layers and, whenever possible, the first layer shall entirely cover the reinforcing steel in order to secure it in its proper position.

## **2.2 WATERSTOP**

- A. Compressible Waterstop
  1. Use as illustrated in drawing details for the following:
    - a. Sealing non-moving cold joints and construction joints between structural elements against penetration of water from wet-face of structure with less than 30-foot hydrostatic head.
    - b. Sealing pool piping penetrations against water penetration from wet-face of structure with less than 30-foot hydrostatic head.
  2. Product Description: The product shall be a 0.59" x 0.39" compressible hydrophilic sponge rubber strip composed of vulcanized rubber and urethane polymer as the hydrophilic agent.
  3. Product & Manufacturer:
    - a. Adeka KBA-1510FP waterstop, manufactured by Adeka Corporation and distributed by OCM, Inc., Chicago, IL USA.
    - b. Website: [www.adeka.com](http://www.adeka.com)
  4. Physical & Swelling Property Requirements: The product shall at a minimum meet the physical properties as shown in the official Adeka literature as follows.
    - a. Expansion Pressure: The product shall not produce more than 0.03MPa (4.35 psi) expansion pressure when fully hydrated.
    - b. Tensile Strength: At least 0.78 MPa (113 psi),
    - c. % Elongation: No greater than 350% when fully hydrated,
    - d. Volume (thickness) % Change: No greater than 30% volume change or increase in thickness when fully hydrated.
  5. Alternative Products
    - a. General: Drawing documents have been completed using the specified Adeka waterstop product as a basis of design. Alternative compressible waterstops shall not be used without approval from Engineer/Architect. Considerations such as concrete coverage requirements and wall thicknesses must be considered when substituting alternative products. Contractor will be responsible for any structural changes required due to alternate product concrete coverage requirements.
    - b. Product Requirements: Compressible waterstop alternatives may not contain bentonite materials and may not have swelling properties that exceed the specified product.
    - c. Acceptable Alternative: An acceptable alternative may be Synko-Flex SF302 Preformed Plastic Adhesive Waterstop with Synko-Flex SF300 emulsion primer or equal, but it must be approved prior to use. Manufacturer: Henry Company, Houston, TX. Website: <http://us.henry.com/>

## **2.3 NON-SHRINK GROUT**

- A. Upcon High Flow, the Upco Company, Cleveland, Ohio; Master Flow 713, The Master Builder Company, Cleveland, Ohio; Crystex, L & M Construction Chemicals, Inc., Omaha, Nebraska.

## **PART 3 - EXECUTION**

### **3.1 GENERAL REQUIREMENTS**

- A. Existing Conditions: Each contractor is responsible for verifying that existing conditions meet the requirements for the installation of their materials or systems.
  1. Start of work signifies that the Contractor accepts existing conditions, substrates and working conditions and will be fully responsible for warranting their own work as required herein.
  2. Do not begin work if existing conditions cannot provide durable base for an acceptable permanent installation. Inform construction manager immediately of any defects requiring correction, in writing, and wait for remedy or instructions on how to proceed, before beginning work.
- B. Ground all materials, equipment and systems as required by local codes and the most recent version of the National Electric Code.

### **3.2 SITE CLEARING:**

- A. Prior to the start of pool construction, the site shall have been cleared by the General Contractor.

### **3.3 LAYOUT OF WORK:**

- A. Before any excavation or construction shall be commenced the Contractor, under the supervision of the Architect/General Contractor, shall place batter boards permanently locating the perimeter of all structures. The site shall be excavated to an even grade by the General Contractor and templates installed demoting the exterior line of the pool shell.

### **3.4 DIMENSION AND DESIGNS:**

- A. Structural designs shown on the pool drawings shall govern.
  1. Concrete surfaces against which new gunite is to be placed shall be thoroughly cleaned and slushed with neat cement.
  2. All horizontal or vertical steel shall pass through construction joints in such a manner that the full strength of the reinforcing will be developed.
- B. Tolerances:
  1. Depth - 0 to 1/4";
  2. Vertical; walls - +/- 1/8" in 10 feet.

### **3.5 EXCAVATION AND GRADING:**

- A. The machine excavation and hand trim by the Contractor shall be carried on as one operation to aid in eliminating over excavation.
  1. In order to obtain an even wall line, radius templates shall be used.
  2. The floor area shall be fine graded by placing screeds at intervals.

- B. Any minor voids which may occur due to over-excavation, or from boulders removed, shall be filled with flowable fill; the design of which shall be provided by the structural engineer.
  - 1. Any major deformations in the excavation caused by the removal of large boulders, collapse of earth of inadequate bearing capacity or cave-ins, caused by subsurface water conditions, shall be reviewed with the structural engineer and shall be remedied utilizing recommendations from the structural engineer.
    - a. Stop work immediately; inform the construction manager of the conditions encountered and wait for instructions before proceeding.
- C. Before completion of the pool excavation, the beam at the top of the pool wall, which is a monolithic portion of the pool shell, shall be formed to the dimensions as shown on the drawings. A header shall be installed completely around the pool, the inside face of which shall be properly anchored in place. A taut cutting wire shall be anchored to ensure the dimensional integrity of the gunite structure. Cutting wires shall be placed at all intersections of pool radius and vertical walls and on floor elevation pins to ensure dimensional accuracy of the structure.
- D. Pool pipe excavation and backfill: Special backfill and bedding materials.
  - 1. Existing subsoil materials shall not be used for pipe bedding.
  - 2. All piping shall be bedded with a minimum of 6" clear stone material and a minimum of 2'-0" clear stone material top cover. The balance may be existing site material, provided no organic material, clay or topsoil is used.

### **3.6 EMBEDDED ACCESSORIES:**

- A. The Contractor shall place, before commencing the gunite work, all special pool fittings and receptacles that are to be embedded in the gunite and shall be responsible for their positioning in accordance with the drawings.

### **3.7 CAST-IN-PLACE CONCRETE**

- A. Concrete shall be agitated by at least 70 revolutions of the mixing drum but not by more than 270 revolutions. Concrete shall be placed within 1-1/2 hours after the cement has been added to the mix.
  - 1. Mix shall include 5% shrinkage reducing admixture; SikaControl NS or approval equal and 10% Silica fume.
- B. Provide concrete blocks of same strength as the concrete mix to support reinforcing bars. Do not use broken concrete, brick or stone.

### **3.8 WATERSTOP**

- A. If shotcrete is applied to pool walls within 24 hours of the pool floor pour, the waterstops may be omitted with prior written approval from the Architect/Engineer.
- B. Compressible Waterstop – Adeka KBA-1510FP
  - 1. Non-moving Joint Installation:
    - a. Consult manufacturer and follow all recommended installation instructions.
    - b. Allow concrete to cure a minimum of 24 hours.
    - c. Concrete must be dry and free from form oils, release agents, curing compounds, laitance and other dirt or debris prior installation. Use a wire brush to remove contaminants prior to installation of waterstop.

- d. Use butyl tape to attach KBA-1510FP to a dry and clean substrate. The butyl tape comes in a 3/4" X 1/8" X 82-foot roll (1 roll per roll of KBA-1510FP). Press the butyl strip onto the substrate and remove the release paper. Press the KBA-1510FP firmly onto the butyl tape.
  - e. Check for any gaps between the product and the substrate. If gaps are present, fill in using Adeka P-201 applied to the side of the strip. Use P-201 on corner joints and on side-by-side splice joints.
  - f. Once installed, keep the product covered, clean, and dry prior to concrete placement. For best results, place the waterstop product immediately before pouring concrete. Check to make sure the waterstop is firmly adhered before placing concrete.
  - g. During concrete placement, assure that the concrete is well consolidated around the waterstop at all locations with no voids or gaps.
2. Pipe Penetration Installation:
- a. Consult manufacturer and follow all recommended installation instructions.
  - b. Pipe must be dry and free from form oils, release agents, curing compounds, laitance, and other dirt or debris prior to installation.
  - c. Press the butyl strip onto the clean pipe completely around the pipe diameter and remove the release paper. Press the KBA-1510FP firmly onto the butyl tape. Tightly butt strip ends together with 1" overlap or side lap.
  - d. Once installed, keep the product covered, clean, and dry prior to concrete placement. For best results, place the waterstop product immediately before pouring concrete. Check to make sure the waterstop is firmly adhered before placing concrete.
  - e. During concrete placement assure that the concrete is well consolidated around the waterstop at all locations with no voids or gaps.
3. Alternative Products Installation:
- a. Drawing documents have been completed using the specified Adeka waterstop product as a basis of design. Alternative flexible adhesive waterstops shall not be used without approval from Engineer/Architect. See Part 2 for additional information.
  - b. If Synko-Flex has been approved during the submittal process, the following installation requirements shall be met, as well as all manufacturer's installation instructions.
  - c. Allow concrete to cure a minimum of 24 hours before priming with Synko-Flex primer.
  - d. Concrete must be dry and free from form oils, release agents, curing compounds, laitance and other dirt or debris prior to priming. Use a wire brush to remove contaminants prior to installation of primer.
  - e. Apply Synko-Flex SF311 primer.
  - f. Apply Synko-Flex SF302 Preformed Plastic Adhesive Waterstop over primed areas. Place Synko-Flex to primed areas at an approximately 5/8" thickness and approximately 1 1/2" width.
  - g. Tightly butt strips together with 1" overlap or side lap.

### **3.9 FORMWORK**

- A. Forms: Materials shall produce tight forms and an acceptable finish.
- B. Form Ties: Constructed so that the tie remains embedded in the wall, except for a removable portion at each end. Form ties shall have conical or spherical type inserts. Inserts shall be fixed so that they remain in contact with forming material, and shall be constructed so that no metal is within 1 inch of the concrete surface when the forms, inserts and tie ends are removed. Wire ties will not be permitted. Ties shall withstand all pressures and limit deflection of forms to acceptable limits. Flat bar ties for panel forms shall have plastic or rubber inserts having a minimum depth of 1 inch and sufficient dimensions to permit proper patching of the tie hole.

### **3.10 WORKMANSHIP**

- A. Forms: Construct forms accurately to dimensions and elevations required and to be strong and unyielding. Construct forms with tight joints to prevent the escape of mortar and to avoid the formation of fins. Brace as required to prevent distortion during concrete placement.
- B. Placing reinforcing steel: Place reinforcing steel in conformance with the information on the Contract Drawings and CRSI Recommended Practice for Placing Reinforcing Bars, except as modified herein. Minimum length of splices shall be as shown in table on Contract Drawings. Tie splices with 18-gauge annealed wire as specified in the referenced CRSI standard.
- C. Placing concrete:
  1. Prior to placing concrete, remove water from excavation and all debris and foreign material from forms. Check the reinforcing steel for proper placement and correct any discrepancies.
  2. Place concrete as soon as possible after leaving mixer, without segregation or loss of ingredients, without splashing forms or steel above, and in layers not over 2 feet deep. The vertical drop to final placement shall not exceed 6 feet. Placement shall conform to the requirements of ACI 318, except as modified herein.
  3. Do not place concrete when the ambient temperature is below 40 degrees F and falling without special protection. Any concrete damaged by freezing shall be removed and replaced at no additional cost to the Owner.
  4. Compaction: Apply approved vibrator at points spaced not farther apart than vibrator's effective radius. Apply close enough to forms to vibrate surface effectively but not damage form surfaces. Vibrate until concrete becomes uniformly plastic. Vibrator must penetrate the fresh placed concrete and into the previous layer of fresh concrete below.

### **3.11 FINISHING**

- A. Screeed surfaces of floor slabs and tops of exposed walls to true level planes. After the initial water has been absorbed, float and trowel with steel trowel. Provide rough broom finish on floor and walls to accommodate special aggregate mechanical bonding requirements.
- B. Do not absorb wet spots with neat cement. Pool floors shall not vary from level or true plane more than 1/4 inch in 10 feet when measured with a straightedge.

### **3.12 FORM REMOVAL**

- A. Remove after concrete has set sufficiently to carry the dead load and construction load it has to sustain. Remove forms with care to prevent scarring and damaging the surface.

### **3.13 PROTECTION AND CURING**

- A. Protect fresh concrete from direct rays of the sun, drying winds and wash by rain. The method of water curing shall be the responsibility of the Contractor; however, the method used shall guarantee that all concrete surfaces remain wet to the touch, (free moisture present), at all times during the cure period.
- B. Wet cure shall be used conforming to ACI 308. Keep concrete slabs and wall continuously wet for a 7-day period. Intermittent wetting is not acceptable. Any product used shall be compatible with finish bond requirements.

### **3.14 PROTECTION OF ADJACENT SURFACES**

- A. Contractor shall take every possible precaution to protect adjacent concrete surfaces, equipment, etc., from being damaged by overshooting concrete. Overshot concrete and rebound materials deposited shall be removed at the Contractor's expense.

### **3.15 FINISHING FORMED SURFACES**

- A. Areas not subject to water: Cut out all honeycombed and defective areas. Cut edges perpendicular to surface at least 1 inch deep, no feather edge allowed, and patch. Using bonding agent, fill holes flush with cement mortar composed of 1 part cement and 2 parts sand. Rub surface with wood float and burlap. Keep patches damp for a minimum of seven days. Fill all form tie holes in same manner.
- B. Areas subject to water: Cut out all honeycombed and defective areas, cut edges perpendicular to surface at least 1 inch deep, no featheredge allowed, soak area to be patched for 24 hours, then allow surface to drain free of standing water, then patch with color matched non-shrink grout:
- C. The grout used shall be cured as recommended by grout manufacturer.

### **3.16 GUNITE INSTALLATION**

- A. Gunite shall be mixed at one-part silica fume cement and shrinkage reducing admixture to four parts gunite sand by volume mixed dry for a period of not less than one (1) minute after materials have been added.
- B. Hydration shall occur at the nozzle of the cement gun using just enough water so that no slump shall occur in the gunite.
- C. The cement gun shall be equipped with an air pressure gauge and the air pressure at the end of the gun shall not be less than forty-five (45) pounds nor more than seventy (70) pounds when the hose is two hundred (200) feet in length or less.
- D. Air pressure shall increase five (5) pounds for each additional fifty (50) feet of material hose used but not more than three hundred (300) feet of material hose shall be used unless previously approved in writing by the Architect.
- E. Water pressure at the nozzle shall be maintained at not less than fifteen (15) pounds greater than the air pressure at the gun.
- F. The structural gunite shall be applied against original undisturbed soil, thoroughly compacted earth or suitable forms that will not yield during applications of the gunite.
- G. Surfaces upon which the gunite is to be applied shall be shot at a right angle to the surface, starting at the bottom and continuing upward.
  - 1. It will be built up in layers of thicknesses that will not slump, allowing sufficient time between the placing of layers for initial set to take place.
  - 2. All loose fine aggregate or rebound shall be removed from the surface being gunited before placing succeeding layers and, whenever possible, the first layer shall entirely cover the reinforcing steel in order to secure it in its proper position.
- H. Pool Steps: Pool steps, ladders and/or recessed stairwells shall be incorporated into the pool as shown on the drawings.

### **3.17 PLACING REINFORCING STEEL**

- A. Place reinforcing steel in conformance with the information on the drawings and CRSI 63 and CRSI, except as modified herein. Minimum length of splices shall be as shown in table on drawings. Tie splices with 18-gauge annealed wire as specified in the referenced CRSI standard. All tie wires shall be "made tight" for electrical bonding purposes, as required by NEC Article 680.

### **3.18 WATER TIGHTNESS TEST**

- A. General:
  1. This test applies to the pool, the surge tank, and the gutter system. A water tightness test shall be completed on each pool, surge tank and gutter system, independently of each other, prior to the application of the pool finish.
  2. The cost of the water for one initial water tightness test, and the final fill shall be borne by the Owner. Any subsequent fillings or partial fillings (more than 25%) of the pool shall be by the CONTRACTOR, at its own expense.
  3. Contractor shall include and itemize these requirements in the overall construction schedule.
  4. The Owner may elect to waive leak test requirements if schedule becomes a critical factor. Only the Owner may waive these requirements. If the Owner elects to waive these requirements the Contractor is still responsible for providing leak-free structures, and at a minimum, all specified applicable warranties shall apply.
- B. Water Tightness Test Procedure
  1. Preparation
    - a. Visually examine the concrete structure and joints for potential leakage prior to fill. Contractor shall repair areas of potential leakage prior to fill.
    - b. Allow the concrete structure to cure a minimum of 28 days, or as required to gain sufficient strength to withstand the test load, prior to initiating test.
    - c. Securely seal all inlets/outlets and penetrations prior to fill.
    - d. The test shall not be scheduled when the weather forecast indicates the water surface could freeze before the test is completed.
  2. Fill
    - a. Fill the pool with potable water from an approved water source, and then isolate the pool, the surge tank, and the gutter system. The water tightness test and measurement documentation shall begin after the test structure has been filled for a minimum of three (3) days to allow the concrete to absorb water and minimize absorption effects during the testing period.
    - b. Fill each structure to the design maximum liquid level or 4 inches below any fixed overflow level.
    - c. After the initial fill, remove ground water to a level below the bottom of the structure main drain or floor slab (below lowest concrete plane) utilizing the pool observation tube, the pool de-watering system, or the construction dewatering system. This shall be completed prior to the start of the water tightness test and maintained for the duration of the test.
  3. Evaporation/Precipitation Measurement Procedure
    - a. Partially fill a floating, restrained, calibrated (known volume and surface area), open container (hereafter "container" or "control container") with water and allow this container to float within the filled structure during the testing period. This will be used to measure total evaporation and precipitation.

- b. Mark and measure the change in container's water level. If the container water level has gone down (evaporation), this change shall be subtracted from each structure's water loss measurement. If the container water level has risen (rain), this change shall be added to each structure's water loss measurement.
4. Measurement
- a. Conduct all measurements with the Architect or Owner's representative present, and document all measurements on the table below.
  - b. Provide an as-built drawing or sketch the pool, surge tank, and gutter identifying measurement locations and the evaporation control container's location.
  - c. The water surface elevation shall be recorded to within 1/16 of an inch, measured from a fixed point on the structure above the water surface.
  - d. Average multiple sample locations for structures exposed to wind.
  - e. Repeat and record the measurements for a total of three (3) consecutive days.

Measurement Times	Pool Measurements	Gutter System Measurements	Surge Tank Measurements	Control Container Measurements
12 Hrs				
24 Hrs				
36 Hrs				
48 Hrs				
60 Hrs				
72 Hrs				

5. Water Leakage
- a. Calculate water leakage as follows:
  - b.  $\text{Leakage [Gallons]} = [7.481 \times \text{Structure Surface Area (SF)}] \times [\text{Structure Loss Measurement (FT)} - \text{Control Container Measurement (FT)}]$ .
  - c. Gutter System Measurement or Surge Tank Measurement independently.
  - d. Calculate the leakage from the pool, gutter, and surge tank independently.
  - e. Add the measurements for two consecutive 12 hour periods to obtain the total daily loss due to leakage.
  - f. Record Daily losses due to leakage for Day #1, #2, and #3 in the table below.

Total Daily Loss Due To Leakage	Pool Leakage	Gutter Leakage	Surge Tank Leakage
Day 1			
Day 2			
Day 3			

6. Submittal
  - a. Provide test location as-built/sketch, measurement tables, and Water Leakage calculations to Engineer in the form of a submittal for review and records.
7. Allowable Loss from Leakage
  - a. The allowable leakage rate for an unlined, open concrete structure (i.e. backfilled pool, gutter, and surge tank) shall not exceed 0.1 percent of the total water volume in a 24-hour period. (Example:  $0.001 \times 200,000$ -gallon pool = 200 gallons per 24-hour period.)
  - b. Elevated pools and gutters with a secondary containment vessel shall have no measurable loss; the drop in the water surface shall not exceed 1/8" over the three-day test period when adjusted for evaporation and precipitation.
8. Repair and Retest
  - a. If the leakage volume calculated exceeds the "allowable loss" in section 7, Contractor shall locate and identify leakage points, repair the structure and provide documentation on the location of repaired areas.
  - b. After proper curing of all repair work, re-test the water tightness of structure following the procedure specified in this section.

END OF SECTION

**SECTION 13 1115**  
**POOL PLASTER**

**PART 1 - GENERAL**

**1.1 SCOPE**

- A. All preparation of swimming pool structures and labor and materials required to provide swimming pool plaster as indicated on the Drawings and herein specified.

**1.2 QUALITY ASSURANCE**

- A. All Work of this Section shall be performed or supervised by the Swimming Pool Contractor.

B. Qualifications of Workers:

1. The contractor / subcontractor for this portion of the Work shall have been successfully engaged in the respective trade for at least five (5) years immediately prior to commencement of this work and shall demonstrate to the approval of the Owner's Representative that his record of workmanship is satisfactory.
2. For actual construction operations, use only thoroughly trained and experienced workers completely familiar with the materials and methods specified.
3. Provide at least one person who shall be always present during execution of this portion of the Work and who shall be thoroughly familiar with the type of materials being installed, the referenced standards, and the requirements of this Work, and who shall direct all Work performed under this Section.

- C. Standards: Swimming pool plaster shall be designed to comply with the published standards of the State and Local Health Department as they apply to the material and services furnished herein. In addition, meet requirements of applicable portions of most current edition of the "Technical Manual," National Plasterers Council.

D. Start-up:

1. Retain a qualified pool chemistry consultant (AFO/CPO), familiar with operation and maintenance of aquatic facilities, to supervise and properly balance swimming pool chemistry.
2. Demonstrate to the Owner's Representative and appropriate officials that all systems are fully operational and that calcium hardness; total alkalinity, chlorine residual and pH levels are within specified limits.
3. Standards: Contractor shall furnish labor and chemicals as required to condition the water properly to the following specifications:
  - a. Calcium Hardness: 150 to 300 ppm
  - b. Total Alkalinity: 100 ppm
  - c. Chlorine Residual: 1.00-1.50 ppm
  - d. pH Factor: 7.2 to 7.4

**1.3 SUBMITTALS AND SUBSTITUTIONS**

- A. Provide submittals in accordance with the requirements of Section 131100.

**1.4 PRODUCT HANDLING**

- A. Delivery: Deliver materials to the Project Site in the manufacturer's original unopened containers with all labels intact and legible.

- B. Storage: Store materials under cover in a manner to prevent damage and contamination, and store only the specified materials at the Project Site.
- C. Protection: Use all means necessary to protect the swimming pool plaster before, during, and after installation and to protect the installed Work and materials of all other trades.
- D. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Owner's Representative.

## **1.5 ENVIRONMENTAL CONDITIONS**

- A. No plastering shall be done under unsuitable conditions of weather or temperature. No plastering shall be done when prevailing temperature is 40 degrees Fahrenheit or less.
- B. Do not install plaster during rain and, if rain commences after plastering has begun, immediately protect the plaster from rain by all means necessary until the plaster has set.
- C. Do not install plaster during wind greater than 10 mph and, if wind commences after plastering has begun, immediately protect the plaster from wind by all means necessary until the plaster has set.

# **PART 2 - PRODUCTS**

## **2.1 CEMENT**

- A. Swimming pool plaster cement shall be white Portland cement conforming to ASTM C-150 as manufactured by Riverside Cement, Lehigh Cement, or approved equal.

## **2.2 AGGREGATE**

- A. Swimming pool aggregate shall be Georgia Marble Pool Aggregate, Riverside Premium Pool Aggregate, or approved equal. Mix per manufacturer's recommendations for specific application.

## **2.3 COLOR**

- A. Swimming pool plaster shall be white in color.

## **2.4 WATER**

- A. Water for swimming pool plaster shall be clean and free from injurious amounts of acid, alkali, and organics.

# **PART 3 - EXECUTION**

## **3.1 SURFACE CONDITIONS**

- A. Inspection:
  1. Prior to Work of this Section, carefully inspect the installed Work of other trades and verify that all such Work is complete to the point where this installation can properly commence.
  2. Verify that swimming pool plaster can be installed in accordance with the original design and all referenced standards.
- B. Discrepancies:
  1. In the event of discrepancy, immediately notify the Owner's Representative.

2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.
3. Failure to notify the Owner's Representative and give written notice of discrepancies shall constitute acceptance by the Contractor of existing conditions as fit and proper to receive the Work.

### **3.2 INSTALLATION OF POOL PLASTER**

#### A. General:

1. Completion of other work: DO NOT commence plastering of swimming pool until the following conditions have been met:
  - a. The Health Department and/or other governing agencies have approved the pool for plaster.
  - b. All concrete pool deck construction is complete and the pool decks have been thoroughly cleaned.
  - c. The backwash sewer connection is complete.
  - d. All dust raising construction and/or activities in areas adjacent to the pool are complete or mitigated.
  - e. The circulation pump is operational.
  - f. The mechanical system has been flushed sufficiently to remove all dirt and debris from the piping system.
  - g. All necessary chemicals (Chlorine, pH adjuster, Sodium Bicarbonate and Calcium Chloride or any other required chemicals are on site and ready for use.
  - h. Obtain written approval from the Owner.

B. Contractor accepts all liability from damage done to the pool plaster if the pool is plastered before the completion of the above listed items or without the written approval of the Owner

#### C. Preparation:

1. Do not apply plaster over dirt, rust, scale, grease, moisture, scuffed surfaces or conditions otherwise detrimental to the formation of a durable plaster finish.
2. Consult with manufacturer on application to specific surfaces being treated. Follow manufacturer's recommendation for curing or cleaning of cast-in-place concrete or shotcrete surfaces prior to application of plaster.
3. Protect ceramic tile, decking, deck equipment, gratings, fittings and other items by suitable covering or masking.
4. Mask or remove all hardware, hardware accessories, machined surfaces, plates, lighting fixtures and similar items in place not to receive pool plaster. Following completion of plaster for each space or area remove masking. Re-install all removed items utilizing workers skilled in the trades involved.

#### D. Application:

1. Into the parging coat of the concrete surfaces; trowel a finish coat of the specified marble plaster to a thickness between 1/4" and 3/8" maximum. If leveling coat is required, use a brown coat application of one part -cement to three parts clean, washed sand.
2. Float the plaster to a uniform plane and trowel to a smooth, dense, impervious surface using extreme care to avoid stains.
3. Take special care in finishing around pool fittings, making sure to mask off or plug openings so as not to fill such openings with excess plaster. Be certain to completely enclose pool fittings with plaster to insure a leak-proof seal around pipes, fittings, lights, anchors, etc.
4. Accurately interface with the finish planes of items installed by other trades.

### **3.3 CURING**

- A. Preparation: Anticipate the need for required equipment and have all such equipment immediately available for use upon completion of pool plastering.
- B. Pool Filling:
  1. After the plaster has sufficiently dried and before drying has proceeded to a damaging point, cure the plaster by gradually filling the pool with water, preventing all damage to finished plaster surfaces.
  2. Flow the water continuously until the pool is filled.
  3. When the weather is hot and/or water pressure is low, keep the pool walls damp while the pool is filling.
  4. Coordinate with Contractor to ensure that the pool is continuously monitored while filling to prevent overfill.

### **3.4 EQUIPMENT ACTIVATION**

- A. All water chemistry and filtration mechanical equipment shall be operational upon filling of pool after plaster. Chemicals and other related support items as supplied by Contractor shall be in supply at start-up.
- B. For the first fourteen (14) calendar days after completion of the pool plaster, brush all plastered surfaces at least twice a day and coordinate with Contractor to ensure that the plaster is carefully maintained after the initial fourteen day period. In addition, coordinate with the Contractor to ensure that pool filtration equipment is continuously running during the initial fourteen day period.
- C. Start-up and provide qualified personnel to operate pool equipment for a period not less than fourteen (14) days after the pool is placed in operation, or until the Owner takes occupancy of the facility or letter of substantial completion. During this time, Contractor shall instruct and supervise the Owner's personnel in the various operating and maintenance techniques involved. Contractor shall be responsible for supply of chemicals during this not less than fourteen (14) day period and at time of turnover to Owner, chemical storage tanks shall be full. (Owner's personnel shall be fully trained and capable of assuming swimming pool maintenance tasks, training may begin before Owner takes occupancy).

### **3.5 CLEAN-UP**

- A. Upon completion of swimming pool plaster, remove all materials, equipment and debris occasioned by this Work and leave the job site in a clean and presentable condition.
- B. Perform all such clean-up to the approval of the Owner's Representative.

END OF SECTION

**SECTION 13 1118**  
**POOL CERAMIC TILE**

**PART 1 - GENERAL**

**1.1 SCOPE**

- A. Provide a ceramic tile finish on the entire interior surface of the Activity Pool.
- B. Provide ceramic tile accents on the interior surface of the Main Pool.
- C. Work of this section shall be performed by, or under direct supervision of, the Pool Contractor as shown and detailed on the contract drawings and in strict accordance with these specifications.

**1.2 REFERENCE STANDARDS**

- A. Conform to the following standards unless otherwise required herein.
  - 1. American National Standards Institute (ANSI)
    - a. A108.01 - General Requirements: Subsurfaces and Preparations by Other Trades.
    - b. A108.02 - General Requirements: Materials, Environmental, and Workmanship.
    - c. A108.1, Glazed Wall Tile, Ceramic Mosaic Tile, Quarry Tile and Paver Tile installed with Portland Cement Mortar.
    - d. A108.1C - Contractor's Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry Set or Latex-Portland Cement Mortar.
    - e. A108.5 - Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar.
    - f. A108.6 - Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile Setting and Grouting Epoxy for the Epoxy Grouting Installation Process.
    - g. A108.10 - Installation of Grout in Tile Work.
    - h. A137.1 Standard Specifications for Ceramic Tile.
  - 2. American Society for Testing and Materials (ASTM)
    - a. C144-99, Aggregate for Masonry Mortar
    - b. C150-00, Portland Cement
    - c. C171-97a, Sheet Materials for Curing Concrete
    - d. C206-97, Finishing Hydrated Lime
    - e. C207-91 (R1997), Hydrated Lime for Masonry Purposes
    - f. F-1869, Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
    - g. F-2170, Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In Situ Probes
  - 3. Tile Council of North America (TCNA); 2013 Edition, Handbook for Ceramic Tile American National Standards Institute (ANSI) A108.01 - A108.17 American National Standard Specifications for The Installation of Ceramic Tile Installation.
  - 4. International Standards Organization (ISO)
    - a. ISO 13007 - Part 1: 2004 Ceramic Tiles - Grouts and adhesives; specifies the value of performance requirements for tile adhesives.

- b. ISO 13007 - Part 2: 2005 Ceramic Tiles - Grouts and adhesives; test method for adhesives.
  - c. ISO 13007 - Part 3: 2005 Ceramic Tiles - Grouts and adhesives; terms, definitions and specifications for grout.
  - d. ISO 13007 - Part 4: 2005 Ceramic Tiles - Test methods for grout.
5. American Concrete Institute
    - a. ACI302 - Guide for Concrete and Floor Slab Construction
  6. International Concrete Repair Institute (ICRI)
    - a. Concrete Surface Profile (CSP)
- B. Tile installers must have two years' experience in similar pool projects which the Owner may require written proof thereof and proper tools to install tile.

### **1.3 MANUFACTURERS**

- A. Subject to compliance with requirements provide ceramic tile, mortar and grout of the following manufacturers: American Olean Tile Co. (tile), Dal-Tile Co. (tile), Buchtal (tile), KlinkerSire (tile), Daldorado (tile), MAPEI, Inc. (thin-set, waterproofing, grout and admixtures), and LATICRETE International Inc. (thin-set, waterproofing, grout and admixtures) or approved equal.

### **1.4 SUBMITTALS**

- A. Submit shop drawings indicating tile layout, patterns, joint layout, color arrangement, perimeter conditions, junctions with dissimilar materials, thresholds and setting details.
- B. Submit product data indicating material specifications, characteristics, and instructions for using adhesives and grouts.
- C. Samples:
  1. Mount tile and apply grout on 24"x24" backerboard to indicate pattern, color variation and grout joint size variations of each pattern. Furnish mounted tile samples as requested by the architect/owner.
- D. Submit manufacturer's installation instruction.
- E. Submit maintenance data.
  1. Include recommended cleaning and stain removal methods, cleaning materials.

### **1.5 PRODUCT DELIVERY AND STORAGE**

- A. Deliver tile materials to site in unopened factory containers sealed with grade seals bearing printed name or manufacturer and the words "Standard Grade". Keep the grade seals intact and containers dry until tiles are used. Keep cementitious materials dry until used.

### **1.6 JOB CONDITIONS**

- A. Inspect and verify job conditions. Report defects in base surfaces for correction before proceeding.
- B. Maintain a temperature range of 40 degrees Fahrenheit to 90 degrees Fahrenheit during installation of tile and grout materials. Tile installation should cure for a minimum 14 days with average a temperature of 70 degrees, while maintaining the minimum 40 degrees and maximum 90 degrees Fahrenheit, prior to filling pool with water.

- C. Vent temporary heaters to outside to avoid carbon dioxide damage to the new tile work.

## **1.7 COLORS**

- A. Colors must be selected by the Architect or Interior Designer. Note that swimming pool regulations may dictate color selections within the pool tank. See tile materials for price group breakdowns.

## **1.8 WARRANTIES**

- A. The CONTRACTOR warrants to the Owner that materials and equipment provided under the contract will be of good quality and new unless otherwise required or permitted by the contract documents, that the work will be free from defects not inherent in the quality required or permitted and that the work will conform with the requirements of the contract documents. Work not conforming to these requirements including substitutions not properly approved and authorized, may be considered defective. The CONTRACTOR'S warranty excludes remedy for damage or defect caused by abuse, improper or insufficient maintenance, improper operation, modifications not executed by the CONTRACTOR or improper wear and tear under normal usage. If required by the Owner, provide satisfactory evidence as to the kind and quality of materials and equipment. Warranties must be for a period of five years, unless otherwise specified.
- B. Setting materials must be provided by the same manufacturer. Mixing materials and application procedures must be done in accordance with manufacturer's recommendations and requirements. Documentation must be provided to this affect by the contractor with verification from the manufacturer. This documentation must be included in the operations and maintenance manual under warranties as documentation qualifying the project for a 15 Year Systems Warranty by LATICRETE International, Inc., MAPEI, Inc. or approved equal.
- C. The CONTRACTOR must agree to repair or replace work at no cost to the Owner upon written notification from the Owner within the warranty period. Pro-rated warranties are not acceptable.

# **PART 2 - PRODUCTS**

## **2.1 TILE MATERIALS**

- A. Standard grade conforming to ANSI A137.1. Provide trimmer units as indicated and specified, including special shapes as detailed or required. Tile patterns and colors must be as indicated and specified, colors of approved shades. Mesh mounted or perforated paper backed tile is not allowed where the mesh of paper remains as a permanent part of the installation. If dot mounting is used, a minimum of 67% of the depth of the tile must be free from dots to ensure proper grout curing.
- B. Tile must be "frost-proof".
- C. Unglazed Ceramic Mosaic Tile
1. Slip-resistant porcelain unglazed ceramic mosaic tile, cushion or all-purpose edges, 2" square from price group 2 for floor, walls, and stair treads unless otherwise noted. Minimum dynamic coefficient of friction must be 0.42 for wet surfaces and 0.65 for ramped surfaces. Where special shapes are required, they must be selected from price group 3. Equivalents provided by Knottile, Dal-Tile or American Olean. For wet surfaces: Buchtal Chroma Mosaics with front mount film (seven color options) 2"x2" 7161HVF or American Olean Unglazed color-body porcelain mosaics 2"x2", price group 1 -3. For ramps: Buchtal Chroma non-slip mosaics with glass fiber net (four color options) 2"x2" 7161H. Or for wet surfaces or ramps: Buchtal Chroma non-slip 5"x5" 32020H thirteen color options) or Dal-Tile or American Olean Unglazed color-body mosaics 2"x2" with 7.5% abrasive grain (7 color options). Colors must be approved by the architect.

- 2. Contrasting ceramic tile nosings at pool stairs must be Universal Trim 2"x2" with color selected by the Architect from Dal-Tile, Keystone Unglazed Mosaic, price group 3 and 4, American Olean Unglazed color-body porcelain mosaics 2"x2", price group 1-3, or Safety Edge Tile from Inlays, Inc.; Black CPC00022, Blue CPC00021, Brown CPC00023 and Green CPC00024.
- 3. 4" wide contrasting ceramic tile stripe and 12" lane markers on the pool floor with color selected by Architect from Dal-Tile, Keystone Unglazed Mosaic, 2"x2" price group 3, American Olean Unglazed color-body porcelain mosaics 2"x2" price group 3, or from Knoxtile.
- D. Provide tile trim units where indicated or necessary for a complete and finished installation. Provide rounded units for external and internal corners and angles. Provide trim units of material and finish identical to the adjoining tile.
- E. Message Tile and Depth Markings
  - 1. Provide depth markers and warning signs on the deck. Provide 6" x 6" ceramic tiles with 4" high letters and numbers as detailed on the drawings, Inlays Inc. 6" Tile – 4" Numbers, or approved equal.

## **2.2 SWIMMING POOL TILE SETTING MATERIALS AND INSTALLATION**

- A. Surface Preparation
  - 1. Surface preparation must be in accordance with ACI 302. The surface must be structurally sound and free of foreign substances and debris that could reduce or impair adhesion. Sound and remove loose concrete to firm substrate. Surfaces must be roughened to a CSP of 3 to 5 (reference ICRI CSP Standards 7 to 9 for acceptable profile height). Thoroughly wash/rinse with clean potable water. Surface defects or holes in the substrate must be patched per manufacturer's recommendations.
- B. Slurry Bond Coat
  - 1. Horizontal surfaces to receive a thick bed mortar application must be installed over a slurry bond coat of either LATICRETE 254 Platinum one-step, polymer-fortified, thin-set mortar or MAPEI Planislope RS polymer-modified pre-blended, rapid-setting mortar mixed with water only in compliance with ANSI A108.1A (2.2 & 5.2). As manufactured by LATICRETE International, MAPEI, Inc., or approved equal. Note that slurry bond coats are not required under vertical applications of the render and scratch coat.
- C. Mortar & Leveling Beds
  - 1. Bonded Thick Bed Method (Floor / Horizontal Surfaces): Provide a dry pack, thick mortar bed on horizontal surfaces consisting of LATICRETE 3701 Fortified Mortar Bed or MAPEI Planislope RS polymer-modified pre-blended, rapid-setting mortar mixed with water only. Apply over a properly prepared slurry bond coat. Maximum lift thickness not to exceed 2".
  - 2. Render- Scratch and Float Coats (Wall / Vertical Surfaces): Provide wall render (scratch and float coats) on vertical competition turning surfaces to a depth of 4'-0" below the water surface, consisting of either LATICRETE 3701 Fortified Mortar Bed or MAPEI Planislope RS polymer-modified pre-blended, rapid-setting mortar mixed with water only for lift thicknesses up to 'A". Wall render is made to a plastic consistency when used vertically. Fill holes and bring surface up to line and plane as required. As manufactured by LATICRETE International, MAPEI, Inc. or approved equal. Note that slurry bond coats are not required under vertical applications of the render and scratch coat.
- D. Tile Thin-Set
  - 1. Use either LATICRETE 254 Platinum one-step, polymer fortified, thin-set mortar or MAPEI Keralflex Super one-step, polymer modified, thin-set mortar, used in accordance with the

manufacturer's requirements. As manufactured by LATICRETE International, MAPEI, Inc., or approved equal.

E. Tile Grout

1. Use either LATICRETE SPECTRALOCK PRO Premium Grout or MAPEI Kerapoxy CQ Grout in accordance with the manufacturer's requirements as manufactured by LATICRETE International, MAPEI, Inc. or approved equal.

F. Elastomeric Sealant

1. Use LATICRETE LATASIL over LATASIL 9118 primer or MAPEI Mapesil "T" 100% silicone sealant for inside/outside comers, expansion/movement joints, and to seal lighting/plumbing fixture penetrations. Primer and sealant installation must be in accordance with the manufacturer's requirements. As manufactured by LATICRETE International, Inc., MAPEI, Inc. or approved equal.

G. Mixing and application procedures must be in accordance with the manufacturer's recommendations and requirements. The manufacturer's representative must visit the site to verify field conditions, confirm materials and application requirements and ascertain that materials and systems are so installed. Documentation must be provided to this effect.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Complete water tightness test prior to tile installation. Concrete tank must be watertight per ASTM D5957, the Tile Council of North America, and specification 131100.
- B. Clean substrates of dust, dirt, oil, grease and deleterious substances and mechanically roughen concrete and shotcrete for bond. Conform to applicable reference standards and to recommendations of manufacturers of materials used and meeting ICRI, CSP of 3-5.

C. Substrates to Receive Mortar Setting Beds

1. Dampen concrete substrate to receive tile work according to above referenced standards or tile manufacturer's instructions, as required.
- D. Substrates to receive thin set tile applications must meet normal construction tolerances of 1/4" in 10' where competition tolerances do not apply and must meet competition tolerances where required elsewhere in these specifications, and must be free of bumps, dips and surface irregularities that may affect the satisfactory installation of the tile.

E. Tile Wetting

1. Dampen tile according to above reference standards or tile manufacturer's instructions, as required.

F. Screeds

1. Accurately set temporary screeds to control the finish plane of mortar-bed set tile and remove as soon as setting bed is sufficiently hardened. Fill void spaces from screeds with same mortar.

### **3.2 TILE INSTALLATION**

- A. Arrange tile according to patterns detailed. Set tile with flush well-fitted joints, finished in true planes, plumb, square, joints of uniform size. Provide approved trimmers as shown or required. Cut tile without marring. Carefully grind and joint tile edges and cuts.
- B. Follow Tile Council of North America installation methods P601 and B417 to achieve total tile system thickness for thin or thick-set.
  - 1. Thick Set
    - a. Apply specified setting bed mortar, up to 2" in thickness, on cured and dried concrete pool shell. Tamp and screed to required planes. Spread no more mortar than can be covered with tile before initial set. Do not use re-tempered mortar. Trowel 3/32" to 1/8" thick bond coat over plastic setting bed mortar just before setting tile or apply bond coat to back of each tile placed. 95% coverage of the back of the tile or tile sheet is required. Set tile in position and beat firmly into the setting bed mortar. Bring tile faces to a true and correct plane. Complete beating and leveling before mortar sets and in no case later than one hour after first placing. When ready, wet and remove paper and glue avoiding excess water. At this time adjust out-of-line or out-of-level tile.
  - 2. Thin Set
    - a. Apply specified bond coat on cured and dried concrete pool shell. Trowel 3/32" to 1/8" thick bond coat over concrete pool shell just before setting tile or apply bond coat to back of each tile placed. 95% coverage of the back of the tile or tile sheet is required. Set tile in position and beat firmly into the setting bed mortar. Bring tile faces to a true and correct plane. Complete beating and leveling before mortar sets and in no case later than one hour after first placing. When ready, wet and remove paper and glue avoiding excess water. At this time adjust out-of-line or out-of-level tile.
- C. Finished tile surface must be level and in plane, with no sharp or protruding edges. Tiles out of plane more than 1/16" must be removed and replaced. Sharp edges must be stoned smooth.
- D. Grout Joint Sizes
  - 1. Unless otherwise approved, install tile with uniform 3/32" joint width. A maximum 1/8" joint width may be utilized to meet specific installation requirements, if required.
- E. Ceramic Tile Joint Grouting
  - 1. Mix grout to a thick creamy consistency and force into joints for entire thick depth, flush with surface. Clean off excess and fill skips and gaps before grout sets. Color selection by Architect or Interior Designer. Provide dampness for minimum 3-day curing and polish with clean dry cloths (not required when epoxy grouts are used).
- F. Fill and Empty Rates
  - 1. Use a fill and drain rate of 2'-0" per 24 hours to minimize thermal shock and structural movement. Maintain a temperature differential of 10 degrees Fahrenheit or less between the pool water and the substrate during fill and drain cycles.

### **3.3 TESTING AND INSPECTION**

- A. Tile work found loose, improperly adhered, out of plane, misaligned or otherwise non-conforming must be removed and replaced at no additional cost to the Owner.

### **3.4 CLEANING**

- A. Upon completion of placement and grouting, clean tile installation as recommended by TCNA and manufacturers of proprietary materials. Tile must be cleaned with pH neutral solutions, free of both sodium and potassium, in accordance with the tile and grout manufacturer's printed instruction.
- B. Leave finished installation clean and free of cracked, chipped, broken, un-bonded or otherwise defective tile work.
- C. Protect installed tile work with non-staining Kraft paper, polyethylene sheeting, or other approved heavy covering during the construction period to prevent damage.

### **3.5 REPLACEMENT TILE**

- A. Provide Owner with approximately 10% or 25 square feet (whichever is least) of each color and type tile used on the project for Owner's repair and replacement requirements.

END OF SECTION

**SECTION 13 1120**  
**POOL PIPING & ACCESSORIES**

**PART 1 - GENERAL**

**1.1 SECTION INCLUDES**

- A. This section of the specifications describes piping and accessories related to swimming pool construction, swimming pool equipment installation, and service.
- B. Applicable requirements of the following Specifications and Codes apply to Work of This Section.

**1.2 CODES & REFERENCES**

- A. All work in this division shall be according to applicable local, state and national codes and regulations.
  1. All state and local health codes.
  2. National Sanitation Foundation (NSF) Seal of Approval program.
  3. American Society for Testing and Materials (ASTM).
- B. Provisions for plumbing work that is part of this section: Comply with the following reference standards except where more stringent requirements are shown or specified.
  1. ANSI/ASTM D2564 – Solvent cements for polyvinyl chloride (PVC) plastic pipe and fittings.
  2. ANSI/ASTM D1785 – Standard specification for polyvinyl chloride (PVC) plastic pipe schedules 40, 80 and 120, NSF seal for potable water.
  3. ASTM B88 – Seamless copper water tube.
  4. ASTM D2855 – Practice for making solvent cemented joints with PVC pipe and fittings.
  5. Eslon Engineering Manual for plastic piping systems.

**1.3 SUMMARY OF WORK INCLUDED**

- A. The work of this section includes, but is not necessarily limited to the following:
  1. Provide the recirculation system piping, as shown on the drawings.

**1.4 SUBMITTALS**

- A. Submittals Required.
  1. Product Data: Provide Manufacturer's/Installer's written installation instructions as called for throughout this section.
  2. Valve Charts: Submit two copies of valve charts for each piping system, consisting of Isometric Drawings, or piping layouts showing and identifying each valve and describing its function to the Architect/Engineer for approval.
    - a. Upon completion of the Work, one copy of each chart sealed to rigid backboard with clear lacquer placed under glass and framed shall be hung in a conspicuous location in the equipment room.

3. Operation and Maintenance Manuals:
  - a. Submit to the Architect/Engineer four (4) copies at substantial completion of the project.
4. Furnish to the Owner/Architect/Engineer the following:
  - a. Product Data:
    - 1) Valves.
    - 2) Gauges and Flow Meters.
    - 3) Piping Materials.
  - b. Test Results:
    - 1) Piping Pressure Testing.

#### **1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Protect plastic pipe from exposure to chemicals i.e.: aromatic hydrocarbons, halogenated hydrocarbons and other esters and ketones that might attack the material. Protect all pipes from mechanical damage and long exposure to sunlight during storage.

#### **1.6 WARRANTIES**

- A. General Warranty: Provide one (1) year warranty covering all pool workmanship, materials, and equipment. Refer to Division 1 of the Specifications for additional requirements.
- B. All standard manufacturer's warranties shall apply to all equipment and products provided by the Contractor.

#### **1.7 TESTING/FIELD QUALITY CONTROL**

- A. This section requires the following tests be performed during construction of the project.
  1. Testing and Flushing of Pipe:
    - a. Contractor shall be responsible for discovering leaks and making necessary repairs.
    - b. Pressure piping: After the piece is laid, the joints completed, and the trench partially backfilled leaving joints exposed for examination, subject new lines to a hydrostatic pressure of not less than thirty-five pounds per square inch. Joints shall remain watertight under this pressure for a period of two hours. All air must be expelled from pipes prior to testing.
    - c. Gravity lines: A water test shall be applied to all gravity drain piping system, either in their entirety or in sections. All openings shall be tightly plugged and each system filled with water and tested with at least a 10-foot head of water. The water shall be kept in the system or in the portion under test, for at least 15 minutes before the inspection starts. System shall be watertight at all joints.
    - d. Test results must be provided to the Architect/Engineer before covering the pipes.
    - e. Leaks shall be repaired and tested repeatedly until leakage or infiltration is approved.
    - f. The Contractor must adhere to the applicable provisions in the mechanical portions of the specifications for the installation of piping systems.

## **PART 2 - PRODUCTS**

### **2.1 POOL PIPING**

#### **A. WORK INCLUDED**

1. Pipe, fittings, connections, wall penetrations, hangers and supports, equipment bases and supports, excavation and backfill.
2. The drawings indicate the general arrangement of the pool plumbing. Details of proposed departures due to actual field conditions or other causes shall be submitted to the Architect for approval. The Pool Contractor shall carefully examine the drawings and shall be responsible for the proper fitting, materials and equipment as indicated without substantial alteration.
3. The Pool Contractor shall supply and install all piping, pipe fittings and valves from the pool fittings to the juncture or the filter equipment; all piping, pipe fittings and valves from the pool main outlet line; chlorinator hoses where indicated; all piping and pipe fittings within the filter room required and as shown on the drawings; all pipe hangers, rods and supports and other material to complete the intended scope of work.
4. Any item of equipment or materials obviously a part of the filter and pool recirculation system and necessary to its operation but not specifically mentioned in the specifications or shown on the drawings shall be furnished and installed by this Pool Contractor as a part of his work at no extra cost.
5. All materials to be used in this work shall be installed by workmen thoroughly skilled in their trade and all work shall present a neat and mechanical appearance when complete. The architect shall be the sole judge of whether work installed under this contract has met this requirement and the Pool Contractor, at no additional expense to the Owner, shall replace or correct any work not judged acceptable by the Architect.

#### **B. REFERENCES**

1. ANSI/ASTM D2564 – Solvent cements for polyvinyl chloride (PVC) plastic pipe and fittings.
2. ANSI/ASTM D1785 – Standard specification for polyvinyl chloride (PVC) plastic pipe schedules 40, 80 and 120, NSF seal for potable water.
3. ASTM B88 – Seamless copper water tube.
4. ASTM D2855 – Practice for making solvent cemented joints with PVC pipe and fittings.
5. Eslon Engineering Manual for plastic piping systems.

#### **C. PLACEMENT AND USE**

1. All plastic pipe flanges shall be schedule 80 PVC with neoprene gaskets where required.
2. All pool gutter lines shall be schedule 80 solvent weld conforming to ASTM D1785/76. All gutter lines shall drain by gravity as shown on the drawings.
3. All buried filter return lines and main drain lines shall be PVC schedule 80, solvent weld.
4. All buried supply lines for miscellaneous equipment and features shall be PVC schedule 80, solvent weld.
5. All above grade piping inside the pool mechanical room shall be PVC schedule 80, solvent weld.
6. All chemical piping shall be schedule 80 PVC, solvent weld.

7. All connections between PVC or CPVC and metal piping must be flanged, plastic flange to metal flange. DO NOT use threaded connections between plastic and metal piping.

#### D. HANGERS AND SUPPORTS

1. GENERAL
  - a. All mechanical room piping must be properly supported using the schedule indicated on the drawings as a guideline for maximum allowable spacing between supports.
  - b. It shall be the contractor's responsibility to properly support piping at all valves, pumps, equipment, overhead areas, changes in direction, etc.
  - c. Use of the proper hanger for the conditions is essential. All piping must be supported laterally as well as vertically hung.
  - d. All hangers, pipe supports, threaded rod, hardware, etc. shall be zinc plated or galvanized steel.
  - e. All piping connections and support hardware shall be stainless steel inside surge tanks, balance tanks, and gutters.
  - f. Ring, clevis, roller and J hook type hangers are not acceptable.
2. STRUT
  - a. Minimum height 1-5/8", minimum width 1-5/8", minimum thickness 12-gauge material.
  - b. Finish shall be hot-dip galvanized steel, ASTM A123; or type 304 stainless steel or better grade, ASTM A240.
3. STRUT CLAMPS
  - a. Pipe sized ½" thru 12", two-piece clamps with clamping bolt and nut. Pipe sizes 14" and larger, provide "U" bolts, nuts, and washers.
  - b. Finish shall be hot-dip galvanized steel, ASTM A123; or type 304 stainless steel or better grade, ASTM A240.
4. STRUT ACCESSORIES
  - a. Flat plate fittings, corner braces, post bases, etc. Finish shall be hot-dip galvanized steel, ASTM A123; or type 304 stainless steel or better grade, ASTM A240.
5. WEDGE ANCHORS
  - a. One-piece assembly, 3/8" minimum body diameter.
  - b. Grade 2, zinc plated with stainless steel clips; or type 304 stainless steel or better grade, ASTM A240.
6. BEAM CLAMPS
  - a. Steel "C" clamp type with locknut.
  - b. Finish shall be electro-plated galvanized; or type 304 stainless steel or better grade, ASTM A240.
7. SUPPORT COMPONENTS
  - a. All threaded rod, threaded rod couplings, nuts, washers, etc. Finish shall be electro-plated galvanized; or type 304 stainless steel or better grade, ASTM A240.

#### E. POOL PIPE EXCAVATION AND BACKFILL

1. Excavation for all pool systems and related piping must comply with Division 1 and Division 2 of the specifications.

#### F. SPECIAL BACKFILL AND BEDDING MATERIALS.

1. Existing subsoil materials shall not be used for pipe bedding.
2. All piping shall be bedded with a minimum of 6" clear stone material and a minimum of 2'-0" clear stone material top cover. The balance may be existing site material, provided no organic material, clay or topsoil is used.

#### G. PIPING

1. Piping must be laid on a grade so it will drain completely by gravity. In all instances where gravity drainage is not provided, the contractor shall install drain valves so that all lines can be drained completely. Shop drawings will be required on any such installation.
2. Cut all pipe with mechanical cutter without damage to the pipe.
3. Placing and laying: Inspect pipe for defects before installation. Clean the interior of the pipe thoroughly of foreign matter and keep clean during laying operation. Pipe shall not be laid in water or when trench conditions are unstable. Water shall be kept out of the trench until the pipe is installed. When work is not in progress, open ends of the pipe and fittings shall be securely closed so that no trench water, earth, or other substance will enter the pipes or fittings.
4. Threaded joints: After cutting and before threading, the pipe shall be reamed and shall have burrs removed. Screw joints shall be made with graphite or inert filler and oil or with an approved graphite compound applied to male threads only. Threads shall be full-cut and not more than 3 threads on the pipe remained exposed. Use Teflon ii tape on the male threads of all threaded pipe joints. Caulking of threaded joints to stop or prevent leaks will not be permitted. Unions shall be provided where required for disconnection of exposed piping. Unions will be permitted only where access is provided.
5. Solvent welded joints shall be made in accordance with the manufacturer's printed instructions and the following minimum standards:
  - a. All fittings shall fit easily on the pipe before applying cement. The outer surface area of pipe and inner wall of fitting shall be dry and clean. Cleaner is to be applied to the outer surface of the pipe and to the inner surface of the fitting. Cement is to be applied to the outer surface of the pipe, or on the male section of fittings only. When the outside surface area of the pipe is satisfactorily covered with cement allow ten (10) seconds open time to lapse before inserting the pipe end into fittings. After full insertion of pipe into fitting, turn fitting about the pipe end approximately 1/8 to 1/4 of a turn. Wipe off excess cement at the joint in a neat cove bead. Follow manufacturer's instructions on solvents.
  - b. All joints shall remain completely undisturbed for a minimum of ten (10) minutes from the time of jointing the pipe and fitting. If necessary, to apply pressure to a newly made joint, limit to 10% of rated pipe pressure, during the first 24 hours after the joint has been made.
  - c. Full working pressure shall not be applied until the joints have set for a period of 24 hours.
  - d. Make provisions for expansion and contraction by way of swing joints or snaking.
  - e. Protect plastic pipe from exposure to aromatic hydro-carbons, halogenated hydro-carbons, and most of esters and ketones that attack the material. Protect all pipe from mechanical damage and long exposure to sunlight during storage.
  - f. PVC welding is not allowed without prior approval of the Architect/Engineer.

- g. No installation shall be made that will provide a cross connection or inter-connection between distribution supply for drinking purposes and the swimming pool that will permit a backflow of water into the potable water supply. Pipe openings shall be closed with caps or plugs during installation. Equipment and pool fittings shall be tightly cove red and protected against dirt, water and chemical or mechanical injury. At the completion of work the fittings, materials and equipment shall be thoroughly clean and adjusted for proper operation.

## 2.2 VALVES

- A. Butterfly Valves:
1. Butterfly valves 3" - 12" shall be wafer or lug bodies and shall be suitable for use between ANSI 125 and 150 lb. Flanges.
  2. Bodies of the flangeless design shall be provided with at least two bolt guides to center the valve in the pipeline.
  3. All valves shall be as manufactured by Bray Valve (713) 894-5454, Dominion or equal.
  4. All bolts and nuts shall be corrosion resistant zinc plated steel with plated washers to be used when secured to PVC flanges.
- B. Ball Valves:
1. PVC True Union Ball Valves, Ipx, Asahi, Spears or equal.
- C. Globe Valves:
1. Globe Valves shall be PVC body with EPDM seals and PVC disc with rising stem. There shall be no metal to media contact. All sizes rated for full vacuum service to 29.9" Hg. Valves shall have excellent flow regulating characteristics throughout the entire lift of the disc.
  2. Valves shall be provided by Asahi/America, Inc. of Lawrence, MA.
  3. Manufacturer must be ISO-9001 certified.
  4. Rating:
    - a. 150 psi at 70°F for sizes 1/2 inch to 2 inch.
    - b. 110 psi at 70°F for sizes 2-1/2 inch to 4 inch.
- D. Wafer Check Valves
1. Materials:
    - a. PVC Conforming to ASTM D1784 Cell Classification 12454
    - b. EPDM – Ethylene Propylene Diene Terpolymer Rubber
  2. Wafer Check Valves shall be of solid thermoplastic construction, having no metal to media contact. Valves shall incorporate a single disc design suitable for either horizontal or vertical installations. Valves shall be wafer style conforming to ASME/ANSI B16.1 face to face for 150 lb flanges. Valve face to face dimensions shall conform to ISO 5752 short pattern face to face dimension. Valves shall be round body design with EPDM O-ring seals and accept as an option a SWP-B ETFE coated spring for use in vertical applications. PVC shall conform to ASTM D1784 Cell classification 12454. Valves shall be rated to 150 psi (3" – 8") and 85 PSI (10" & 12") as manufactured by Asahi/America Inc.
  3. Approved Manufacturer
    - a. Valves shall be provided by Asahi/America, Inc. of Lawrence, MA or approved substitution. Manufacturer must be ISO-9001:2008 certified.

4. Minimum Back Pressure sealing requirements
  - a. All Wafer Check valves, all sizes require 1.0 psi back pressure to fully seat the disc and provide positive shut-off. This includes valves with and without the spring option, installed in both horizontal and vertical installations.
5. Accessories:
  - a. Internal SWP-B spring with ETFE coating
6. Shall be designed, built and installed by Asahi/America, Inc. To be used for wafer check valves in vertical Installations to minimize water hammer or off the discharge side of the pump to minimize chattering and assist in closing.
7. Installation Procedures:
  - a. All valve joints shall be prepared using flanged connections. The bolt diameters and torque values should be in accordance with the requirements put forth in the Wafer Check Valve Operation & Maintenance manual. All accessories should be installed in accordance with the manufacturer's requirements.

### **2.3 PIPE IDENTIFICATION**

- A. Provide identification on all piping located in the mechanical equipment, chlorine, acid rooms, heater courts, etc.
- B. Identify the contents and direction of flow.
- C. Mark at least once on each line and at 5-foot intervals minimum. Consult Health Department Code for minimum marking requirements.
- D. Color code per Health Department requirements. If code does not identify color coding requirement consult the Architect/Engineer.
- E. Brady, B-946, custom legend, self-sticking markers and arrows or equal.

## **PART 3 - EXECUTION**

### **3.1 GENERAL REQUIREMENTS**

- A. All systems and subsystems shall be installed in accordance with that systems manufacturer's recommendations and instructions.
  1. In the event of a discrepancy between these specifications and the manufacturer's recommendations, price the most stringent approach for the purpose of bidding but call the issue to the attention of the construction manager in the form of a Request for Information and wait for an answer.
  2. Provide all accessories and supplemental equipment necessary to provide a complete working installation of all materials, equipment and systems specified or shown on drawings, as part of the base bid.

### **3.2 PIPING INSTALLATION**

- A. Piping must be laid on a grade, so it will drain completely by gravity. In all instances where gravity drainage is not provided, the contractor shall install drain valves so that all lines can be drained completely. Shop drawings will be required on any such installation.
- B. Cut all pipe with mechanical cutter without damage to the pipe.
- C. Placing and laying: Inspect pipe for defects before installation. Clean the interior of the pipe thoroughly of foreign matter and keep clean during laying operation. Pipe shall not be laid in water or when trench conditions are unstable. Water shall be kept out of the trench until the pipe is installed. When work is not in progress, open ends of the pipe and fittings shall be securely closed so that no trench water, earth, or other substance will enter the pipes or fittings.
- D. Threaded joints: After cutting and before threading, the pipe shall be reamed and shall have burrs removed.
  - 1. Screw joints shall be made with graphite or inert filler and oil or with an approved graphite compound applied to male threads only.
  - 2. Threads shall be full-cut and not more than 3 threads on the pipe remained exposed.
  - 3. Use Teflon ii tape on the male threads of all threaded pipe joints. Caulking of threaded joints to stop or prevent leaks will not be permitted. Unions shall be provided where required for disconnection of exposed piping.
  - 4. Unions will be permitted only where access is provided.
- E. Solvent welded joints shall be made in accordance with the manufacturer's printed instructions and the following minimum standards:
  - 1. All fittings shall fit easily on the pipe before applying cement. The outer surface area of pipe and inner wall of fitting shall be dry and clean. Cleaner is to be applied to the outer surface of the pipe and to the inner surface of the fitting. Cement is to be applied to the outer surface of the pipe, or on the male section of fittings only. When the outside surface area of the pipe is satisfactorily covered with cement allow ten (10) seconds open time to lapse before inserting the pipe end into fittings. After full insertion of pipe into fitting, turn fitting about the pipe end approximately 1/8 to 1/4 of a turn. Wipe off excess cement at the joint in a neat cove bead. Follow manufacturer's instructions on solvents.
  - 2. All joints shall remain completely undisturbed for a minimum of ten (10) minutes from the time of jointing the pipe and fitting. If necessary to apply pressure to a newly made joint, limit to 10% of rated pipe pressure, during the first 24 hours after the joint has been made.
  - 3. Full working pressure shall not be applied until the joints have set for a period of 24 hours.
  - 4. Make provisions for expansion and contraction by way of swing joints or snaking.
  - 5. Protect plastic pipe from exposure to aromatic hydro-carbons, halogenated hydro-carbons, and most of esters and ketones that attack the material. Protect all pipe from mechanical damage and long exposure to sunlight during storage.
  - 6. PVC welding is not allowed without prior approval of the Architect/Engineer.
- F. No installation shall be made that will provide a cross connection or inter- connection between distribution supply for drinking purposes and the swimming pool that will permit a backflow of water into the potable water supply. Pipe openings shall be closed with caps or plugs during installation. Equipment and pool fittings shall be tightly cove red and protected against dirt, water and chemical or mechanical injury. At the completion of work the fittings, materials and equipment shall be thoroughly clean and adjusted for proper operation.

### **3.3 PIPE IDENTIFICATION**

- A. Provide identification on all piping located in the mechanical equipment, chlorine, acid rooms, heater courts, etc.
- B. Identify the contents and direction of flow.
- C. Mark at least once on each line and at 5-foot intervals minimum. Consult Health Department Code for minimum marking requirements.
- D. Color code per Health Department requirements. If code does not identify color coding requirement consult the Architect/Engineer.

END OF SECTION

**SECTION 13 1125**  
**POOL PUMPS & DRIVES**

**PART 1 - GENERAL**

**1.1 SCOPE**

- A. This section includes pumps and specialties as indicated on plans and specified herein including, but not limited to, the following:
1. Centrifugal Pump(s).
  2. Pump Strainers.
  3. Variable Frequency Drives.
  4. Pressure Gauges.
  5. Flow Meters.

**1.2 RELATED WORK**

- A. Electrical Work:
1. Engage a licensed electrician to provide branch circuit power wiring to pump drives and from drives to pump motor connections.
  2. Provide 24VDC power supply to main system flow meter.
  3. Provide control wiring between flow meter, VFD, and filter control panel in accordance with filter manufacturer's instructions.

**1.3 CODES AND STANDARDS**

- A. All work in this Section shall be according to applicable local, county, state and national codes and regulations, including but not limited to those of Department(s) of Public Health, National Sanitation Foundation (NSF) Seal of Approval program, and building codes.
- B. All pumps shall be NSF50 certified as provided, including required coatings and shall be labeled as such on the serial number identification tag.
- C. Referenced Standards: The following latest edition reference specifications, guides and standards shall become part of this Specification as if herein written. If provisions conflict, the more stringent provisions shall apply.
1. National Electrical Code, NEC.
  2. Hydraulic Institute Standards.
  3. Institute of Electrical and Electronics Engineers Standards (IEEE).
  4. National Electrical Manufacturers Association Standards (NEMA).
  5. Occupational Safety and Health Administration Rules and Regulations (OSHA).
  6. National Sanitary Foundation (NSF).
  7. American Society for Testing and Materials Standards (ASTM).
  8. American Iron and Steel Institute (AISI).
  9. American National Standards Institute (ANSI).

10. ASTM A48 – Standard Specification for Gray Iron Castings.
11. ASTM B584 – Standard Specification for Copper Allow Sand Castings for General Applications.

#### **1.4 SUBMITTALS**

- A. Product Data: Submit manufacturer's technical data, product specifications, installation instructions, and other pertinent information as applicable for each product or material specified. Product Data shall include, but may not be limited to:
  1. Pump manufacturer and model number, name of motor manufacturer, type of pump and motor with dimensioned drawings.
  2. Complete pump description plus material list including casings, impellers, seals, shaft, bearing frame, motor mounts, guards, base plate, and finishes.
  3. Characteristic curves at full load motor speed showing flow, TDH, efficiency, horsepower, and NPSH required. For all VFD applications include a family of performance curves, separate of the full load motor speed curve, for speeds of 105%, 100%, 89%, 83%, 66%, and 50% of the scheduled RPM.
  4. Nominal motor horsepower, speed at full load, frame size, enclosure construction, winding insulation class and treatment, temperature rise at nominal horsepower, service factor, voltage rating (indicate if dual voltage), number of phases, frequency rating, full-load amperes at nominal horsepower for application voltage, starting code letter, or locked rotor KVA or amperes.
- B. Installation, Operation and Maintenance Manual.

### **PART 2 - PRODUCTS**

#### **2.1 CLOSE-COUPLED CENTRIFUGAL PUMPS**

- A. Provide close coupled, end suction centrifugal pump units. All pump units shall be of one manufacturer and provided complete including electric motor drive.
  1. Each pump shall be designed for clockwise rotation viewed from driven end and include the following design features:
    - a. Casing: The pump casing shall be spiral volute type, back pull-out design with ANSI Class 150 flat faced flanged suction and discharge connections above 2½" size and shall be constructed of ASTM A48 Class 30B Cast Iron. Provide gauge tappings on the suction and discharge flanges along with volute vent and drain tappings. 2 Volute Cast Iron ASTM A48 Class 30B
    - b. Internally Epoxy Coated cast iron components to improve wear resistance.
    - c. Impeller: Impeller ASTM A743 Grade CF8 - 304 Stainless Steel; ISO G6.3 Balanced.
    - d. Shaft Sleeve: ASTM A312 Grade TP304 - 304 Stainless Steel.
    - e. Jacking bolts provide ease of volute disassembly.
    - f. Stainless Steel Volute Wear Ring.
    - g. 5 Impeller Key #304 Stainless Steel 6 Impeller Washer Steel 7 Impeller Lock Washer #304 Stainless Steel 8 Impeller Cap Screw #304 Stainless Steel 9 Volute Gasket Cellulose Fiber
    - h. NSF-50 Certified for the material health effects, corrosion resistance, performance, and disinfection efficacy for equipment used at a water park, pool or spa equipment and components.

2. Mechanical Seal:
  - a. Temperature Range: -20 to 225°F
  - b. Maximum Pressure 175 PSI
  - c. pH Limitations 7.0 - 9.0.
  - d. Elastomer: Buna
  - e. Rotating Face: Carbon
  - f. Stationary Face: Ceramic
  - g. Hardware: Stainless Steel / Brass
3. Motor: The pump drive motor shall be non-overloading of NEMA standard design JM-frame suitable for horizontal mounting and close coupled to the pump unit as described above. The motor shall be totally enclosed with fan cooled enclosure, 1.15 Service Factor; High Efficiency.
4. Testing: Each pump casing shall be hydrostatically tested by the manufacturer in accordance with Hydraulic Institute Standards at 250 PSIG. Production performance testing will be conducted by the manufacturer on each pump unit. Head at three operating points (70% of BEP, BEP and 120% of BEP) shall be measured at design speed to verify performance.

## **2.2 PUMP STRAINERS**

- A. Unless the pump has an integral hair and lint strainer, supply and install strainers equal to those manufactured by Paddock Pool Equipment Co.. Provide each strainer with two strainer baskets.
  1. Material: Type 316L stainless steel.

## **2.3 PRESSURE GAUGES**

- A. Provide compound gauges at pump and strainer inlets and where indicated. Compound gauges shall be Liquid Filled, 30 Hg to 60 PSI with gauge cock and snubber as manufactured by Weksler, Marsh, Winters or equal.

## **2.4 VARIABLE FREQUENCY DRIVE (VFD)**

- A. Invertek OPTIDRIVE; NEMA 4X enclosure.
  1. Provide factory authorized setup and programming for pool pump speed control using closed loop feedback from pool return flowmeter.

## **2.5 FLOW METERS**

- A. Pool Circulation (Return):
  1. Signet 2551 Magmeter Flow Sensor; blind version.
  2. Signet 9900 Transmitter; Field Mount.

## **PART 3 - EXECUTION**

### **3.1 PUMP INSTALLATION**

- A. The pumping units shall be installed in accordance with the instructions of the manufacturer and as shown on the drawings.

- B. Ensure that the pumps and motors are properly installed with no pipe strain transmitted to the pump casing.
- C. Installation shall include furnishing the required oil and grease for initial operation. The grades of oil and grease shall be in accordance with the manufacturer's recommendations.
- D. Mount pumps on concrete pads. Provide four (4) #4 dowels drilled into existing slab and set 3" deep in epoxy to bond pads to existing slab. Provide #4 rebar 12" on center each direction. Adjust pad height to align pump with piping. Pad dimensions shall extend a minimum of 6" beyond pump mounting bolts. Secure pumps to pads.

### **3.2 FACTORY TRAINED REPRESENTATIVE**

- A. Provide a factory-trained representative for the purpose of supervising installation, start-up, final field acceptance testing, and providing instruction to the owner's operating personnel in the proper operation and maintenance of the equipment in this section.

END OF SECTION

**SECTION 13 1134**  
**POOL VACUUM SAND FILTER**

**PART 1 - GENERAL**

**1.1 SECTION INCLUDES**

- A. Stainless Steel Vacuum Sand Filter.
- B. Filter Accessories.

**1.2 CODES & REFERENCES**

- A. All work in this division shall be according to applicable local, state and national codes and regulations.

**1.3 SUMMARY OF WORK INCLUDED**

- A. The work of this section includes, but is not necessarily limited to the following:
  1. Provide and install complete filtration equipment and pool mechanical systems, including pumps and motors.

**1.4 SUBMITTALS**

- A. Submittals Required.
  1. Product Data: Provide Manufacturer's/Installer's written installation instructions as called for throughout this section.
    - a. Complete capacity and performance data
    - b. All accessory and auxiliary equipment
    - c. All pertinent details of manufacture.
    - d. Shop drawings for equipment shall be submitted and approval of shop drawing shall be obtained before proceeding with fabrication.
  2. Shop Drawings: Submit shop drawings required by this Section.
    - a. The drawings accompanying this specification are essentially diagrammatic in nature and show the general arrangement of all equipment, piping ductwork, services, etc. Because of the small scale of the drawings, it is not possible to show all offsets, fittings and accessories that may be required. The Contractor shall carefully investigate the structural and finish conditions of all his work, and shall arrange such work accordingly, furnishing all fittings, pipe and accessories that may be required to meet such conditions. Where conditions necessitate a rearrangement, the Contractor shall obtain the Architect/Engineer's approval. Locate all valves for maximum operation accessibility.
    - b. Before commencing any work, Contractor shall submit and obtain approval of shop drawings indicating all work called for in this division.
  3. Operation and Maintenance Manuals:
    - a. Submit to the Architect/Engineer four (4) copies at substantial completion of the project.
    - b. Training – arrange for a day of training covering all systems and equipment.
    - c. Guarantees/Warranties:
    - d. Close Out Documents:

- 1) O & M Manuals.
- 2) As Built Drawings.
- 3) Owners Certification of Instruction.
- 4) Extra Materials.

## **1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver all materials and equipment to the work site in original packages fully identified, with manufacturer's label. Store off ground and protect from weather with a suitable covering.

## **1.6 WARRANTIES**

- A. General Warranty: Provide one (1) year warranty covering all pool workmanship, materials, and equipment. Refer to Division 1 of the Specifications for additional requirements.
- B. All standard manufacturer's warranties shall apply to all equipment and products provided by the Contractor.

# **PART 2 - PRODUCTS**

## **2.1 COMPAK VACUUM SAND FILTER**

- A. Filter Requirements
  1. Filter specified is a Compak Vacuum Sand Filter (VSC) as manufactured by Paddock Pool Equipment Company, Inc., of Rock Hill, South Carolina. Filtration shall be accomplished by drawing water through a permanent media bed of sand. A specially designed Vacuum Equalization System shall maintain a uniform flow through media bed to recirculation pump after which filtered water shall be returned to pool.
- B. Filter Tank
  1. Filter shall be a single chamber, open top rectangular tank, and shall contain a vacuum equalization screen, media, underdrain system, backwash trough, control piping, valves, gauges, air release system, and pump and motor to make a complete filtering unit. Filter walls shall be constructed of low carbon Type 316L stainless steel, 12 gauge or 1/8" for larger tanks in thickness, floor is 3/16". Tank interior and exterior shall be coated with a protective epoxy coating for buried installation.
  2. A 3" IPS male overflow connection and a 1½" IPS female water make-up connection shall be provided. All valve handles shall be extended so that the valves may be operated from above the blue fiber grate that covers the filter tank to serve as a platform and as a guide for the upper end of the valve handle extensions.
  3. Vacuum equalization screen shall be corrugated perforated fiberglass and sized to exact dimensions of tank. Vacuum equalization screen shall be supported by brackets welded to sides of tank. At one end, there shall be a view port to permit observation of sand during backwash.
- C. Built-In Tank Chloramine Remover
  1. Type 316L stainless steel Chloramine Evacuator System is integral with all indoor Vacuum Sand Filters. A 4" flanged connection will be connected to a TD-Mixvent 150 fan with 6" intake to exhaust from building.

**D. Variable Frequency Drive**

1. There shall be supplied a variable frequency drive (VFD) for pump control. It shall have an integral disconnect and manual bypass capability for servicing and manual operation. It shall incorporate a flow meter for control signal for VFD set points.

**E. Filter Media**

1. Filter media shall be carefully selected grade of silica sand. Depth of media bed shall be 18 inches. Sand shall be free from clay or limestone deposits. Hydrochloric acid and solubility shall not exceed 1%, iron content 0.1%.
2. Sand shall have a particle size between .45mm and .55mm with a uniformity coefficient of 1.6 maximum. Sand shall be supported on a layer of 1/16" to 1/8" gravel. Four (4) inches of gravel shall be placed in bottom of tank for support of underdrain laterals. Media shall be supplied in separate bags, each containing approximately 1 cubic foot.

**F. Underdrain System**

1. Filter chamber shall be supplied with a pressure equalizing underdrain system consisting of a central header tapped for 2" laterals. Laterals shall be molded, slotted with orifice slots on .1985" centers, extending around 1/2 perimeter of lateral. Loss in underdrain system from entrance slots to flange at suction header shall not exceed 0.5 inches Hg.
2. Slot area shall be covered with a Type 316L, 30 mesh, 13 gauge stainless steel screen with a 40.8% open area.

**G. Air Release System**

1. There shall be provided one automatic air release system so that at regular intervals, air removed from water due to negative pressure in filter system can be released upwards to atmosphere. A manually reset vacuum limit controller shall be provided as an integral part of the system. Air release and vacuum limit system requires a 115-volt, 60 cycle, and 10-amp supply circuit. Connections to 115 volt electrically held contractor in coil of recirculation pump and motor starter or VFD, circuit power and electrical conduits by Electrical Contractor.

**H. Face Piping**

1. Filter manufacturer shall supply all integral piping required in the filter tank to carry out all normal functions of the filter. Filter tank will have exterior flanges or thread connections for main drains, perimeter overflows, return to pool, backwash to waste, tank drain, and tank overflow.

**I. Valves**

1. Filter manufacturer shall supply following valves: (1) main drain float valve, (1a) minimum operating level set valve, (2) suction valve, (3) return to pool valve, (4) backwash suction, (5) backwash to waste, (6) underdrain control valve (7) perimeter overflow outlet, and (8) backwash influent. All valves shall be nylon coated cast iron bodied wafer type butterfly valves with Type 316 stainless steel shaft and nylon coated disc. The valve operators shall be extended above and be guided by the fiberglass grating. Six-inch and eight-inch valves shall be lever operated. Valves 10"

and larger shall be gear operated. When 8" and 10"-12" are used on same filter, all valves will be gear operated.

J. Gauges

1. Filter air release system shall be supplied with a vacuum and pressure gauge mounted on a common gauge holder.

K. Backwash Control

1. Filter backwash initiation shall be indicated by a vacuum limit switch. When a preset vacuum is reached, pump shall shutdown, indicating filter requires cleaning. After a two to four minute up-flow through the media, filter may be returned to filter mode. Backwash shall be initiated by manually adjusting individual valves per operating instructions. Pump will not restart until vacuum limit switch is manually reset.

L. Backwash System

1. All backwash water shall transfer by hydraulic gradient from pool through sand to backwash chamber and then pumped out of tank to waste. Backwash line shall be brought to filter tank by Pool Contractor. At disposal point into the sewer or storm drain, Pool Contractor shall provide a suitable air gap.

M. Air Scour Backwash

1. Air scour is independent air distribution grid. Air scour will scrub media prior to backwash rinse. Air scour cleansing shall be at an air pressure of minimum 1 psi (gauge) and an air volume minimum of 2 s.c.f.m. per square foot of filter area. A rotary blower, as shown on plans shall be supplied. Starter, circuit power and electrical connections shall be supplied by the electrical contractor. Piping system shall be designed to allow for isolation of tank to permit air scour cleansing prior to water flush. After air scour, dirt shall be flushed from media to waste at a flow rate of 7.5 GPM per square foot of filter area.

N. Pump and Motor

1. There shall be supplied a single centrifugal pump directly connected to a TEFC premium efficiency electric motor and mounted within filter tank. Pump characteristics and performance data shall be as shown on the plans.
2. On outdoor installations the pump and motor shall be covered by a vented fiberglass enclosure.

O. Effluent Quality

1. Filter shall be capable of producing an effluent with a turbidity not to exceed 0.5 FTU measured with a Hach Model 1120A Turbidity Meter.

P. Engineering Services

1. A qualified representative of the Contractor or manufacturer shall visit work site after installation of filter has been completed and shall put filter into operation and shall assist and instruct Owner's representative(s) in operation of filter.

Q. Warranty

1. Filter manufacturer shall guarantee in writing that this filter, if operated in accordance with written instructions given and accepted by Owner, will perform in complete

accord with specifications. Contractor shall supply complete drawings and printed instructions for installation and operation of all equipment specified herein and shown on Drawings.

R. Filter Performance Data:

- |                    |                              |
|--------------------|------------------------------|
| 1. Model           | 9794-1545                    |
| 2. Number of Tanks | 1                            |
| 3. Dimensions      | 91" x 94" x 8'               |
| 4. Area            | 45 ft <sup>2</sup>           |
| 5. Flow Rate       | 675 GPM                      |
| 6. Filtration Rate | 15 GPM/ft <sup>2</sup>       |
| 7. Backwash Rate   | 337 @7.5 GPM/ft <sup>2</sup> |

**PART 3 - EXECUTION**

**3.1 GENERAL REQUIREMENTS**

- A. All systems and subsystems shall be installed in accordance with that systems manufacturer's recommendations and instructions.
  1. In the event of a discrepancy between these specifications and the manufacturer's recommendations, price the most stringent approach for the purpose of bidding but call the issue to the attention of the construction manager in the form of a Request for Information and wait for an answer.
  2. Provide all accessories and supplemental equipment necessary to provide a complete working installation of all materials, equipment and systems specified or shown on drawings, as part of the base bid.
- B. Bond all materials, equipment and systems as required by local codes and the most recent version of the National Electric Code.

END OF SECTION

**SECTION 13 1142**  
**POOL EQUIPMENT**

**PART 1 - GENERAL**

**1.1 SUMMARY OF WORK INCLUDED**

- A. The work of this section includes, but is not necessarily limited to the following:
  - 1. Perimeter overflow and recirculation system.
  - 2. Recirculation fittings.

**1.2 SUBMITTALS**

- A. Submittals Required.
  - 1. Product Data:
    - a. Main Drains and outlet fittings.
  - 2. Shop Drawings:
    - a. Perimeter overflow and recirculation system.
  - 3. Guarantees/Warranties:
  - 4. Close Out Documents:
    - a. O & M Manuals.
    - b. As Built Drawings.
    - c. Owners Certification of Instruction.

**1.3 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver all materials and equipment to the work site in original packages fully identified, with manufacturer's label. Store off ground and protect from weather with a suitable covering.

**PART 2 - PRODUCTS**

**2.1 PERIMETER OVERFLOW AND RECIRCULATION**

- A. Perimeter Overflow and Recirculation System: A factory fabricated radial curved perimeter overflow system consisting of a PVC covered stainless steel overflow channel and integral filtered water supply channel according to the details shown on the project drawings shall be supplied around the entire perimeter of the pool. The system shall conform exactly to the pool walls, matching the design radius requirements continuously around the perimeter. Field fabricated sections, or mitered straight sections, shall not be acceptable. The system shall be the R300TG Perimeter as manufactured by Paddock Pool Equipment Co., Inc., of Rock Hill, South Carolina, US Patent #D515,183
- B. Anchorage: The entire perimeter overflow system section shall be anchored to the pool structure with commercial quality threaded stainless steel rods (or U-bars, if shown on the drawings) installed as shown on the plans and fastened to the pool reinforcing steel, thus forming a continuous perimeter section. These anchors shall be placed at the corners and on a maximum of 4-foot centers around the pool.

- C. Filtered Water Supply Channel: The filtered water return tube shall be fitted with variable sized nylon jet inlet nozzles sized for the flow requirements of the pool. Inlets shall be spaced not more than 36" on center around the entire pool perimeter except where expressly deleted. These inlet jets shall be installed so as to provide a stream of filtered chlorinated water on a fixed 45° angle directed toward the bottom of the pool. The filtered water supply conduit shall be machine welded using the TIG process by the manufacturer in his plant and pressure tested prior to shipment. Field welded pressure conduits shall not be acceptable.
- D. Overflow Channel: The main overflow channel shall be fitted with jet flow nozzles to provide a constant stream of filtered chlorinated water in the channel to prevent any stagnation or build-up of dirt, as shown on the plans. All areas of the gutter shall be accessible for inspection and cleaning. The overflow channel shall be covered by a protective grating formed of extruded PVC sections comprised of 5/8" wide, 1" deep extruded I-beam ribs placed perpendicular to the pool perimeter for maximum efficiency in quelling waves. The top shall be serrated to create a non-skid surface. The open area of the grating shall not be less than 32%. The grating shall be white unless otherwise specified on the plans.
- E. Surge Weirs: Surge control weirs shall be installed in the perimeter overflow system as shown on the drawings. They shall be located to provide a surface cleaning action when the water level is below the perimeter overflow system lip during periods of non-use. The weir gate shall close automatically as the water level in the pool rises, thus allowing the pool to be operated at rim level for competition without flooding the overflow channel. The system specified provides for automatic closing of surge weirs for rim flow operation without raising the water level in the perimeter channel, thus providing minimum perimeter surge containment of approximately 5 gallons per foot of perimeter to prevent momentary surcharging of the perimeter overflow system channel and to provide capacity for wave entrapment and quelling during competition. *The surge control weirs shall be responsive only to changes in water level within the pool.* Weirs responsive only to changes in water level in the perimeter overflow channel shall not be acceptable. The flow through each weir shall be designed to be 50 GPM. The system specified provides "in-pool" surge capacity of one gallon per square foot of pool surface area and quiescent surface cleaning in a manner which permits water displaced by bathers and their dynamic surge to remain within the pool structure.
- F. Materials: The perimeter sections shall be fabricated entirely from Type 316L stainless steel with a finish similar or equal to a #3 polished (100 mesh abrasive) finish. The 1 1/2" X 3/16" angle anchors and all stiffener brackets shall be stainless steel.
- G. Accessories: The perimeter system shall be fitted with stainless steel converters, jet wash fittings, surge weirs, and lane line anchors as necessary to achieve proper performance and design. Quantities, locations, and descriptions shall be as shown on the plans.
- H. Guarantee: The equipment manufacturer shall guarantee in writing that if the system is operated in accordance with written instructions given and accepted by the Owner, it will perform in complete accord with the specifications.

## **2.2 RECIRCULATION FITTINGS**

- A. Main drains shall be 12-gauge 316L stainless steel as sized on the drawings. Grate openings shall not exceed 11/32 inch with a maximum velocity of 1.5 fps through open area. Grate shall be 316L stainless steel fit closely and flush with top surface of frame and secured to frame with vandal resistant fasteners. Exposed edges of main outlets shall be rounded and smooth, free of burrs and sharp edges. Main drain covers shall comply with the Virginia Graeme Baker Act and ANSI/APSP-16 2017.
  - 1. Provide hydrostatic relief valves consisting of a 2" cycolac relief valve connected to an FPT commercial style Schedule 80 PVC collector tube. The collection tube must have seepage holes, 3/8 inch in diameter, and must be screwed securely to the valve body. The hydrostatic

relief valve must be designed to seal with minimum pressure and must have a non-plugging, self-cleaning raised valve seat. Hydrostatic relief valve shall be Hayward SP1056 with collector tube model SP1055 or approved equal.

B. ADJUSTABLE FLOOR INLET FITTINGS

1. ABS plastic body and adjusting top plate with a positive locking device. A spanner wrench shall be provided to facility flow adjustment. The inlet body shall include a 2-inch cyclac solvent weld connection and internal NPT threads to facilitate line pressure testing. Floor inlet fitting shall be Sta-Rite #8417-0000-Wite or approved equal.

**PART 3 - EXECUTION**

**3.1 GENERAL REQUIREMENTS**

- A. Verify that existing conditions meet the requirements for the installation of equipment specified in this section.
  1. Start of work signifies that the Contractor accepts existing conditions, substrates and working conditions and will be fully responsible for warranting their own work as required herein.
  2. Do not begin work if existing conditions cannot provide durable base for an acceptable permanent installation. Inform construction manager immediately of any defects requiring correction, in writing, and wait for remedy or instructions on how to proceed, before beginning work.
- B. All systems and subsystems shall be installed in accordance with that systems manufacturer's recommendations and instructions.
  1. In the event of a discrepancy between these specifications and the manufacturer's recommendations, price the most stringent approach for the purpose of bidding but call the issue to the attention of the construction manager in the form of a Request for Information and wait for an answer.
  2. Provide all accessories and supplemental equipment necessary to provide a complete working installation of all materials, equipment and systems specified or shown on drawings, as part of the base bid.

**3.2 PERIMETER OVERFLOW SYSTEM INSTALLATION**

- A. Work shall be performed by an authorized licensee of the manufacturer or by the manufacturer acting as a subcontractor to the Pool Contractor. All installation is to be performed by a welder with at least five years' experience in the field welding stainless steel recirculating systems. Strict procedures for welding, brushing, blending, testing, and cleaning shall be provided by the manufacturer. The pool contractor shall perform all required grouting and caulking as shown on the plans.
- B. Engineering Services: The pool contractor shall supply the services of a competent and experienced field engineer to test and inspect the completed installation, place it in operation, and give operating instructions relative to its care and use.
- C. Bond all materials, equipment and systems as required by local codes and the most recent version of the National Electric Code.

END OF SECTION 131142

**SECTION 13 1144**  
**POOL WATER TREATMENT EQUIPMENT**

**PART 1 - GENERAL**

**1.1 SECTION INCLUDES**

- A. Calcium Hypochlorite Tablet Chlorination System.
- B. pH Adjustment System.
- C. Water Chemistry Controller

**1.2 CODES & REFERENCES**

- A. All work shall conform to applicable local, state and national codes and regulations.
- B. Referenced Standards:
  1. Chapter 1 – State Sanitary Code Subpart 6-1 Swimming Pools.
  2. State and County health department regulations.
  3. National Electrical Code (NEC).
  4. National Sanitation Foundation (NSF) Seal of Approval program.
  5. American Society for Testing and Materials (ASTM).

**1.3 SUBMITTALS**

- A. Shop Drawings: Show fabrication and connection details.
- B. Provide standard catalogue sheets and installation instructions for each item specified.
- C. Contract Closeout Submittals:
  1. Installation and Maintenance instructions.

**1.4 DELIVERY, STORAGE AND HANDLING**

- A. All materials required for the completion of this project shall be delivered to the project site in a manner designed to prevent damage. No hooks or forks shall be used for unloading. The contractor shall perform or direct the unloading of all materials. Materials shall be stored in a flat, dry area in a manner that will not damage them. All materials provided are to be new and in unopened packaging.

**PART 2 - PRODUCTS**

**2.1 CALCIUM HYPOCHLORITE TABLET CHLORINATION SYSTEM**

- A. General Description.
  1. The system shall be designed to feed low concentrations of calcium hypochlorite in solution intermittently or continuously as required for pool and spa applications. The system shall be a single pre-assembled, package unit with a welded aluminum frame consisting of chlorinator,

electrical box, centrifugal pump, and balance tank for ease of installation and operation. The system shall be the Power Base Model 1030 by Axiall Corporation. Only Accu-Tab® Blue SI calcium hypochlorite tablets by Axiall Corporation shall be used, with the patented solution modifier and the patented blue colorant added for safety (to help prevent accidental mixing with other chemicals).

2. The base proposal requires furnishing equipment as specified herein, though substitutions will be considered. The bidder is cautioned that substitutions must meet the quality and operational requirements of each feature specified in Section 1.02 below. Batch systems with pressure mixing components producing chlorine concentrations exceeding the limits of the specifications will not be considered.
3. Any system offered shall use an NSF Standard 50 listed erosion feeder and tablet combination and shall be capable of meeting all requirements of the Health Department having jurisdiction over the installation.

B. System Features.

1. A maximum chlorine solution level of 0.1% (1000 ppm) shall be maintained to prevent calcification in system components. Systems producing chlorine concentrations higher than 0.1% shall not be acceptable.
2. Delivery shall be by erosion feed technology to control accurate and consistent concentration limits in the chlorine treatment solution. Soaking type, spray and/or vortex technology systems shall not be acceptable.
3. The chlorinator shall automatically and continuously feed a limited quantity of chlorine in solution as needed; when the system is not running, no more chlorine than that amount which can be fed in one minute or less shall be left in the tank to prevent dilution. Batch systems preparing excess quantities of solution for delivery over an extended period shall not be acceptable.
4. centrifugal pump wired to the system electrical box shall feed freshly mixed chlorine treatment solution only as required for maximum efficiency. Batch systems requiring the use of a metering pump or pumps to feed pre-prepared standing solution shall not be acceptable.
5. All piping in the chlorinator unit shall be Schedule 40 PVC. Systems with flexible tubing shall not be acceptable.

C. System Components.

1. Tablet Chlorinator. Accu-Tab® chlorinators by Axiall Corporation are designed exclusively for Accu-Tab® Blue SI calcium hypochlorite tablets by Axiall Corporation. Tablets are placed on a sieve plate inside the chlorinator; as water flows across the sieve plate, the tablets erode at a rate proportional to the flow rate.
2. Inlet Water Supply Connection.
3. Model 1030 1" Socket (water supply of 10 GPM required)
4. Flow Meter. A rotameter (flow-through) flow meter, measuring the flow of the water-dissolving stream to the chlorinator.
5. Solution Tank. Made of PVC. Capacity: 7 gallons
6. Primary Solution Tank Level Control. Made from Schedule 80 PVC and 316L stainless steel, this 3/4" float valve meters the flow through the chlorination system. The float valve opens or closes to maintain the pump rate as it is manually throttled.
7. Solution Delivery Pump. Delivers chlorinated solution to the return line. A single-stage centrifugal pump is provided for systems with pressures up to 20 PSIG.

8. Solution Injection Pump Air Bleed. Used to prime the pump at start-up, or at any time, if necessary.
  9. Overflow Protection. Two level switches in the upper portion of the solution tank will run the pump from high to lower level to prevent system overflow.
  10. Primary Backflow Prevention. A PVC check valve prevents reverse flow of water into the system.
  11. Discharge Flow Control Valve (manual). PVC gate valve allows operator to adjust flow of solution to the pool system.
  12. Outlet Connection.
  13. Model 1030 1" socket
  14. Nema 4X Electrical Enclosure.
  15. Aluminum Frame, Type 6061-T.
- D. Optional Equipment.
1. Inlet pressure Regulator. Required if inlet pressure exceeds 15 psi.
  2. Larger Pump. On systems requiring unit discharge pressures greater than 20 PSIG.
  3. Inlet Booster Pump. A pump and electrical box mounted on a small aluminum frame for use when the inlet pressure is too low to feed the required amount of water.
  4. Overflow Protection Alarm Light. A red light on the electrical box will illuminate when Over Flow Protection is initiated. The light remains illuminated until reset.
  5. High-High Level Pump Switch (HHL Pump Switch). An additional level switch is installed that will run the pump for a field settable time to pump the level down in the solution tank. This will also provide low level protection for the pump.

E. Electrical Requirements.

1. Two electrical circuits are required for operation: (1) 110v 15- amp power, and (1) 110v control circuit from a pool controller.

F. Warranty.

1. The manufacturer shall guarantee in writing that this unit, if operated in accordance with written instructions given and accepted by the Owner, will perform in complete accord with the specifications. All components will be warranted against manufacturers' defects for twelve (12) months from its original installation date.

## 2.2 PH ADJUSTMENT SYSTEM

A. General Description.

1. The system shall be designed to erode Acid-Rite tablets, creating an acid solution, and feeding the solution intermittently or continuously as required for pool applications. The system shall be a single pre-assembled, package unit with a welded aluminum frame consisting of a feeder/balance tank combination, electrical box, and centrifugal pump for ease of installation and operation. The system shall be the Acid-Rite® 450 Feeder pH adjusting system by Axiall, a Westlake Company. Only Acid-Rite Tablets by Axiall shall be used with a red colorant added for safety (to help prevent accidental mixing with other chemicals).
2. The base proposal requires furnishing equipment as specified herein, though substitutions will be considered. The bidder is cautioned that substitutions must meet the quality and operational requirements of each feature specified.

3. Any system offered shall use an NSF Standard 50 listed erosion feeder and tablet combination and shall be capable of meeting all requirements of the Health Department having jurisdiction over the installation.

B. System Features.

1. Delivery shall be by erosion feed technology for accurate control of acid addition. Soaking type, spray and/or vortex technology systems shall not be acceptable.
2. The acid feed system shall automatically and continuously feed a limited quantity of acid solution as needed. When the system is not running, no more acid solution than that amount which can be fed in 2 minutes or less shall be left in the tank to prevent dilution. Batch systems preparing excess quantities of solution for delivery over an extended period shall not be acceptable.
3. A centrifugal pump wired to the system electrical box shall feed freshly mixed acid solution only as required for maximum efficiency. Batch systems requiring the use of a metering pump or pumps to feed pre-prepared standing solution shall not be acceptable.
4. All piping in the acid feed system shall be Schedule 40 PVC. Systems with flexible tubing shall not be acceptable.

C. System Components.

1. Acid Feeder. Acid-Rite feeders by Axiall are designed exclusively for Acid-Rite tablets by Axiall. Tablets are placed on a plate inside the feeder; as water flows across the plate, the tablets erode at a rate proportional to the flow rate.
2. The lid color shall be red, matching the pail lid color to avoid mixing chemicals.
3. Inlet Filter. A filter is included to prevent debris from entering the float valve.
4. Inlet Water Supply Connection. 1" Socket (water supply of 10 GPM required)
5. Solution Tank. PVC, Integral with feeder. Capacity: 6 gallons
6. Primary Solution Tank Level Control. Made from Schedule 80 PVC and 316L stainless steel, this  $\frac{3}{4}$ " float valve meters the flow through the feed system. The float valve opens or closes to maintain the pump rate as it is manually throttled.
7. Solution Delivery Pump. Delivers acid solution to the aquatic system return line. A single-stage centrifugal pump is provided for systems with pressures up to 20 PSIG.
8. Solution Injection Pump Air Bleed. Used to prime the pump at start-up, or at any time, if necessary.
9. Flow Meter. A flow meter, measuring the flow of the water-dissolving stream through the feed system.
10. Primary Backflow Prevention. A PVC check valve prevents reverse flow of water into the system.
11. Discharge Flow Control Valve (manual). PVC gate valve allows operator to adjust flow of solution to the pool system.
12. Overflow port. A 1" FPT port is located on the back side of the feeder solution tank. Can be plumbed to drain as desired.
13. Stacking Cartridge. A stacking cartridge is included that allows 1-7 stacks of tablets to permit control of lower delivery rates.
14. Outlet Connection. 1" Socket
15. Nema 4X Electrical Enclosure.
16. Aluminum Frame, Type 6061-T.

- D. Optional Equipment.
  - 1. None
- E. Electrical Requirements.
  - 1. Two electrical circuits are required for operation: (1) 110v 20 amp power, and (1) 110v control circuit from a pool controller.
- F. Warranty.
  - 1. The manufacturer shall guarantee in writing that this unit, if operated in accordance with written instructions given and accepted by the Owner, will perform in complete accord with the specifications. All components will be warranted against manufacturers' defects for twelve (12) months from its original installation date.

### **2.3 WATER CHEMISTRY CONTROLLER**

- A. The controller shall continuously monitor water chemistry (ORP, PPM, and pH), Langelier Saturation Index, and temperature. It shall automatically control the chemical feed system, heater, and main recirculation pump. The controller shall include a programmable microprocessor with an eight-line display screen and a 16-key keyboard for operator access. The controller specified is a Chemtrol PC 2100 system as supplied by Santa Barbara Controls.
- B. Display features shall include: eight-line, twenty-two-character LCD display; full page menus; numeric keypad; English, French, and Spanish language options; U.S. and metric unit options. The controller shall be contained in one NEMA Type 3 lockable fiberglass cabinet. Multiple cabinets shall not be permitted.
- C. Control features include: ORP control; shock program; chemical saver program; pH control; PPM control; temperature control; energy saver program; saturation index; influent/effluent pressures; electronic flowmeter; recirculation pump; water level control; instrumented bypass line; probe rinse program; dynamic analysis probe failure alarm.
- D. Data and Communications features shall include in-board data logging; RS-232 connector; local data download; data/voice modem; remote operation; graphic data display.

## **PART 3 - EXECUTION**

### **3.1 GENERAL REQUIREMENTS**

- A. All systems and subsystems shall be installed in accordance with that systems manufacturer's recommendations and instructions.
  - 1. Provide all accessories and supplemental equipment necessary to provide a complete working installation.

### **3.2 START-UP AND TRAINING**

- A. A qualified factory trained representative of the manufacturer shall install this equipment, put it into operation and instruct the owner's representative in the operation and maintenance of all such equipment.

END OF SECTION

**SECTION 13 1145**  
**ULTRAVIOLET DISINFECTION EQUIPMENT**

**PART 1 - GENERAL**

**1.1 SUMMARY OF WORK INCLUDED**

- A. Medium pressure ultraviolet disinfection equipment including UV chamber, control panel, installation, training, and accessories.

**1.2 CODES & REFERENCES**

- A. All work in this division shall be according to applicable local, state and national codes and regulations.

**1.3 SUBMITTALS**

- A. Submittals:
  1. Product Data: Provide Manufacturer's/Installer's written installation instructions as called for throughout this section.
    - a. Complete capacity and performance data
    - b. All accessory and auxiliary equipment
    - c. All pertinent details of manufacture.

**1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver all materials and equipment to the work site in original packages fully identified, with manufacturer's label. Store off ground and protect from weather with a suitable covering.

**1.5 WARRANTIES**

- A. General Warranty: Provide one (1) year warranty covering all pool workmanship, materials, and equipment. Refer to Division 1 of the Specifications for additional requirements.
- B. All standard manufacturer's warranties shall apply to all equipment and products provided by the Contractor.

**PART 2 - PRODUCTS**

**2.1 ULTRAVIOLET DECHLORINATION AND DISINFECTION SYSTEM:**

- A. It is the intent of these specifications that the swimming pool water be routinely monitored and treated by UV sterilization in the range of 220nm to 400nm to kill bacteria, viruses, molds and their spores and to continuously remove chloramines. The concentration of free chlorine residual shall at all times meet the requirements of the Health Department authority having jurisdiction over the swimming pool.
- B. The bidder is cautioned that any substitution must meet the quality and operational requirements of these specifications. Any proposed UV system must have a UL listing on the complete system

and be listed under NSF Standard 50. Any substitute system shall have Health Department approval for this project prior to being offered.

- C. Equipment General Description: The UV System shall be a complete unit with all necessary controls. The control panel and UV chamber shall be capable of being installed up to 200 feet apart. The system shall be preassembled, and controls packaged for ease of installation at the job site and shall include:
1. the UV chamber with flow and output safety control;
  2. a UV medium pressure arc tube modified to emit UV light from 220nm to 400nm;
  3. an automatic, adjustable, electric motor-driven quartz sleeve cleaning system;
  4. operational and power controls.
  5. the ability to dose control the UV delivered to the pool water.
- D. UV Chamber: The UV chamber shall be pressure rated for continuous operation at 150psi tested to 225psi and constructed of type 316L stainless steel. It shall be designed for an internal pressure drop not to exceed 2psi at maximum flow. The chamber shall incorporate:
1. temperature sensor to shut off the UV arc tube when there is inadequate flow in the chamber;
  2. UV intensity monitor which alarms when the UV arc tube output drops below the dosing level required for proper operation. The monitor shall be of the wet probe type wavelength specific to 240nm - 280nm with a 4-20mA output. It shall display actual lamp intensity (mW/cm<sup>2</sup>) on the control cabinet door display. (NOTE: Relative type UV monitors shall not be acceptable.) Dry probe monitors shall not be acceptable, as this type cannot be wiped during the automatic wiping action. Direct line of site monitors (ie those types that have the sensor directly exposed to UV light) shall not be permitted. The monitor shall use offset filters to extend monitor life and to ensure only a limited band of wavelengths is measured.
  3. stainless-steel terminal cover fastened to the chamber end plate, to which is affixed the electrical conduit, to protect the lamps and electrical leads. NOTE: plastic terminal covers/caps shall not be permitted.)
  4. design for laminar flow to provide maximum efficiency in the transfer of UV to the water. (NOTE: baffle plates or similar devices create turbulent flow and dead spots which reduce the efficiency of UV transfer into the water and are therefore not permitted.)
  5. Limit switches shall be located to position the wiper, and to prevent the wiper parking over the active arc tube. The switches shall be magnetic type and shall include visual indication of the wiper position. The wiper mechanism shall be fail-safe, and shall shut the system down in the event of failure, as described below.
  6. The chamber shall contain a quartz sleeve, which is sealed at both ends by a UV shrouded O ring. The quartz must be annealed for durability and against breakage. Systems that contain a quartz thimble shall not be permitted. The thimble is inherently buoyant and poses a safety risk to operators during annual maintenance.
  7. The wetter surfaces shall be chemically passivated and all welds ground to eliminate any potential corrosion mechanisms. Crevices (as found behind a quartz thimble) shall not be permitted under any circumstance.
  8. Automatic Wiper System: For periodic cleaning of the quartz sleeves and the UV monitor probe, the chamber shall be fitted with an automatic cleaning mechanism.
  9. It shall consist of a single SS yoke with Teflon bosses and replaceable molded viton wiper rings which travel the full length of the quartz sleeve twice per cleaning cycle.
  10. The frequency of the wiper cycle shall be adjustable from 15 to 720 minutes and set for job conditions.

11. The mechanism shall be driven by a two-pole bi-directional electric motor and acme lead screw.
  12. Reed type limit switches shall control the length of travel.
  13. The wiper mechanism wiper rings in the "parked" position shall not be over the lamp, blocking the transfer of UV light, or creating a "hot" spot on the arc tube.
  14. Ultraviolet Lamp: The UV lamp shall be a high intensity, medium-pressure UV arc tube modified to emit a continuous UV spectrum from 220nm to 400nm into the water.
  15. Full output must be available from 0 to 200 degrees.
  16. The lamp shall be UL approved with one electrical lead at each end.
  17. Lamps with metal frames shall not be permitted.
  18. Each lamp shall be individually numbered, and the manufacturing process shall permit full audit and traceability of assembly. In addition to an individual serial number, the part number shall be displayed on the lamp.
- E. UV System Control: The system control cabinet shall be epoxy coated steel, NEMA 12, fan cooled with louvers and replaceable filters.
1. The control system shall be de-energized when the cabinet door(s) are open.
  2. All wiring shall be harnessed in DIN channels. The power supply to the UV arc tubes shall be from a constant wattage transformer.
  3. The entire system shall be UL listed and there shall be a decal clearly showing this listing displayed in the cabinet.
  4. The control cabinet shall display via a back lit liquid-plasma display the following information:
    - a. Power on
    - b. UV intensity (% and mW/cm<sup>2</sup>)
    - c. UV dose (mJ/cm<sup>2</sup>)
    - d. Flow rate in GPM
    - e. Arc tube ready indicator
    - f. Any alarm condition
    - g. Wiper status and alarm
  5. Consumable spare parts list with part numbers
  6. Local/remote operation switch, door mounted
  7. Data logging of UV dose, lamp hours, lamp intensity for regulatory audit.
  8. The control panel shall contain an Earth Leakage detector, which shall provide fail-safe protection for bathers and those working on the equipment within the pool environment.
  9. The control panel shall be UL LISTED, and in addition shall conform to EN 50081 and EN 61000.
  10. The panel and all UV components shall be manufactured to ISO 9001-2000.

## **PART 3 - EXECUTION**

### **3.1 GENERAL REQUIREMENTS**

- A. All systems and subsystems shall be installed in accordance with that systems manufacturer's recommendations and instructions.
  - 1. In the event of a discrepancy between these specifications and the manufacturer's recommendations, price the most stringent approach for the purpose of bidding but call the issue to the attention of the construction manager in the form of a Request for Information and wait for an answer.
  - 2. Provide all accessories and supplemental equipment necessary to provide a complete working installation of all materials, equipment and systems specified or shown on drawings, as part of the base bid.
- B. Bond all materials, equipment and systems as required by local codes and the most recent version of the National Electric Code.

**END OF SECTION**

**SECTION 13 1160**  
**POOL DECK & SAFETY EQUIPMENT**

**PART 1 - GENERAL**

**1.1 SECTION INCLUDES**

- A. DECK EQUIPMENT
  - 1. Grab rails.
  - 2. Recessed steps.
  - 3. Handrails.
  - 4. Pool Lift
  - 5. Depth markers.
- B. RACING EQUIPMENT
  - 1. Starting platforms.
  - 2. Racing lane lines.
  - 3. Backstroke marker post.
  - 4. Backstroke pennant lines.
  - 5. Racing lane lines.
- C. SAFETY EQUIPMENT
  - 1. Lifeguard Chairs
  - 2. Ring Buoys.
  - 3. Life Hooks.
  - 4. Life Safety Line.
  - 5. Spineboard.
  - 6. First Aid Kit.
  - 7. Rescue Tubes.

**1.2 CODES & REFERENCES**

- A. All work shall conform to applicable local, state and national codes and regulations.
- B. Referenced Standards:
  - 1. Chapter 1 – State Sanitary Code Subpart 6-1 Swimming Pools.
  - 2. State and County health department regulations.
  - 3. National Electrical Code (NEC).
  - 4. National Sanitation Foundation (NSF) Seal of Approval program.
  - 5. American Society for Testing and Materials (ASTM).

### **1.3 SUBMITTALS**

- A. Shop Drawings: Show fabrication and connection details.
- B. Provide standard catalogue sheets and installation instructions for each item specified.
- C. Contract Closeout Submittals:
  1. Installation and Maintenance instructions.

### **1.4 DELIVERY, STORAGE AND HANDLING**

- A. All materials required for the completion of this project shall be delivered to the project site in a manner designed to prevent damage. No hooks or forks shall be used for unloading. The contractor shall perform or direct the unloading of all materials. Materials shall be stored in a flat, dry area in a manner that will not damage them. All materials provided are to be new and in unopened packaging.

## **PART 2 - PRODUCTS**

### **2.1 DECK EQUIPMENT**

- A. PRETZEL BEND GRAB RAILS
  1. The grab rails shall be fabricated from 1.90" OD x .083" wall, Type 316 stainless steel tubing. Top of rails to be 33" above deck. Exposed surfaces shall be polished to a 320-grit finish. Paddock No. 4497 or equal, 8 pairs required, Paddock No., 32 or equal deck anchors with Paddock No. 4837 or equal escutcheons shall be supplied, 32 required.
- B. RECESSED STEPS
  1. The recessed steps shall be fabricated from 14-gauge, Type 316 stainless steel. All exposed welds shall be ground, and all exposed surfaces shall be polished to a 320-grit finish. A non-skid tread shall be installed in the foot contact area on the lower surface. Paddock No. 4501-3, 26 required.
- C. STAINLESS STEEL HANDRAILS
  1. Stair handrails shall be of stainless-steel construction and furnished with bronze wedge anchors and stainless steel escutcheons. Handrails shall have an outside diameter of 1.90" and a wall thickness of .083". Handrails shall be constructed of 316L stainless-steel polished to a 320 grit finish.
- D. POOL LIFT
  1. ADA Compliant, UL Certified by Aqua Creek Products "The Mighty 400" or approved equal.
    - a. 400 lb. capacity.
    - b. 360 degree rotation.
    - c. Flip up armrests.
    - d. All stainless-steel construction.
    - e. Powder coat finish.
    - f. Cover.
    - g. Charger and spare battery.
    - h. Five year pro-rated electronics warranty.
    - i. Five year structural warranty.

## **2.2 RACING EQUIPMENT**

- A. STARTING PLATFORMS**
  - 1. Each platform shall be designed to be quickly and easily removable.
  - 2. The platforms shall be side mounted and have a 24" wide X 32" long stainless- steel top. Placement of the side mounting step shall be opposite from the diving boards.
  - 3. A backstroke starting bar shall be flush with the front edge of the platform and there shall also be two vertical backstroke grips made of stainless steel positioned 15" on center.
  - 4. Lane number will be visible from all four sides of the platform.
  - 5. Side rails made from 1" O.D. stainless-steel tube welded to a 1/8" stainless steel plate shall be on the top of the starting platform.
  - 6. Mounted to the side rails there shall be a removable "wedge" made of 12 gauge, stainless-steel with a 45-degree incline on the surface facing forward toward the pool. The front surface shall have a non-slip surface. The wedge will use spring loaded plunger pins to lock securely into place. A single mechanism will be used to retract both pins simultaneously with one hand for ease of adjustment. Wedge shall slide uninhibited along guide rails on sides of the platform
  - 7. The top of the platform shall be made of a non-slip solid surface.
  - 8. Options, such as colors and custom logos shall be available and selected by the Architect/Owner.
- B. BACKSTROKE MARKER POST**
  - 1. The Backstroke Marker Post shall be fabricated from low carbon, Type 316 stainless steel with a .065" wall thickness. The post shall have a No. 3 or equal finish. The top shall be closed with an eye formed over the capped end. The eye shall be fabricated from 1/4" stainless steel rod. There shall be a rope cleat provided 2'6" from the top. The post shall be supplied with a stanchion anchor with removable cap. Lengths as shown on the drawings.
  - 2. Provide an eyebolt at the top and a cleat for securing rope.
  - 3. Provide a stainless-steel slip-in cap to cover the anchor when the posts are removed.
- C. BACKSTROKE PENNANT LINE**
  - 1. Backstroke Pennant Lines shall be nylon with triangular pennants alternating in color, Owner selected. The pennant line shall be 100' in length, 48 pennants per line.
- D. RACING LANE LINES**
  - 1. Racing Lane Lines shall consist of individual float segments measuring 4 1/4" in diameter by 1 15/16" wide, butted end to end on a 5/32" clear, vinyl, plastic covered aircraft type stainless steel cable to form a continuous line. Each float shall be injection molded of ultra violet stabilized polyethylene with 4 Turbo-Reactive Vanes integrally molded on each side of central diaphragm at a right angle to the center cable sleeve; and with a peripheral ring 3/4" wide joining the central diaphragm to the Turbo-Reactive Vanes. The Vanes shall be curved into the peripheral ring to catch and absorb the energy in the wave as it strikes the Vane. Each float segment itself shall be buoyant and shall rotate freely about the cable. Lines shall be assembled at the poll site to insure proper fit. Each Marker Line shall be composed of six float segments per foot (to provide flexibility for storage), clear vinyl covered aircraft type stainless steel cable, one stainless steel extension drawbar spring, one stainless steel tension toggle, two stainless steel cable clamps, two cable thimbles, and two stainless steel 5" hooks. Provide recessed stainless steel "U" racing line anchors.

2. Provide lengths as required with 15' at each end in a solid color with alternating one-foot sections of contrasting colors in between.
3. Colors shall be as selected by Owner.

## **2.3 SAFETY EQUIPMENT**

- A. LIFEGUARD CHAIRS (3 required)
  1. Chairs shall be made from highly durable furniture grade recycled plastic lumber and stainless steel hardware to withstand weather extremes. Chairs shall have a slip-resistant texture for increased lifeguard safety. Chair material shall be 100% PVC and BPA free and shall contain 100% highly sanitized plastic that is over 90% recycled high density polyethylene and shall be 100% recyclable. Integrated umbrella mount and ring buoy holder.
  2. Seat height: 66"
  3. Manufacturer and model: Kiefer Forever Lifeguard Chairs
- B. RING BUOY
  1. The 24" Ring Buoy with white canvas cover designed and manufactured to U.S. Coast Guard requirements shall be supplied, Paddock Model 4726, 3 required.
- C. LIFE HOOK
  1. The life hook with one-piece 16" aluminum handle shall be supplied, Paddock Model 4723, 3 required.
- D. LIFE SAFETY LINE
  1. Polyethylene Rope:  $\frac{3}{4}$ " polyethylene rope, Paddock Model 4747 and 2 each Paddock Model 4774  $\frac{3}{4}$ " rope hook terminals.
  2. Rope Hook Terminals: Stainless Steel recessed cup anchor for lifeline, Paddock Model 9026, 6 required and Paddock Model 4778, 5" x 9" lifeline floats, 11 required.
- E. SPINEBOARD (1 required)
  1. CJ Rescue 6 package as manufactured by CJ spineboard or approved equal.
  2. Provide set of heavy-duty stainless-steel utility hooks for storing the spineboard at a convenient and readily accessible location near the pool (Recreonics #10-362).
- F. FIRST AID KIT
  1. 24 unit kit per American Red Cross standards as manufactured by Swift First Aid or approved equal.
- G. RESCUE TUBE (3 required)
  1. Provide one rescue tube for each lifeguard chair. Recreonics #12-203 or approved equal.

## **PART 3 - EXECUTION**

### **3.1 GENERAL REQUIREMENTS**

- A. All systems and subsystems shall be installed in accordance with that systems manufacturer's recommendations and instructions.
  1. Provide all accessories and supplemental equipment necessary to provide a complete working installation.

### **3.2 START-UP AND TRAINING**

- A. A qualified factory trained representative of the manufacturer shall install this equipment, put it into operation and instruct the owner's representative in the operation and maintenance of all such equipment.

END OF SECTION

**SECTION 13 1174**  
**WATER SPRAY FEATURES**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. The work of this Section consists of furnishing all materials, equipment, supplies, and accessories required for performing all work needed in connection with the installation of public play water spray features and equipment.

**1.2 QUALITY ASSURANCE**

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

**1.3 SUBMITTALS**

- A. Product Data: Manufacturer's descriptive literature for specified system including all components.
- B. Shop Drawings: Indicate component connection details and details of interface with adjacent construction.
- C. Manufacturer's Instructions: Indicate installation instructions for specified equipment, including each component.
- D. Operation and Maintenance Data: Submit manufacturer's maintenance instructions and parts list for specified equipment

**1.4 DELIVERY, STORAGE, AND PROTECTION**

- A. Delivery: Deliver materials to site in manufacturer's original, unopened packaging.
- B. Storage: Store all equipment and materials under cover and elevated above grade.
- C. Protection: Protect equipment and materials to prevent damage.

**PART 2 - PRODUCTS**

**2.1 WATER SPRAY EQUIPMENT**

- A. Play Product Structure: The Aqua Dome No. 1 VOR-555.2000 shall be constructed of 304/304L stainless steel structural tubing with an outside diameter of 4½" (11.4cm) and a wall thickness of 0.120" (3mm). The SAFESWAP™ anchoring and leveling system shall be used.
  1. Overall play product dimensions: The above ground height of the structure shall be no less than 45" (114cm) height.
  2. Play Product Interactivity: Users can watch the bell-shaped spray and touch the laminar texture of the water.

- 3. Hydraulic Activity/Components: The spray effect shall be a clear, laminar bell-shaped, sheet descending from the top of the post towards grade.
- 4. Hydraulic Requirements: The hydraulic requirements shall be 10-18 gpm (38-68 lpm) @ 5-10 psi (0.3 – 0.7 bar).
- B. Play Product Structure: The Bubbler VOR-1107 shall be constructed of 304/304L stainless steel structural tubing with an outside diameter of 1.05" (2.7 cm) and a wall thickness of 0.083" (.21cm). It shall have a 3" (7.6cm) diameter stainless steel spray head housings welded to the stuctural tubing. The spray head housing shall be fitted with an orifice spray cap. The spray cap shall be free of finger entrapment hazards. The Bubbler shall be installed in water, the recommended water depth shall be 4" (10cm) min. and 8" (20cm) max. The embedded anchoring and leveling system shall be used.
  - 1. Overall play product dimensions: The above ground height of the Play Product shall be 0" (0cm).
  - 2. Play Product Interactivity: The high or low stream of water produced by the Bubbler creates visual interest.
  - 3. Hydraulic Activity/Components: The water effect from the spray head shall produce a single soft stream.
  - 4. Hydraulic Requirements: The hydraulic requirements shall be 20-40 gpm (76-151 lpm) @ 5-11 psi (0.3 - 0.8 bar)
- C. Valves: There shall be one ball valve for isolation and one globe valve for flow adjustment for each of the water lines for the spray features.
- D. Piping and Fittings: All piping shall be Schedule 80 PVC and all fittings shall be schedule 80 PVC. All factory-assembled pieces shall be tested to 100 PSI.
- E. Other Equipment: Provide all related components and accessories as required for a complete and fully functional system.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Verify that required utilities are in correct location and are of correct capacities for specified products.
- B. Verify equipment rough-in before proceeding with work.

#### **3.2 INSTALLATION**

- A. Install all equipment in accordance with shop drawings and manufacturer's printed installation instructions, comply with standards required by authorities having jurisdiction.
- B. When applicable, templates shall be supplied to facilitate the installation of embedded anchoring equipment.
- C. All play products shall have electrical bonding studs incorporated into their associated anchoring equipment. All play products shall be bonded by the installer per the NEC.

- D. Schedule installation to ensure that utility connections are achieved in an orderly and expeditious manner.
- E. Install equipment plumb, square, and straight without distortion; securely anchor and insure spray equipment base plate connection is flush with finished surfaces.

### **3.3 INTERFACE WITH OTHER WORK**

- A. Coordinate with other trades for proper installation of plumbing and concrete work.

### **3.4 START-UP AND TRAINING**

- A. Adjust for proper operation within manufacturer's published tolerances.
- B. Upon completion of construction, the general contractor shall provide the owner/operator adequate training on facility system operations and maintenance.

### **3.5 ADJUSTING AND CLEANING**

- A. Replace damaged components as directed by the Engineer.
- B. Protect installed equipment from subsequent construction operations.

END OF SECTION

## **SECTION 13 1175**

### **SPLASH PAD RECREATION EQUIPMENT**

#### **PART 1 GENERAL**

##### **1.01 SUMMARY**

- A. Section Includes
  - 1. Work shall include, but is not limited to:
    - a. Furnish and install splash pad play equipment, activation devices and controller, and manifold.
    - b. Furnish and install all piping, valves, electrical, and accessory items shown and/or specified as needed to form complete operating system in conjunction with splash pad equipment.
    - c. Contractor shall coordinate with the equipment supplier and furnish and install all components, wiring and accessories to provide a complete and operational system that complies with all local, state, and federal requirements.

##### **1.02 REFERENCES**

- A. This installation shall comply with all applicable provisions of the latest edition of the following codes:
  - 1. All local, state and governing building, plumbing electrical, health, etc. codes.
  - 2. National Electrical Code (NEC).
  - 3. National Fire Protection Association (NFPA).
- B. Materials furnished hereunder shall comply with the latest edition of applicable standard specifications published by the following organizations:
  - 1. American Society for Testing and Materials (ASTM).
  - 2. American National Standards Institute (ANSI).
  - 3. American Society of Mechanical Engineers (ASME).
  - 4. American Society of Sanitary Engineering (ASSE).
  - 5. American Water Works Association (AWWA).
  - 6. Commercial Standards (CS).
  - 7. National Electrical Manufacturers Association (NEMA).
  - 8. National Sanitation Foundation (NSF).

### **1.03 QUALITY ASSURANCE**

- A. Owner has selected to use splash pad related equipment as manufactured by Vortex Aquatic Structures International, Inc. as identified in this Section. Vortex Manufacturer Representative for the project area is Denzak Recreational Design and Supply, (800) 925-1545, Contact: Joe Denzak. Contractor shall purchase and install the Vortex materials identified in the Specifications and as shown on the Drawings.
- B. Contractor shall include and schedule the manufacturer representative to attend a pre-installation meeting with Contractor, Owner, and Engineer a minimum of 2 weeks prior to starting work of this Section. Contractor shall use the manufacturer representative to provide additional guidance and recommendations throughout construction.
- C. Certain sections of the Specifications contain performance criteria rather than product descriptions. It shall be the obligation of the Contractor to ensure that all criteria are satisfied, and the burden of proof of conformance shall rest with the Contractor. The Engineer shall require complete calculation, past performance records, and if required, inspection trips of similar facilities to substantiate conformance with these criteria. The Engineer shall be the sole judge of conformance and the Contractor is cautioned that he will be required to Bid and provide a finished product meeting all stated criteria.
- D. Installer: Company specializing in performing the work of this Section with minimum of three years' experience.
- E. Upon completion of construction, Contractor shall include and arrange for the manufacturer representative to provide onsite training for the Owner relative to startup, shutdown and winterization procedures, day to day operation, and maintenance procedures, control programming, etc. for the splash pad.
- F. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories (UL) as suitable for the purpose specified and indicated.

### **1.04 SUBMITTALS**

- A. The Contractor shall be responsible for providing electronic copies plus the quantity that Contractor would like returned to them of all submittals.
- B. Product Data: Provide data on specified systems, including all components.
- C. Shop Drawings: Indicate location of spray features, activators, control system, valves, as well as dimensions, connection details, details of assembly and interface with adjacent construction and equipment, anchors, and utility rough-in locations.
- D. Certificates: Certify that products of this Section meet or exceed specified requirements.
- E. Manufacturer's Installation Instructions: Indicate installation instructions for specified equipment including each component.
- F. Project Closeout Items.
  1. Operation and Maintenance Manuals. Provide operating and maintenance instructions for the entire system, including but not limited to start-up procedures, day to day operation of the system, maintenance instructions and maintenance schedules, instructions for winterizing, reprogramming controllers, parts lists, etc.

## **1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING**

- A. All aquatic play products and associated equipment must be properly wrapped and secured in place while in transport to the Site. Care shall be observed during offloading and handling to prevent excessive stress and abrasions.
- B. The Contractor shall keep the play products and associated equipment stored in safe secured areas until the actual time of installation.
- C. Protective wrapping on the aquatic play features must be left in place until construction work for the splash pad is complete.
- D. Painted surfaces shall be protected against impact, abrasion, discoloration, and other damage. Painted surfaces that are damaged prior to acceptance of equipment shall be repainted to the satisfaction of the Engineer.
- E. Electrical equipment, controls, and insulation shall be protected against moisture or water damage.
- F. Store materials under cover and elevated above grade.
- G. Replacements: In the event of damage, loss, etc. immediately make all repairs and replacements necessary to the approval of Engineer at no additional cost to the Owner.

## **1.06 WARRANTY**

- A. In general, correct defective work of materials and workmanship within a 2-year period after Substantial Completion for all Project elements. Additional manufacturer warranties are noted in the following Paragraph B.
- B. The following is a description of the Splash Pad Equipment Manufacturer Warranties to be provided:
  1. 25-year warranty on stainless steel water play features, stainless steel anchoring systems, and aluminum spheres.
  2. 5-year warranty on brass components, including spray nozzles, spray caps, and spray heads. High-density polyethylene components, polyurethane components, and ultra high molecular weight polyethylene components. The stainless steel automated water distribution manifold, drain boxes, strainers, and electrical enclosures.
  3. 2-year warranty on coatings, stainless steel hardware and moving parts, fiberglass products, Seeflow Polymers, Soft Touch Elastomers (Toe Guards), polyvinyl chloride (PVC) piping, fittings, ball valves, check valves, pressure gauges, electrical relays, terminal blocks, actuated valves, programmable logic controller (PLC controller), time switches, manual switches, transformers, breakers, electrical wiring, and connections.

## **PART 2 PRODUCTS**

### **2.01 APPROVED MANUFACTURER**

- A. Spray features, activators, and control system shall be supplied by Vortex, Montreal, Canada, Tel 877-586-7839 or 514-694-3868, <https://www.vortex-intl.com/>, Local Manufacturer Representative: Denzak Recreational Design and Supply (Tel 800-925-1545). Contact: Joe Denzak. OR an approved equal, with all features, activators, and equipment from a single

manufacturer, which meet specifications of this section. Note that any approved alternate manufacturer must provide product and system training as part of their service, at no additional cost.

## **2.02 SPLASH PAD EQUIPMENT**

- A. Spray features shall operate at the flow rates as indicated in the Specifications.
- B. General Product Construction:
  1. Stainless Steel Structural Tubing: Shall be 304/304L, structurally strong, durable and resistant to corrosive environments. Rigid centricast fiber reinforced (FRP) and/or molded fiberglass, PVC, filament wound tubing, galvanized steel, or aluminum shall not be utilized for any above or below grade play product structures.
  2. Mounting and Assembly Hardware: All hardware and anchoring systems shall be 304/304L stainless steel. All Play Products and Ground Spay systems shall include an integrated anchoring and leveling system facilitating installation and a flush surface finish. Exposed and accessible hardware shall be tamper resistant, requiring a special tool for removal to deter vandalism and theft.
  3. Spray nozzles, Caps, and Heads: Shall be manufactured from C360 brass and shall use tamper resistant tools for installation and removal. PVC, Nylon, and Delrin™ shall not be utilized. All grade level play products are to be furnished with appropriate winterization caps
  4. Play Product Finish: Shall be polished stainless steel finish or polyester smooth glossy heat-cured powder coat that is UV and chemical resistant and suitable for public spaces. Color selections to be made by Owner from manufacturer standard colors.
  5. Material for Paneling, Signage, Water Deflection, and Toe Guards: All polyethylene, polyurethane, elastomers, and Seeflow polymers used for paneling, signage, or water deflection shall be resistant to chlorinated water and be ultraviolet stabilized to inhibit sunlight fading.
  6. Safety and Craftsmanship: All edges shall be machined to a rounded finish. All welds shall be watertight, buffed smooth, or polished to a non-visible finish and factory pressure tested. Accessible nozzles and spray heads shall be recessed to ensure a completely safe play environment with no pinch points, head entrapments, or protrusion hazards. All products shall be designed in accordance with ASTM F1487 and CSA Z614-98 regulations for public playgrounds.
  7. Bonding/Grounding: All play equipment is to be grounded and bonded per the requirements of a permanently installed pool and splash pad per article 680 of the NEC.
  8. Concrete footings shall be as shown on the Drawings and specified. The Contractor shall provide all labor, material, and equipment to construct the concrete footings as shown on the Drawings and shall confirm with manufacturer regarding installation requirements.
- C. Spray Feature Equipment List:
  1. Feature Accessories:
    - a. Manufacturer shall provide winterization accessories, i.e. caps, plugs, etc. for all water features.

2. Wall Spray (VOR-0302) (Quantity: 1)
  - a. Play Product Structure: The Wall Spray VOR-302.4000 shall be constructed of 304/304L stainless steel with an outside diameter of 4½" (11.4cm). The lead-free brass spray cap shall be fastened to the body using tamper-resistant fasteners. Tamper resistant brass winter cap shall be included. The spray zone dimension given are for a nozzle installation 36" of the ground. It could be installed higher or lower but the spray zone dimensions will be impacted. The sprays head is compatible with many nozzles each producing different water effects. The spray zone of each chosen nozzle varies according to its respective water effect. When many ground sprays are connected to the same water line, they must have the same hydraulic requirements.
  - b. Overall play product dimensions: The Play Product size shall not be exceeding the wall.
  - c. Play Product Interactivity: Users can enjoy the far-reaching water arch created by the wall spray.
  - d. Hydraulic Activity/Components: The spray cap shall have a thirteen (13) hole- pattern angled at 15° from the vertical divided into two (2) rows. The upper row shall consist of seven (7) holes equally spaced and angled from 0° on center to 18° left to right from the horizontal. The lower row shall consist of six (6) holes equality spaced and angled from 3° off-center to 15° to the right from the horizontal and 3° off center to 15° to the left from the horizontal, thus creating a fan-like spray pattern.
  - e. Hydraulic Requirements: The hydraulic requirements shall be 8-10 gpm (30-38 lpm) @ 5-10 psi (0.3 – 0.7 bar).
3. Water Tunnel No. 1 (VOR-0304) (Quantity: 1)
  - a. Play Product Structure: The Water Tunnel No.1 VOR-304.0000 shall be constructed of 304/304L stainless steel structural tubing with an outside diameter of 1.9" (4.8cm) and a wall thickness of .109" (.28cm). It shall have eight (8) equally spaced 3" (7.6cm) diameter stainless steel spray head housings welded to it. Each spray head housing shall be fitted with a spray cap assembly consisting of a brass locking ring and an adjustable brass spray sphere. All nozzle systems shall be free of finger entrapment hazards. The Embedded anchoring and leveling system shall be used.
  - b. Overall play product dimensions: The overall height of the Play Product shall be 0" (0cm) above ground.
  - c. Play Product Interactivity: Users can run under the arch created by the water sprays to enjoy the mist and experience the feeling from the powerful water jets spraying up compared to the softer sprays falling down.
  - d. Hydraulic Activity/Components: The water effect from each spray head shall produce a single soft stream adjustable from the vertical position to a maximum of 25° from vertical. Rotating the adjustable spray nozzle 90° from the vertical position sets the spray head to its water-tight winterized position.
  - e. Hydraulic Requirements: The combined hydraulic requirements of all eight (8) spray nozzles shall be 16-32 gpm ( 61-121 lpm) @ 7-11 psi (0.5-0.8 bar).

4. Water Jelly No. 3 (VOR-7032) (Quantity: 2)
  - a. Play Product Structure: The Water Jelly No. 3 VOR-7032.4000 shall consist of three (3) Water Jelly spray head bodies hydraulically connected together with a stainless steel distribution manifold centered with the array of spray heads. Each spray head body shall be constructed of 304/304L stainless steel structural tubing with an outside diameter of 3½" (8.9cm) and a wall thickness of .216" (5.4mm). The brass spray head shall be threaded into the spray head body using a tamper-resistant tool. Tamper resistant brass winter cap shall be included. The Embedded anchoring and leveling system shall be used.
  - b. Overall play product dimensions: The overall height of the structure shall be 12.2" (31cm)
  - c. Play Product Interactivity: Creates soft, laminar sprays with a unique texture that even young users can touch. Cones of water start small and gently grow out and flows over in soft, inviting cascades.
  - d. Hydraulic Activity/Components: Each spray head shall produce an inverted laminar bell spray effect.
  - e. Hydraulic Requirements: The hydraulic requirements shall be 15-20 gpm (57-76 lpm) @ 3-5 psi (0.2 – 0.3 bar).
5. Team Spray No. 1 (VOR-7640) (Quantity: 1)
  - a. Play Product Structure: The Team Spray N°1 VOR-7640.0000 shall consist of one (1) Geyser and seven (7) PODSPRAY™ all hydraulically connected. The Team Spray N°1 underground structure shall be constructed of 304/304L stainless steel structural tubing with an outside diameter of 2 7/8" (7.3cm) and a wall thickness of 0.120" (3mm). The snake-shaped bending shall be fabricated from one continuous bending with no ripples or joints. The Geyser shall consist of a 3½" (8.9cm) body with a flush-mounted spray cap. Tamper resistant brass winter cap shall be included. The nozzle system shall be free of finger entrapment hazards. The seven (7) PODSPRAY™ bodies shall be constructed of 2 3/8" (6cm) diameter 304/304L stainless steel tubing with a wall thickness of 0.154" (0.4 cm). Each PODSPRAY™ housing shall be fitted with a recessed Ultra-High Molecular Weight Polyethylene nozzle. The Embedded anchoring and leveling system shall be used.
  - b. Overall play product dimensions: Team Spray shall span 7'8" (235cm) in length and 3'8" (111cm) in width. The above ground height of the Play Product shall be 0" (0 cm).
  - c. Play Product Interactivity: The Team Spray encourages group play and collaboration. Users can interactively increase the height of the water spray by depressing one or all PODSPRAYS™.
  - d. Hydraulic Activity/Components: Seven (7) hydraulically connected PODSPRAYS™ stemming from the geyser spray head body shall allow the user to interactively increase the height of the geyser spray effect when one or all PODSPRAYS™ are depressed by the user. Each PODSPRAY™ housing shall be fitted with a recessed Ultra-High Molecular Weight Polyethylene nozzle that shall produce three (3) particularized, soft stream spray effects. The Geyser spray cap shall have a ten (10)-stream spray pattern angled at 5° from vertical.
  - e. Hydraulic Requirements: The combined hydraulic requirements of all eight (8) spray nozzle shall be 15-20 gpm (57- 76 lpm) @ 1-5 psi (0.1 – 0.3 bar).

6. Foaming Geyser No. 2 (VOR-8084) (Quantity: 1)
  - a. Play Product Structure: The Foaming Geyser No2 8084.4000 shall be constructed of 304/304L stainless steel structural tubing with an outside diameter of 10  $\frac{3}{4}$ " (27cm) and a wall thickness of 0.165" (0.4 cm). The spray cap shall be constructed of impact resistant Polyurethane. It shall have a slip resistant domed shape with a peak height of 1" (25 mm) above grade. A brass nozzle system shall be free of finger entrapment hazards.
  - b. Overall play product dimensions: The overall height of the Play Product shall be 1" (3cm) above ground with a diameter of 11" (28cm) .
  - c. Play Product Interactivity: The Foaming Geyser No2 shall create visual interest and invite people to feel the texture of the soft, frothy water erupting from the center of the spray cap.
  - d. Hydraulic Activity/Components: The spray nozzle shall produce an aerated foaming geyser column by drawing air from the atmosphere through the nozzle body into a projected water stream.
  - e. Hydraulic Requirements: The hydraulic requirements shall be 8-20 gpm (30-76 lpm) @ 2-5 psi (0.1-0.3 bar).
7. Magic Mist No. 2 (VOR-8099) (Quantity: 2)
  - a. Play Product Structure: The Magic Mist N°2 VOR-8099.4000 shall be constructed of 304/304L stainless steel with an outside diameter of 4½" (11.4cm). The lead free brass spray cap shall be fastened to the body using tamper-resistant fasteners. The anchoring system shall have an integrated levelling system facilitating installation and a plumb finished to the activity deck surface. The Magic Mist N°2 shall have three (3) nozzles inserts spaced equidistant across the diameter. All nozzles are to be flush with the surface to eliminate finger entrapment and protrusion hazards. Tamper resistant brass winter cap shall be included. Ground Sprays can be fitted with several interchangeable compatible spray head styles However, the spray zone layouts between the different products must be similar or must be planned to accommodate the various spray effects. When multiple ground sprays are plumbed together on a single water line, the connected ground sprays must have similar hydraulic requirements.
  - b. Overall play product dimensions: The above ground Height of the feature shall be 0" (0 cm)
  - c. Play Product Interactivity: Users can enjoy the refreshing, breezy sensation from the soft, fine sprays of the Magic Mist.
  - d. Hydraulic Activity/Components: Each nozzle shall produce a particularized mist effect.
  - e. Hydraulic Requirements: The combined hydraulic requirements of all three (3) spray nozzles shall be 3-6 gpm (11-23 lpm) @ 10-25 psi (0.7 – 1.7 bar).

D. Activator:

1. Foot Activator (VOR-606.0000) (Quantity: 2)
  - a. Play Product Structure: The Foot Activator VOR-606.0000 shall be constructed of 304/304L stainless steel structural tubing with an outside diameter of 4.50" (11.4cm) and a wall thickness of 0.120" (3mm). The activator shall have no moving parts and run on a low voltage electrical supply. A capacitive sensorswitch is to be used as an

interface for processing user input activation. The activation cap shall consist of a high impact-resistant protective cap. The protective cap shall be constructed of 316 Stainless steel and powder coated. The Stainless Steel Button shall be integrated and shall be secured in place using tamper-resistant fasteners.

- b. Overall play product dimensions: The surface diameter shall be 11" (28 cm). Product shall be flush with surrounding surface.
- c. Play Product Interactivity: The Foot Activator shall be the direct interface between the users of the aquatic play area and the aquatic Play Products. The pre-programmed sequences of the aquatic Play Products shall be activated only when the touch-activated button on the Foot Activator is pressed by the user.
- d. Hydraulic Activity/Components: Not applicable.

E. Playsafe Drain No1 (VOR-1001.4000) (Quantity: 1)

1. Play Product Structure: The Playsafe Drain No1, VOR-1001.4000 consists of a frame and a removable cover. **Strainer basket shall be provided**. The frame shall be constructed of a stainless steel 1/8" thickness X 2" width X 30" outside diameter bent flat bar and a stainless steel 29 3/4" outside diameter bent square tube. The deckgrating cover shall be stainless steel and constructed with 29 1/2" diameter and 1/4" thickness. The open area of the playsafe drain is 134.5 sq.in. (867.7 sq. cm) and the gap of the openings is 1/4 in (0.6 cm). This removable cover has an antiskid surface. The Playsafe Drain No1 has also an optional strainer basket. A form with the playsafe drain which has the capabilities to be leveled shall be inserted in the hole to create concrete drain box pit. Once the drain box pit is created, the form shall be removed. The Playsafe Drain No1 allows for multi drain access points. Each water line outlet connected to the drain box shall be a maximum of 8" in diameter at a minimum slope of 1%. The maximum GPM will be 629 at a maximum of 1.5 ft/sec through the grating.
2. Overall play product dimensions: The overall height of the Play Product shall be 0" (0 cm) above ground. The diameter of this feature shall be no less than 30" (76.2cm).
3. Play Product Interactivity: N.A.
4. Hydraulic Activity/Components: N.A.
5. Hydraulic Requirements: N.A.

## 2.03 SPLASH PAD COMMAND CENTER

A. Wall Mounted Manifold (Quantity 1):

1. Manifold with up to ten (10) valves shall be a pre-fabricated water distribution system containing piping, valves and electrical wiring. They shall be factory assembled, water pressure tested and delivered from the Splashpad equipment manufacturer's facilities. They shall be equipped with threaded connections for the water inlet and slip-on for water outlets. The solenoid valves shall be pre-wired to the controller or to a junction box when the controller is placed in a remote location. The installer shall provide the plumbing equipment required from the water source to the water inlet or backflow preventer device and pressure regulator if so configured. The installer shall provide the plumbing equipment required from the water outlets to the Splashpad Play Products, as well as adequate drainage ball valves at the low point of each of the Play Product's water distribution lines when required. Should the controller be located remotely, the installer shall supply the electrical equipment required from the power switch with branch circuit protection.

2. Water Distribution Manifold: Shall be constructed of 3 inch diameter stainless steel structural tubing with a powder coat painted finish. Manifold shall have plug at one end, and coupling to pressure regulator at opposite end. The manifold shall be supplied with a pressure gauge, pressure regulator, and backflow preventer (regular and backflow preventer pre-assembled by manufacturer). All welded joints shall be watertight and pressure tested to 150 psi.
3. Solenoid Valves: There shall be 1 solenoid valve installed on each of the water distribution ports to the water play features. They shall be a normally closed 24 VAC 60 cycle solenoid actuated globe/angle pattern design. The valve pressure rating shall not be less than 150 psi. The valve body and bonnet shall be constructed of PVC with stainless steel fasteners. The valve shall have a manual override capability (manual open/close control). It shall house a fully encapsulated, 1-piece solenoid. Each solenoid valve shall have an integrated flow control adjustment valve stem for fine tuning of spray effects.
  - a. Solenoid valve shall be connections via a 1" ball valve to the 3" manifold line, and via a 1" SCH40 union and 1 ½" to 1" SS Reducer Coupling to the distribution piping.
4. Piping and Fittings: All piping and fittings shall be schedule 80 PVC unless specified. All factory-assembled components, fitting, and connections shall be water pressure tested prior to delivery.
5. Electrical Enclosures, Conduit, Wiring, and Connections: All electrical wiring shall be #18 AWG with a 600V rating. All electrical connections, enclosures, and conduit shall be NEMA 4X watertight.

B. Splash Pad Controller (Quantity:1):

1. General
  - a. Controller shall be MaestroPro Controller manufactured by Vortex, VOR 33907.32.
  - b. Equipment Enclosures shall be made from corrosion resistant hot compression moulded fiberglass reinforced polyester which does not contain halogens. Enclosures shall be UL listed per UL Standard 508A, NEMA 4X; CSA Certified per Standard C22.2-0, 0.4, 0.7, 0.6, 94 Type 3, 3R, 4, 4X, 12 and 13.
  - c. Operating temperature: MaestroPRO™ shall be operating in an ambient temperature range of 32°F (0°C) to 131°F (55°C).
2. MAESTROPRO™ CONTROLLER MAIN – 33907.12B2
  - a. The MaestroPRO™ control panel shall be made from corrosion resistant hot compression moulded fiberglass reinforced polyester which does not contain halogen.
  - b. The MaestroPRO™ control panel is a Water Playground Controller cULus and FCC Certified and Marked product. MaestroPRO™ Controller is designed in a compliance to the CE Standards requirements.
  - c. The MaestroPRO™ control panel shall be supplied with a 10.4" touch screen user interface with controls for each output, activation device(s), and operation hours. These selector settings allow the user to select the operational mode of the components (i.e. Manual, Off and Automatic).
  - d. The MaestroPRO™ control panel shall be supplied by power through a MaestroPRO™ Power Box, providing power through two 100VA transformers 120

VAC primary / 24 VAC secondary OR 240 VAC primary / 24 VAC secondary, depending on MaestroPRO™ Power Box associated, with built-in electrostatic shield protection, and by a power supply 120/240 VAC primary to 24 VDC secondary and 100 VA.

- e. The MaestroPRO™ control panel shall integrate 24 digital outputs with 24 VAC (per output: max 1.6 Amp inrush, max 0.3 Amp nominal) and 12 digital inputs with selectable 5 or 24 VDC (1A max over all inputs).
- f. The MaestroPRO™ control panel shall surge at any time a maximum of 4 Amp over each of its two “12 digital outputs” sets.
- g. The MaestroPRO™ control panel shall have the capacity to receive digital signals from activation devices or sensors, operating on 5 or 24VDC.
- h. The MaestroPRO™ control panel shall have the ability to provide a 24VAC auxiliary signal. This signal can be used to trigger a relay for Pumps, Chemical, UV system, or any other item following electrical specification. All outputs are electrically protected against over consumption with resettable fuses.
- i. The MaestroPRO™ control panel shall have the capacity to operate a Rain Diverter Valve with a 24V AC max 1.6 Amp signal to prevent rainwater from entering the sewer network when the Splashpad® is not in function. That requires 2 outputs from MaestroPRO™ control panel.
- j. The MaestroPRO™ main control panel shall have the ability to control Fast Acting Valves supplied by 24 VAC max 1.6 Amp inrush each.
- k. MaestroPRO™ control panel shall have the capacity to receive pulse signal from items compatible with 24 VDC (Paddle wheel water meter, Anemometer,..).
- l. The MaestroPRO™ control panel shall have capability to be interconnected with any MaestroPRO™ Expansion (33907.22B2) using a dedicated RJ45 connector (located on I/O board).
- m. The MaestroPRO™ control panel shall have capability to be interconnected with max 1 Ethernet based item like the Maestro Light Controller (33908.0xxx) by using an Ethernet RJ45 Cat5 cable. If more than 1 Ethernet based items need to be connected, an Ethernet switch junction box (44900.0011) must be used.
- n. MaestroPRO™ control panel shall have removable terminal blocks for easy wiring.
- o. The MaestroPRO™ firmware shall be factory programmed with spray and light sequences designed according to the requirements of the project. Users shall have the flexibility to modify sequence duration specifically to each operation schedule directly through the interface. New sequences (created by Vortex) shall be added into the program using either a transportable USB Key or with an internet connection. A 24hr/7day user programmable Agenda, which shall allow the user to set the operational hours of the facility. Sequence quantity is not limited. For any further details about user interface, please refer to the MaestroPRO™ Manual provided by Vortex.
- p. Operation schedule shall be set by week day or by specific date (month and day number). For both cases, schedule is set by hours in the day (start/end time). Operation schedule quantity is not limited, and all different schedules will be displayed in a paginated style.

- q. The MaestroPRO™ firmware operates in English, French and Spanish.
  - r. The MaestroPRO™ firmware shall have the ability to soft start ramp up the Splashpad® to minimize potential water hammer.
  - s. The MaestroPRO™ firmware shall have the ability to automatically purge all water lines based on the user selected time and duration (i.e. every day at 5 am). It shall also, be configured to purge all lines after a user defined period of inactivity (i.e. after 4 hours of inactivity).
  - t. The MaestroPRO™ firmware in the interface lets the user easily modify the water consumption while keeping the sequence capability.
  - u. The MaestroPRO™ firmware shall have the ability to handle automatic Backwash process once connected to a multi positions valves.
3. MAESTROPRO™ POWER BOX – 33907.13BX
- a. The MaestroPRO™ Power Box shall be housed in a fiberglass corrosion resistant NEMA 4X rated enclosure.
  - b. Power consumption: Maximum power fully loaded forced manually is 200W. Power while in standard sequence in operation hours shall be approx. 100W, Power while in idle mode shall be approx. 10W – i.e. out of operation hours or without sequence running.
  - c. MaestroPRO™ control panel shall be protected by fuses sized according to voltage and transformer size.
  - d. In case of emergency, pushing the Red Emergency Button will power down the associated controller.
  - e. The MaestroPRO™ Power Box shall be powered using either a 120VAC 60Hz or 240VAC 50Hz power input with a maximum of 5 Amps.
4. Remote connection:
- a. The operating system shall be connected to internet.
  - b. A hard connection to an existing network can be set. MaestroPRO™ control panel integrates a LAN port set by default as DHCP client with RJ45 physical connector.
  - c. MaestroPRO™ control panel shall include a built-in LTE/4G cellular module. To connect to internet, a NANO-SIM card previously activated by carrier must be inserted into the control panel on the Main board.
5. Additional Controls.
- a. All electrical equipment, including flow switches, shall be tested before delivery.
  - b. Controller shall control electrical solenoid valves for play features with a 24V AC max 1.6Amp signal with a total of 10Amp over all outputs with the included transformer.
6. Installation:
- a. Electrical Connections: All main power electrical connections to the Splashpad Controller are to be performed per local codes.

- b. As per Electrical Construction and Safety Codes, Controller and/or LED power panels and/or any other electrical equipment must be hard-wired to a ground fault circuit interrupter (GFCI) from the input power source. All electrical work should be performed by a licensed electrician in accordance with local electrical construction and safety codes.
  - c. Drawings and Instructions: Product drawings and installation manuals shall be supplied by the manufacturer for ease of installation.
- C. Equipment and Piping Support:
1. All equipment and piping inside the splash pad equipment room shall be anchored and supported (manifolds and headers, valves, and all other associated equipment inside the splash pad equipment building).
  2. All equipment mounting points shall be bolted to allow the removal and/or replacement of all equipment.
- D. Electrical Enclosures, Conduit, Wiring, and Connections shall comply to all local, State and national regulations and requirements.

## **2.04 MISCELLANEOUS PIPING ITEMS**

- A. Pipe accessories: Provide all accessories, such as couplings for final pipe connections, between different type of pipe materials, etc.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION - EQUIPMENT AND SPRAY FEATURES**

- A. Install operating equipment, piping, and fittings in accordance with component manufacturer' instructions. Any changes that the manufacturer may require from the Contract Documents shall be considered incidental and shall not be made without approval by the Owner/Engineer.
- B. Install grounding and bonding of all products in accordance with applicable electrical codes, as shown on the Drawings and per manufacturer's instructions.
- C. Contractor shall provide all items required to install equipment. The Contractor shall review the wiring diagrams for the equipment actually furnished and modify and conform to the requirements of the equipment furnished. The Contractor shall not be compensated for extra labor and materials which are required to change wiring which was not confirmed with the equipment manufacturer's drawings.
- D. Install accessories and fittings in accordance with component manufacturer's instructions.
- E. Provide templates, anchor bolts, and accessories required for mounting and anchoring equipment. Anchorage system shall be in accordance with the equipment manufacturer's specifications. Consult with equipment manufacturer for length and installation of anchor bolts.
- F. Contractor shall locate play feature bases from the information shown on the Drawings and from the play feature manufacturer.
- G. A factory-trained service person shall be present when the controls are put into service and

shall certify to the Owner and Engineer that all equipment has been installed correctly and is operating properly.

- H. Contractor shall make all adjustments necessary to obtain proper operation of the controls. This shall include but not limited to adjusting valve positions and controls, providing the necessary type and quantity of wire connections to device contacts.

### **3.02 INSTALLATION – PIPING**

- A. Requirements of Section 33 1300 shall apply to this Section.

**END OF SECTION**

**SECTION 22 0513**  
**COMMON MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section includes general requirements for single phase and polyphase, general purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.
- B. Provide all building plumbing systems in compliance with the International Plumbing Code of New York State (2020) and all New York State Amendments.

**1.3 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 GENERAL MOTOR REQUIREMENTS**

- A. Comply with requirements in this Section except when stricter requirements are specified in plumbing equipment schedules or Sections.
- B. Comply with NEMA MG 1 unless otherwise indicated.
- C. Comply with IEEE 841 for severe-duty motors.

**2.2 MOTOR CHARACTERISTICS**

- A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet above sea level.
- B. 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.

## 2.3 POLYPHASE MOTORS

- A. Description: NEMA MG 1, Design B, medium induction motor.
- B. Efficiency: Premium efficient, as defined in NEMA MG 1.
- C. Service Factor: 1.15.
- D. Multispeed Motors: Variable torque.
  - 1. For motors with 2:1 speed ratio, consequent pole, single winding.
  - 2. For motors with other than 2:1 speed ratio, separate winding for each speed.
- E. Multispeed Motors: Separate winding for each speed.
- F. Rotor: Random-wound, squirrel cage.
- G. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.
- H. Temperature Rise: Match insulation rating.
- I. Insulation: Class F.
- J. Code Letter Designation:
  - 1. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.
- K. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

## 2.4 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

- A. 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.
- B. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.
  - 1. 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.
  - 2. Energy- and Premium-Efficient Motors: Class B temperature rise; Class F insulation.
  - 3. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
  - 4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.
- C. Severe-Duty Motors: Comply with IEEE 841, with 1.15 minimum service factor.

## 2.5 SINGLE-PHASE MOTORS

- A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:
  - 1. Permanent-split capacitor.
  - 2. Split phase.
  - 3. Capacitor start, inductor run.
  - 4. Capacitor start, capacitor run.
- B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.
- C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.
- D. Motors 1/20 HP and Smaller: Shaded-pole type.
- E. 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 shall automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 22 0513

**SECTION 220517**  
**SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
1. Sleeves.
  2. Sleeve-seal systems.

**1.2 SUBMITTALS**

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

**PART 2 - PRODUCTS**

**2.1 SLEEVES**

- A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
- B. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.
- C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.
- D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring, bolts, and nuts for membrane flashing.
1. Under deck Clamp: Clamping ring with set screws.
- E. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.
- F. Galvanized-Steel-Sheet Sleeves: 24 Gauge (0.0239-inch) minimum thickness; round tube closed with welded longitudinal joint.

**2.2 SLEEVE-SEAL SYSTEMS**

- 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. Advance Products & Systems, Inc.
  2. Metraflex Company (The).

3. Proco Products, Inc.

- B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.
1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
  2. Pressure Plates: Carbon steel.
  3. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating of length required to secure pressure plates to sealing elements.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

- 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. 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.
- 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 appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Section 079200 "Joint Sealants."
- E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Division 07 section "Penetration Firestopping."

### 3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.
- B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, 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.

### 3.3 SLEEVE AND SLEEVE-SEAL SCHEDULE

- A. Use sleeves and sleeve seals for the following piping-penetration applications:
  - 1. Exterior Concrete Walls above Grade:
    - a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves.
    - b. Piping NPS 6 and Larger: Galvanized-steel-pipe sleeves.
  - 2. Exterior Concrete Walls below Grade:
    - a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves with sleeve-seal system.
      - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
    - b. Piping NPS 6 and Larger: Galvanized-steel-pipe sleeves with sleeve-seal system.
      - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
  - 3. Concrete Slabs-on-Grade:
    - a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves with sleeve-seal system.
      - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
    - b. Piping NPS 6 and Larger: Galvanized-steel-pipe sleeves with sleeve-seal system.
      - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
  - 4. Concrete Slabs above Grade:
    - a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves.
    - b. Piping NPS 6 and Larger: Galvanized-steel-pipe sleeves.
  - 5. Interior Partitions:
    - a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves
    - b. Piping NPS 6 and Larger: Galvanized-steel-sheet sleeves.

END OF SECTION 220517

**SECTION 220518**  
**ESCUTCHEONS FOR PLUMBING PIPING**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section Includes:

1. Escutcheons.
2. Floor plates.

**1.3 DEFINITIONS**

- A. Existing Piping to Remain: Existing piping that is not to be removed and that is not otherwise indicated to be removed and salvaged, or removed and reinstalled.

**1.4 ACTION SUBMITTALS**

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

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:

1. BrassCraft Manufacturing Co.; a Masco company.
2. Dearborn Brass.
3. Jones Stephens Corp.

**2.2 ESCUTCHEONS**

- A. One-Piece, Steel Type: With polished, chrome-plated finish and setscrew fastener.

**2.3 FLOOR PLATES**

- A. Split Floor Plates: Cast brass with concealed hinge.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- 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.
  - 1. Escutcheons for New Piping:
    - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep pattern.
    - b. Chrome-Plated Piping: One-piece steel with polished, chrome-plated finish.
    - c. Insulated Piping: One-piece steel with polished, chrome-plated finish.
- C. Install floor plates for piping penetrations of equipment-room floors.

### 3.2 FIELD QUALITY CONTROL

- A. Using new materials, replace broken and damaged escutcheons and floor plates.

END OF SECTION 220518

**SECTION 22 0519**  
**METERS AND GAUGES FOR PLUMBING PIPING**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section Includes:

1. Liquid-in-glass thermometers.
2. Thermowells.
3. Dial type pressure gauges.
4. Gauge attachments.

**1.3 SUBMITTALS**

- A. Product data and warranty information for each type of product indicated in this section and for the final O & M Manuals.
- B. Provide all building plumbing systems in compliance with the International Plumbing Code of New York State (2020) and all New York State Amendments.
- C. Product warranties for all products in this section.
- D. Operation and maintenance data for the final O & M Manuals.

**PART 2 - PRODUCTS**

**2.1 LIQUID-IN-GLASS THERMOMETERS**

- A. Metal Case, Industrial Style, Liquid-in-Glass Thermometers:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Winters Instruments - U.S.A. Model TSW-132 or comparable product by one of the following:
  - a. Flo Fab Inc.
  - b. Miljoco Corporation.
  - c. Palmer Wahl Instrumentation Group.
  - d. Tel-Tru Manufacturing Company.
  - e. Trerice, H. O. Co.
  - f. Weiss Instruments, Inc.
  - g. Winters Instruments - U.S.
2. Standard: ASME B40.200.
3. Case: Cast aluminum; 8 inch nominal size unless otherwise indicated.
4. Case Form: Straight unless otherwise indicated.

5. Tube: Glass with magnifying lens and red organic liquid.
6. Tube Background: Nonreflective aluminum with permanently etched scale markings graduated in deg F and deg C.
7. Window: #N – 16 Glass.
8. Stem: Aluminum and of length to suit installation.
  - a. Design for Thermowell Installation: Bare stem.
9. Connector: 1-1/4 inches, with ASME B1.1 screw threads.
10. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

## 2.2 THERMOWELLS

### A. Thermowells:

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: CNR.
4. Material for Use with Steel Piping: CRES.
5. Type: Stepped shank unless straight or tapered shank is indicated.
6. External Threads: NPS 1/2, NPS 3/4, or NPS 1, ASME B1.20.1 pipe threads.
7. Internal Threads: 1/2, 3/4, or 1 inch, with ASME B1.1 screw threads.
8. Bore: Diameter required matching thermometer bulb or stem.
9. Insertion Length: Length required matching thermometer bulb or stem.
10. Lagging Extension: Include on thermowells for insulated piping and tubing.
11. Bushings: For converting size of thermowell's internal screw thread to size of thermometer connection.

### B. Heat-Transfer Medium: Mixture of graphite and glycerin.

## 2.3 PRESSURE GAUGES

### A. Direct Mounted, Metal Case, Dial Type Pressure Gauges:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Winters Instruments - U.S.A. Series P1S238 for domestic water services or comparable product by one of the following:
  - a. AMETEK, Inc.; U.S. Gauge.
  - b. Ashcroft Inc.
  - c. Ernst Flow Industries.
  - d. Flo Fab Inc.
  - e. Marsh Bellofram.
  - f. Miljoco Corporation.
  - g. Noshok.
  - h. Palmer Wahl Instrumentation Group.
  - i. Trerice, H. O. Co.
  - j. Watts Regulator Co.; a div. of Watts Water Technologies, Inc.
  - k. Weiss Instruments, Inc.
  - l. WIKA Instrument Corporation - USA.

2. Standard: ASME B40.100.
3. Case: Liquid filled Sealed type(s); cast aluminum or drawn steel; 3-1/2-inch nominal diameter.
4. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
5. Pressure Connection: Brass, with NPS 1/4, ASME B1.20.1 pipe threads and bottom-outlet type unless back outlet type is indicated.
6. Movement: Mechanical, with link to pressure element and connection to pointer.
7. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi and kPa.
8. Pointer: Dark colored metal.
9. Window: Glass.
10. Ring: Polished Brass.
11. Accuracy: Grade A, plus or minus 1 percent of middle half of scale range.

#### 2.4 GAUGE ATTACHMENTS

- A. Snubbers: ASME B40.100, 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. Winters Instruments - U.S.A. Model SAS or approved equal.
- B. Valves: Brass or stainless steel needle, with NPS 1/4, ASME B1.20.1 pipe threads. Winters Instruments - U.S. model SNV or approved equal.

#### 2.5 TEST PLUGS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Winters Instruments - U.S. or comparable product by one of the following:
  1. Flow Design, Inc.
  2. Miljoco Corporation.
  3. National Meter, Inc.
  4. Peterson Equipment Co., Inc.
  5. Sisco Manufacturing Company, Inc.
  6. Trerice, H. O. Co.
  7. Watts Regulator Co.; a div. of Watts Water Technologies, Inc.
  8. Weiss Instruments, Inc.
- B. Description: Test station fitting made for insertion into piping tee fitting.
- C. Body: Brass or stainless steel with core inserts and gasketed and threaded cap. Include extended stem on units to be installed in insulated piping.
- D. Thread Size: NPS 1/4, ASME B1.20.1 pipe thread.
- E. Minimum Pressure and Temperature Rating: 500 psig at 200 deg F.
- F. Core Inserts: Chlorosulfonated polyethylene synthetic and EPDM self-sealing rubber.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Provide thermowells with socket extending to center of pipe and in vertical position in piping tees.
- B. Provide thermowells of sizes required to match thermometer connectors. Include bushings if required to match sizes.
- C. Provide thermowells with extension on insulated piping.
- D. Fill thermowells with heat transfer medium.
- E. Provide direct mounted thermometers in thermowells and adjust vertical and tilted positions.
- F. Provide remote mounted thermometer bulbs in thermowells and install cases on panels; connect cases with tubing and support tubing to prevent kinks. Provide minimum tubing length.
- G. Provide direct mounted pressure gauges in piping tees with pressure gauge located on pipe at the most readable position.
- H. Provide valve and snubber in piping for each pressure gauge for fluids.
- I. Provide test plugs in piping tees.
- J. Provide thermometers in the following locations:
  - 1. Inlets and outlets of each domestic thermostatic hot water mixing valve.
  - 2. Domestic water heater inlets and outlets.

### 3.2 CONNECTIONS

- A. Provide thermometers and gauges adjacent to plumbing equipment to allow service and maintenance.

### 3.3 ADJUSTING

- A. Adjust faces of meters and gauges to proper angle for best visibility.

### 3.4 THERMOMETER SCHEDULE

- A. Thermometer stems shall be of length to match thermowell insertion length.

### 3.5 THERMOMETER SCALE-RANGE SCHEDULE

- A. Scale Range for Domestic Cold-Water Piping: 0 to 100 deg F and minus 20 to plus 50 deg C.
- B. Scale Range for Domestic Hot-Water Piping: 40 to 280 deg F and 5 to 135 deg C.

**3.6 PRESSURE-GAUGE SCHEDULE**

- A. Pressure gauges at discharge of each re-circulation pump and mixing valve in the building shall be the following:

1. Liquid filled sealed and direct mounted, metal case.

**3.7 PRESSURE-GAUGE SCALE-RANGE SCHEDULE**

- A. Scale Range for Domestic Water Piping: 0 to 160 psi.

END OF SECTION – 22 0519

**SECTION 220523.12**  
**BALL VALVES FOR PLUMBING PIPING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

A. Section Includes:

1. Brass ball valves.

**1.2 DEFINITIONS**

- A. CWP: Cold working pressure.
- B. RPTFE: Reinforced polytetrafluoroethylene.
- C. WOG: Water, oil, gas.

**1.3 ACTION SUBMITTALS**

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

**1.4 DELIVERY, STORAGE, AND HANDLING**

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, and soldered ends.
3. Set ball valves open to minimize exposure of functional surfaces.

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.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use operating handles or stems as lifting or rigging points.

**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 valves intended to convey or dispense water for human consumption must comply with the SDWA, requirements of authorities having jurisdiction, and NSF 61 and NSF 372, or must be certified to be in compliance with NSF 61 and 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.

### 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 and copper alloy solder-joint connections.
  4. ASME B16.34 for flanged and threaded end connections
  5. 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 not permitted.
- 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 Actuator Type:  
1. Hand Lever: For quarter-turn valves smaller than NPS 4.
- G. Valves in Insulated Piping:

1. Provide 2-inch extended neck stems.
2. Extended operating handles with nonthermal-conductive covering material and protective sleeves that allow operation of valves without breaking vapor seals or disturbing insulation.
3. Memory stops that are fully adjustable after insulation is applied.

## 2.3 BRASS BALL VALVES

### A. Brass Ball Valves, Two Piece with Full Port and Brass Trim, Threaded or Soldered Ends:

1. **Manufacturers:** Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
  - a. [Milwaukee Valve Company](#).
  - b. [Stockham; a Crane Co. brand](#).
  - c. [Viega LLC](#).
  - d. [WATTS; A Watts Water Technologies Company](#).

2. Standard: MSS SP-110; MSS SP-145.
3. CWP Rating: 600 psig.
4. Body Design: Two piece.
5. Body Material: Forged brass.
6. Ends: Threaded or soldered.
7. Seats: PTFE.
8. Stem: Brass.
9. Ball: Chrome-plated brass.
10. Port: Full.

## 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. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.
- E. 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 space for service, maintenance, and equipment removal without system shutdown.
- B. Provide support to piping adjacent to valves such that no force is imposed upon valves.
- C. Locate valves for easy access.
- D. For valves in horizontal piping, install valves with stem at or above center of pipe.
- E. Install valves in position to allow full valve actuation movement.
- F. Valve Tags: Comply with requirements in Section 220553 "Identification for Plumbing Piping and Equipment" for valve tags and schedules.
- G. 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 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 exhibiting leakage.

### **3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS**

- A. If valves with specified CWP ratings are unavailable, provide the same types of valves with higher CWP ratings.
- B. Select valves with the following end connections:
  1. For Copper Tubing, NPS 2 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 VALVE SCHEDULE**

- A. Pipe NPS 2 and Smaller:
  1. Brass ball valves, two piece with full port, and brass trim. Provide with threaded, solder, or press-connection-joint ends.

END OF SECTION 220523.12

**SECTION 220523.14**  
**CHECK VALVES FOR PLUMBING PIPING CHECK VALVES COMMON TO MULTIPLE**  
**SYSTEMS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Check valves.

**1.2 SUBMITTALS**

- A. Product Data: For each type of valve.
  - 1. Certification that products comply with NSF 61 Annex G and NSF 372.

**PART 2 - PRODUCTS**

**2.1 GENERAL REQUIREMENTS FOR VALVES**

- A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.
- B. ASME Compliance:
  - 1. ASME B1.20.1 for threads for threaded end valves.
  - 2. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
  - 3. ASME B16.18 for solder-joint connections.
  - 4. ASME B31.9 for building services piping valves.
  - 5. ASME B16.1 for flanges on iron valves.
  - 6. ASME B16.5 for steel flanges.
- C. NSF Compliance: NSF 61 Annex G and NSF 372 for valve materials for potable-water service.
- D. Bronze valves shall be made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted.
- E. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
- F. Valve Sizes: Same as upstream piping unless otherwise indicated.
- G. Valves in Insulated Piping:
  - 1. Include 2-inch stem extensions.

## 2.2 CHECK VALVES

### A. Bronze Swing Check Valves with Bronze Disk

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. Apollo Flow Controls; Conbraco Industries, Inc.
- b. Hammond Valve.
- c. Milwaukee Valve Company.
- d. NIBCO INC.
- e. WATTS.

2. Description:

- a. Wye-pattern bronze swing check valve. Valve shall conform to MSS SP-80. Seat and disk shall be lead-free bronze. Hanger and pin shall be stainless steel. Valves  $\frac{1}{4}$ " to 2" shall be pressure rated to 200 psi and 125 psi SWP.

### B. Bronze Spring Check Valves with Disc:

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. Apollo Flow Controls; Conbraco Industries, Inc.
- b. Hammond Valve.
- c. Milwaukee Valve Company.
- d. NIBCO INC.
- e. WATTS.

2. Description:

- a. In-line pattern bronze spring check valve. Valve shall conform to MSS SP-80. Disk shall be lead-free bronze. Seat shall be PTFE. Spring and guide pin shall be stainless steel. Valves  $\frac{1}{4}$ " to 2" shall be pressure rated to 400 psi and 125 psi SWP.

## PART 3 - EXECUTION

### 3.1 VALVE INSTALLATION

- A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- B. Locate valves for easy access and provide separate support where necessary.

### **3.2 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 2 and Smaller: May be provided with Threaded, press-connect, or solder-joint ends.
  2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged or threaded.
  3. For Copper Tubing, NPS 5 and Larger: Flanged.

END OF SECTION 220523

**SECTION 220529**  
**HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section Includes:

1. Metal pipe hangers and supports.
2. Fastener systems.

**1.3 INFORMATIONAL SUBMITTALS**

- A. Welding certificates.

**1.4 QUALITY ASSURANCE**

- A. Structural-Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M.
- B. Pipe Welding Qualifications: Qualify procedures and operators according to 2015 ASME Boiler and Pressure Vessel Code, Section IX.

**PART 2 - PRODUCTS**

**2.1 PERFORMANCE REQUIREMENTS**

- A. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to 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.

**2.2 METAL PIPE HANGERS AND SUPPORTS**

- A. Carbon-Steel Pipe Hangers and Supports:

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. Copper Pipe and Tube Hangers:
1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
  2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.

## 2.3 FASTENER SYSTEMS

- A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Hilti, Inc.
    - b. ITW Ramset/Red Head; Illinois Tool Works, Inc.
    - c. MKT Fastening, LLC.
    - d. Simpson Strong-Tie Co., Inc.
- B. Mechanical-Expansion Anchors: Insert-wedge-type anchors, for use in hardened portland cement concrete, with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
1. Manufacturers: Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
    - a. Cooper B-line; brand of Eaton, Electrical Sector.
    - b. Empire Industries, Inc.
    - c. Hilti, Inc.
    - d. ITW Ramset/Red Head; Illinois Tool Works, Inc.
    - e. MKT Fastening, LLC.
  2. Indoor Applications: Zinc-coated or stainless steel.

## PART 3 - EXECUTION

### 3.1 APPLICATION

- A. Comply with requirements in Section 078413 "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 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 building structure.
- B. Fastener System Installation:
  - 1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete, after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
  - 2. Install mechanical-expansion anchors in concrete, after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- C. Install lateral bracing with pipe hangers and supports to prevent swaying.
- D. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms, and install reinforcing bars through openings at top of inserts.
- E. Load Distribution: Install hangers and supports, so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- F. 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.
- G. 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 39 protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
  - a. Option: Thermal hanger-shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
3. Install MSS SP-58, Type 40 protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
  - a. Option: Thermal hanger-shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
4. 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.
  - c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
  - d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
  - e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.
5. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
6. Thermal Hanger Shields: Install with insulation of same thickness as piping insulation.

### 3.3 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 and attachments for general service applications.
- F. Use copper-plated pipe hangers and copper attachments for copper piping and tubing.
- G. Use padded hangers for piping that is subject to scratching.
- H. Use thermal hanger-shield inserts for insulated piping and tubing.
- I. 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. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F pipes NPS 4 to NPS 24, requiring up to 4 inches of insulation.
  3. 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.
  4. 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.
  5. 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.
  6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8.
  7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
  8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
  9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
  10. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8.
  11. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3.
  12. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
  13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
  14. 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.
  15. 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.
  16. 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.
  17. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30, from two rods if longitudinal movement caused by expansion and contraction occurs.
  18. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24, from single rod if horizontal movement caused by expansion and contraction occurs.
  19. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 if longitudinal movement caused by expansion and contraction occurs but vertical adjustment is unnecessary.
  20. Pipe Roll and Plate Units (MSS Type 45): For support of pipes NPS 2 to NPS 24 if small horizontal movement caused by expansion and contraction occurs and vertical adjustment is unnecessary.
  21. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes NPS 2 to NPS 30 if vertical and lateral adjustment during installation, in addition to expansion and contraction, is required.
- J. 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.
  5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
  6. C-Clamps (MSS Type 23): For structural shapes.
  7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
  8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
  9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
  10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
  11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
  12. 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.
    - c. Heavy (MSS Type 33): 3000 lb.
  13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
  14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
  15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.
- K. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION 220529

**SECTION 220553**  
**IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Pipe labels.
  - 2. Valve tags.

**1.2 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 PIPE LABELS**

- A. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
  - 1. [Brady Corporation](#).
  - 2. [Carlton Industries, LP](#).
  - 3. [Craftmark Pipe Markers](#).
  - 4. [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 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.

## 2.2 VALVE TAGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. [Brady Corporation](#).
2. [Carlton Industries, LP](#).
3. [Craftmark Pipe Markers](#).
4. [Seton Identification Products; a Brady Corporation company](#).

B. Description: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.

1. Tag Material: Brass, 0.04-inch minimum thickness, with predrilled or stamped holes for attachment hardware.
2. Fasteners: Brass S-hook.

C. Letter and Background Color: As indicated for specific application under Part 3.

D. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond 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.

## 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 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 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 and Storm Drainage Piping: White letters on a black background.

### 3.4 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.
    - b. Domestic Hot Water: 1-1/2 inches.
    - c. Domestic Hot-Water Return: 1-1/2 inches.
  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.

END OF SECTION 220553

**SECTION 220719**  
**PLUMBING PIPING INSULATION**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section includes insulating the following plumbing piping services:

1. Domestic cold-water piping.
2. Domestic hot-water piping.
3. Domestic recirculating hot-water piping.
4. Supplies and drains for handicap-accessible lavatories and sinks.

**1.2 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. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail insulation application at pipe expansion joints for each type of insulation.
3. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
4. Detail removable insulation at piping specialties, equipment connections, and access panels.
5. Detail application of field-applied jackets.
6. Detail application at linkages of control devices.

**1.3 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For qualified Installer.

- B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

- C. Field quality-control reports.

**1.4 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.

## 1.5 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.

## 1.6 COORDINATION

- A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 220529 "Hangers and Supports for Plumbing 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.
- C. Coordinate installation and testing of heat tracing.

## 1.7 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.
  - 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. [Manson Insulation Inc](#).
    - d. [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.

### 2.3 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. ASJ+: 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.
5. PSK Jacket: Aluminum foil fiberglass reinforced scrim with polyethylene backing, complying with ASTM C1136, Type II.

## 2.4 PROTECTIVE SHIELDING GUARDS

### A. Protective Shielding Pipe Covers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. [Plumberex Specialty Products, Inc.](#)
  - b. [Truebro; IPS Corporation](#).
  - c. [Zurn Industries, LLC](#).
2. 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. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. ProFlo; a Ferguson Enterprises, Inc. brand.
  - b. [Truebro; IPS Corporation](#).
  - c. [Zurn Industries, LLC](#).
2. 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. Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:
  1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils thick and an epoxy finish 5 mils thick if operating in a temperature range of between 140 and 300 deg F. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
  2. Carbon Steel: Coat carbon steel operating at a service temperature of between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
- 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 Contract Documents, unless otherwise approved by the engineer-of-record.
- 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.
    - 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.
- 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.
  - 4. Cleanouts.

### 3.4 PENETRATIONS

- A. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- B. 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 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.
- C. 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 078413 "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. 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 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 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 FIELD QUALITY CONTROL

- A. 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 tests and inspections with the assistance of a factory-authorized service representative.
- D. All insulation applications will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

### 3.9 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.

### 3.10 INDOOR PIPING INSULATION SCHEDULE

- A. Domestic Cold Water:
  1. NPS 1 and Smaller: 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. Domestic Hot and Recirculated Hot Water:

1. NPS 1-1/4 and 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. Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities:

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.

END OF SECTION 220719

**SECTION 22116**  
**DOMESTIC WATER PIPING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

A. Section Includes:

1. Copper tube and fittings.
2. Piping joining materials.

**1.2 ACTION SUBMITTALS**

A. Product Data:

1. Pipe and tube.
2. Fittings.
3. Joining materials.
4. Transition fittings.

**1.3 INFORMATIONAL SUBMITTALS**

- A. Coordination Drawings: Piping layout, or BIM model, drawn to scale, showing the items described in this Section, and coordinated with all building trades.
- B. System purging and disinfecting activities report.
- C. Field quality-control reports.

**1.4 FIELD CONDITIONS**

- A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:
  1. Notify Owner no fewer than five days in advance of proposed interruption of water service.
  2. Do not interrupt water service without Owner's written permission.

**1.5 WARRANTY**

- A. Polypropylene Piping (PP-R) Manufacturer's Warranty: Manufacturer agrees to repair or replace PP-R pipe and fittings that fail in materials or workmanship within 10 years from date of Substantial Completion.

1. Warranty is to cover labor and material costs of repairing and/or replacing defective materials and repairing any incidental damage caused by failure of the piping system due to defects in materials or manufacturing.
2. Warranty is to be in effect only upon submission by the Contractor to the manufacturer of valid pressure/leak documentation indicating that the system was tested and passed the manufacturer's pressure/leak test.

## PART 2 - PRODUCTS

### 2.1 PIPING MATERIALS

- A. Potable-water piping and components shall comply with NSF 14, NSF 61, and NSF 372. Include marking "NSF-pw" on piping.

### 2.2 COPPER TUBE AND FITTINGS

- A. Drawn-Temper Copper Tube: ASTM B88, Type L.
- B. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings.
- C. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, pressure fittings.
- D. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
- E. 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.
- F. Wrought Copper Unions: ASME B16.22.
- G. Copper Tube, Pressure-Seal-Joint Fittings:
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Elkhart Products Corporation; a part of Aalberts Integrated Piping Systems.
    - b. Mueller Industries, Inc.
    - c. NIBCO INC.
    - d. Viega LLC.
  2. Fittings: Cast-brass, cast-bronze, or wrought-copper with EPDM O-ring seal in each end.
  3. Minimum 200-psig working-pressure rating at 250 deg F.

### 2.3 PIPING JOINING MATERIALS

- A. Solder Filler Metals: ASTM B32, lead-free alloys.
- B. Flux: ASTM B813, water flushable.

- C. Brazing Filler Metals: AWS A5.8M/A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.
- D. Solvent Cements for Joining CPVC Piping and Tubing: ASTM F493.
- E. Solvent Cements for Joining PVC Piping: ASTM D2564. Include primer according to ASTM F656.
- F. Plastic, Pipe-Flange Gaskets, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

## 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. Fitting Option: Extruded-tee connections and brazed joints may be used on aboveground copper tubing.
- D. Aboveground domestic water piping, NPS 2 and smaller, shall be one of 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 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 according to CDA's "Copper Tube Handbook."
- C. Install valves according to the following:
  1. Section 220523.12 "Ball Valves for Plumbing Piping."
- D. Install domestic water piping level 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 sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."
- N. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."
- O. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

### 3.3 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 according to 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. Soldered Joints for Copper Tubing: Apply ASTM B813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B828 or CDA's "Copper Tube Handbook."
- E. 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.

- F. Joint Construction for Grooved-End Copper Tubing: Make joints according to 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.
- G. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

#### 3.4 INSTALLATION OF HANGERS AND SUPPORTS

- A. Comply with requirements for hangers, supports, and anchor devices in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."
- B. Install hangers for copper tubing and 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 within 12 inches of each fitting.

#### 3.5 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.

#### 3.6 IDENTIFICATION

- A. Identify system components. Comply with requirements for identification materials and installation in Section 220553 "Identification for Plumbing Piping and Equipment."

#### 3.7 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 flows indicated.

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.

### 3.8 FIELD QUALITY CONTROL

#### A. Perform the following 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 roughing in 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. Hydrostatic testing and documentation of test results for polypropylene piping to be in accordance with the manufacturer's instructions and submitted to the manufacturer upon successful completion per warranty requirements.
  - f. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
  - g. 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.

### 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 according to either of the following:
      - 1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and 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. Clean non-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 procedures prescribed by authorities having jurisdiction or; if methods are not prescribed, follow procedures described below:
    - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    - b. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.
- C. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.
- D. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

END OF SECTION 221116

## **SECTION 22119 DOMESTIC WATER PIPING SPECIALTIES**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

**A. Section Includes:**

1. Vacuum breakers.
2. Backflow preventers.
3. Balancing valves.
4. Strainers.
5. Hose bibbs.
6. Wall hydrants.
7. Drain valves.
8. Water-hammer arresters.

**B. Related Requirements:**

1. Section 220519 "Meters and Gages for Plumbing Piping" for thermometers, pressure gages, and flow meters in domestic water piping.
2. Section 224719 "Water Station Water Coolers" for water filters for water coolers.

#### **1.2 SUBMITTALS**

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

1. Certification that products comply with NSF 61 Annex G and NSF 372.
- B. Operation and maintenance data: To include operation and maintenance manuals, and manufacturer written warranties to be included in the final O & M Manuals.

### **PART 2 - PRODUCTS**

#### **2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES**

- A. NSF Standard: Comply with NSF 61, NSF 62 Annex G and NSF 372 "Drinking Water System Components—Health Effects," for fixture materials that will be in contact with potable water. The lead content of water system components shall not exceed 0.25 percent by weighted average.
- B. Provide all building plumbing systems in compliance with applicable codes, rules, and regulations of Local, State, and Federal Governments and other authorities having lawful jurisdiction. All work shall conform to latest edition and supplements of following codes, standards, or recommended practices.

## 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. Reduced-Pressure-Principle Backflow Preventers (**RPZ-2**):

1. Manufacturers: Subject to compliance with requirements, provide Watts Series LF909 or approved equal, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - a. Apollo Flow Controls; Conbraco Industries, Inc.
  - b. Zurn Industries, LLC.
2. Standard: ASSE 1013.
3. Operation: Continuous-pressure applications.
4. Pressure Loss: 9 psig maximum, through middle third of flow range.
5. Size: 4 NPS.
6. Design Flow Rate: 400 gpm.
7. Body: Cast Iron or Steel with interior lining complying with AWWA C550 or that is FDA approved.
8. End Connections: Flanged.
9. Configuration: Designed for horizontal flow.
10. Accessories:
  - a. Valves NPS 4 and Larger: Non-rising stem type with Flanged ends.
  - b. Strainer: Bronze with removable basket.
  - c. Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.

- B. Double Check Detector Assembly (**DCDA-1**):

1. Manufacturers: Subject to compliance with requirements, provide Watts Series 3000SS or approved equal, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - a. Apollo Flow Controls; Conbraco Industries, Inc.
  - b. Zurn Industries, LLC.
2. Standard: ASSE 1015.
3. Operation: Continuous-pressure applications.
4. Pressure Loss: 5 psig maximum, through middle third of flow range.
5. Size: 10 NPS.
6. Design Flow Rate: 2,300 gpm.
7. Body: Stainless Steel.
8. End Connections: Flanged.
9. Configuration: Designed for horizontal flow.
10. Accessories:
  - a. Valves: OS&Y type with Flanged ends.
  - b. Strainer: Bronze with removable basket.
  - c. Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.

## 2.5 STRAINERS FOR DOMESTIC WATER PIPING

### A. Y-Pattern Strainers:

1. Pressure Rating: 125 psig minimum unless otherwise indicated.
2. Body: Bronze for NPS 2 and smaller; cast iron with interior lining that complies with AWWA C550 or that is FDA approved, for NPS 2-1/2 and larger.
3. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
4. Screen: Stainless steel with round perforations unless otherwise indicated.
5. Perforation Size:
  - a. Strainers NPS 2 and Smaller: 0.020 inch.
  - b. Strainers NPS 2-1/2 to NPS 4: 0.045 inch.
  - c. Strainers NPS 5 and Larger: 0.10 inch.
6. Drain: Factory-installed, hose-end drain valve.

## 2.6 HOSE BIBBS

### A. Hose Bibbs:

1. Standard: ASME A112.18.1 for sediment faucets.
2. Body Material: Bronze.
3. Seat: Bronze, replaceable.
4. Supply Connections: NPS 1/2 or 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, or chrome or nickel plated.
9. Finish for Service Areas: Rough bronze, or chrome or nickel plated.
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 or operating key.
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.

## 2.7 WALL HYDRANTS

### A. Nonfreeze Wall Hydrants:

1. Manufacturers: Subject to compliance with requirements, Provide Watts HY-420; available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - a. Acorn Engineering Company.
  - b. MiFab.
  - c. Zurn Industries, LLC.
2. Standard: ASME A112.21.3M for exposed-outlet, self-draining wall hydrants.
3. Pressure Rating: 125 psig.
4. Operation: Loose key.
5. Casing and Operating Rod: Of length required to match wall thickness. Include wall clamp.
6. Inlet: NPS 3/4 or NPS 1.
7. Outlet: Concealed, with integral vacuum breaker and garden-hose thread complying with ASME B1.20.7.
8. Box: Deep, flush mounted with cover.
9. Box and Cover Finish: Polished nickel bronze.
10. Outlet: Exposed, with integral vacuum breaker and garden-hose thread complying with ASME B1.20.7.
11. Nozzle and Wall-Plate Finish: Polished nickel bronze.
12. Operating Keys(s): One with each wall hydrant.

## 2.8 DRAIN VALVES

### A. Ball-Valve-Type, Hose-End Drain Valves:

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.

## 2.9 WATER-HAMMER ARRESTERS

### A. Water-Hammer Arresters (WHA):

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. MIFAB, Inc.
  - b. WATTS.
  - c. Zurn Industries, LLC.
2. Standard: ASSE 1010 or PDI-WH 201.
3. Type: Copper tube with piston.
4. Size: ASSE 1010, Sizes AA and A through F, or PDI-WH 201, Sizes A through F.

## 2.10 INSULATED VALVE ENCLOSURES

- A. Description: Prefabricated, sectionalized, insulated aluminum enclosure, designed according to ASTM B209, B221 and ASSE 1060 for Backflow Prevention Assemblies.
  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. Hubbel, Inc.
  2. Sectionalized Aluminum Enclosure:
    - a. Sectionalized enclosures are factory assembled with tongue and grooved sections that slide together and are then secured to the concrete pad with the supplied anchor pads and wedge anchors.
    - b. Access panels have a four-point locking system with pad lockable handle and are completely removable.
    - c. Drain ports are sized for full port backflow discharge and are designed for a one-way operation allowing backflow discharge but not allowing wind, debris and small animals to enter the enclosure.
    - d. Designed to support a minimum vertical load of 100lb/sf.
    - e. ASSE 1060 certified.
    - f. Custom enclosures are designed and constructed in the same manner as standard certified enclosures but have not been lab tested and listed by ASSE.
    - g. Aluminum sheeting shall be 3003 aluminum (.050/18 gauge), stucco embossed finish and shall meet ASTM B209. Stucco embossed finish reduces the glare and helps hide any surface scratches or imperfections received in the field.
    - h. Bracing shall be 6063-T52 aluminum and shall meet ASTM B221.

- i. No wood or particle board should be used in the construction of the enclosure.
  - j. Anchor pads shall be galvanized steel. 3/8-16 unc x 2 3/4 long zinc plated wedge anchors are supplied.
  - k. Insulation shall be approximately 1.5" unicellular, non-wicking, polyisocyanate foam sprayed in place that forms a monolithic bond between the aluminum bracing and aluminum sheeting.
  - l. The Insulation shall have the following properties:
    - 1) R-Value: 10
    - 2) Dimensional Stability: <2% linear change
    - 3) Compressive Strength: 51 psi
    - 4) Flame point: 325 degrees
    - 5) Water absorption: .037 psf
    - 6) Porosity: 91%
3. Heating Element: Required
- a. Heating equipment will protect the piping and equipment from exterior temperatures to -30F. ETL listed thermostatically controlled wall mounted air forced heaters shall be furnished and designed by the manufacturer of the enclosure to maintain the equipment at +40F, In accordance with ASSE 1060 1.2.2.1.
  - b. Heating equipment shall be wall mounted to the supplied heater plates and a minimum of 8" above the slab unless it is UL or ETL certified and NEC approved for submersion.
  - c. Power source shall be protected with a GFI receptacle, U.L. 943, NEMA 3R. Mounted a minimum of 8" from the bottom of the receptacle to the top of the slab.
  - d. Separate 20 amp circuits are recommended for each heater, so in the event a circuit fails all other circuits will remain powered. Installations must be in accordance with the local and national codes.
4. The recommended slab size shall be 12" larger than the interior dimensions of the enclosure and a minimum of 4" thick.
5. The enclosure shall be assembled per the manufacturer's instructions provided with the enclosure.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install backflow preventers 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. Install water regulators with inlet and outlet shutoff valves. Install pressure gages on inlet and outlet.
- C. Install balancing valves in locations where they can easily be adjusted.
- D. Install temperature-actuated, water mixing valves with check stops or shutoff valves on inlets and with shutoff valve on outlet.
  1. Install cabinet-type units recessed in or surface mounted on wall as specified.
- E. Install Y-pattern strainers for water on supply side of each water pressure-reducing valve and pump.
- F. Set nonfreeze, nondraining-type post hydrants in concrete or pavement.
- G. Set freeze-resistant yard hydrants with riser pipe in concrete or pavement. Do not encase canister in concrete.
- H. Install water-hammer arresters in water piping according to PDI-WH 201.
- I. Install supply-type, trap-seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.
- J. Install drainage-type, trap-seal primer valves as lavatory trap with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting.

### 3.2 CONNECTIONS

- A. Comply with requirements for ground equipment in Division 26 Section "Grounding and Bonding for Electrical Systems."
- B. Fire-retardant-treated-wood blocking is specified in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables" for electrical connections.

### 3.3 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
  1. Test each reduced-pressure-principle backflow preventer, double-check, backflow-prevention assembly, and double-check, detector-assembly backflow preventer according to authorities having jurisdiction and the device's reference standard.
- B. Domestic water piping specialties will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

3.4 ADJUSTING

- A. Set field-adjustable pressure set points of water pressure-reducing valves.
- B. Set field-adjustable flow set points of balancing valves.

END OF SECTION 221119

**SECTION 221123**  
**DOMESTIC WATER PUMPS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

A. Section Includes:

1. Domestic Water Circulator Pumps.

**1.2 DEFINITIONS**

- A. "HI" means Hydraulics Institute
- B. "NEMA" means National Electrical Manufacturers Association
- C. "UL" means Underwriters Laboratories, Inc.
- D. "VFD" means Variable Frequency Drive.

**1.3 SUBMITTALS**

- A. Product Data: For each type of pump indicated in this section and for the final O & M Manuals. Include rated capacities, operating characteristics, accessories, materials of construction, and manufacturer written warranties to be included in the final O & M Manuals.
- B. Wiring Diagrams: For power, signal, and control wiring.
- C. Operation and maintenance data.

**1.4 QUALITY ASSURANCE**

- 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: Comply with UL 778 for motor-operated water pumps.
- C. Booster pumps shall be listed and labeled as packaged pumping systems by testing agency acceptable to authorities having jurisdiction.

## PART 2 - PRODUCTS

### 2.1 DOMESTIC WATER CIRCULATOR PUMPS (CP-1):

- 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. Armstrong Pumps, Inc.
  - 2. Bell & Gossett; A Xylem Brand.
  - 3. Grundfos Pumps Corp.
  - 4. TACO Comfort Solutions, Inc.
- B. Description: Factory-assembled and -tested, wet rotor, inline centrifugal pumps.
- C. Pump Construction:
  - 1. Pump and Motor Assembly: Hermetically sealed, replaceable-cartridge type with motor and impeller on common shaft and designed for installation with pump and motor shaft horizontal. Pump internals shall be capable of being serviced without disturbing piping connections.
  - 2. Casing: Stainless Steel, with threaded or companion-flange connections.
  - 3. Impeller: Plastic.
  - 4. Motor: Variable speed, permanent magnet motor tested with the pump as one unit by manufacturer.
- D. Capacities and Characteristics:
  - 1. Capacity: 10 gpm.
  - 2. Total Dynamic Head: 35 feet W.C.
  - 3. Minimum Working Pressure: 125 psig.
  - 4. Maximum Continuous Operating Temperature: 205 deg F.
  - 5. Inlet and Outlet Size: 3/4 NPS.
  - 6. Pump Speed: 3250 RPM.
  - 7. Motor Horsepower: 1/8.
  - 8. Electrical Characteristics:
    - a. Volts: 115.
    - b. Phases: Single.
    - c. Hertz: 60.
    - d. Amperes: 1.4 A.

### 2.2 MOTORS

- A. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors.
  - 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. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in NFPA 70.

## 2.3 CONTROLS

- A. Thermostats: Electric; adjustable for control of hot-water circulation pump.
  1. Type: Water-immersion temperature sensor, for installation in piping.
  2. Range: 50 to 125 deg F.
  3. Enclosure: NEMA 250, Type 4X.
  4. Operation of Pump: On or off.
  5. Transformer: Provide if required.
  6. Power Requirement: 24 V, ac or 120 V, ac.
  7. Settings: Start pump at 110 deg F and stop pump at 115 deg F.

## PART 3 - EXECUTION

### 3.1 PUMP INSTALLATION

- A. Comply with HI 1.4.
- B. Install in-line, sealless centrifugal pumps with shaft horizontal unless otherwise indicated.
- C. Install horizontally mounted, in-line, close-coupled centrifugal pumps with shaft horizontal.
- D. Install continuous-thread hanger rods or uni-strut framing of size required to support pump weight.
  1. Install booster pumps on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Division 03 Section "Cast-in-Place Concrete."
  2. Comply with requirements for hangers and supports specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."
- E. Support connected domestic-water piping so weight of piping is not supported by pumps.
- F. Install thermostats in hot-water return piping.
- G. Provide full port ball valves on inlet and outlet connections of pumps.
- H. Engage a factory-authorized service representative to perform booster pump startup service.

### 3.2 CONNECTIONS

- A. Comply with requirements for piping specified in Section 221116 "Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to pumps to allow service and maintenance.

- C. Connect domestic water piping to pumps. Install suction and discharge piping equal to or greater than size of pump nozzles.
  - 1. Install flexible connectors adjacent to pumps in suction and discharge piping of the following pumps:
    - a. Horizontally mounted, in-line, close-coupled centrifugal pumps.
    - b. Comply with requirements for flexible connectors specified in Section 221116 "Domestic Water Piping."
  - 2. Provide shutoff valve and strainer 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 valves specified in Section 220523 "General Duty Valves for Plumbing Piping," and comply with requirements for strainers specified in Section 221119 "Domestic Water Piping Specialties."
  - 3. Install union, flanged, or grooved-joint connections on suction and discharge piping at connection to domestic-water piping. Comply with requirements for unions and flanges specified in Section 221116 "Domestic Water Piping."
  - 4. Install valved bypass, same size as and between piping, at connections to booster-pump suction and discharge piping. Comply with requirements for domestic-water piping specified in Section 221116 "Domestic Water Piping."
  - 5. Install flexible connectors, same size as piping, on piping connections to booster-pump suction and discharge piping. Comply with requirements for flexible connectors specified in Section 221116 "Domestic Water Piping."
  - 6. Install piping adjacent to booster pumps to allow service and maintenance.
  - 7. Provide pressure gage and snubber at suction of each pump and pressure gage and snubber at discharge of each pump. Install at integral pressure-gage tappings where provided or install pressure-gage connectors in suction and discharge piping around pumps. Comply with requirements for pressure gages and snubbers specified in Section 220519 "Meters and Gages for Plumbing Piping."
- D. Connect thermostats and timers to pumps that they control.

- E. Equipment Nameplates and Signs: Provide engraved metal equipment nameplate or sign on or near each of the following:
  - 1. Domestic Water Circulator Pump.
- F. Provide all nameplates or signs according to requirements specified in Section 220553 "Identification for Plumbing Piping and Equipment."

### 3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
  - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Tests and Inspections:

1. Perform visual and mechanical inspection.
  2. Leak Test: After installation, charge booster pump and test for leaks. Repair leaks and retest until no leaks exist.
  3. Operational Test: After electrical circuitry has been energized, start booster pumps to confirm proper motor rotation and booster-pump operation.
  4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Pumps and controls will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

#### 3.4 ADJUSTING

- A. Adjust 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.

#### 3.5 DEMONSTRATION

- A. Provide for a manufacturer-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain domestic water circulation pumps, and domestic water pressure booster pumps.

END OF SECTION 221123

**SECTION 22 13 13**  
**FACILITY SANITARY SEWERS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
1. PVC pipe and fittings.
  2. Ductile-iron, pressure pipe and fittings.
  3. Nonpressure-type transition couplings.
  4. Pressure-type pipe couplings.
  5. Expansion joints and deflection fittings.
  6. Backwater valves.
  7. Cleanouts.
  8. Manholes.
  9. Concrete.

**1.2 ACTION SUBMITTALS**

- A. Product Data: For each type of product.  
B. Shop Drawings: For manholes and valve pits. Include plans, elevations, sections, details, and frames and covers.

**1.3 INFORMATIONAL SUBMITTALS**

- A. Coordination Drawings:
1. Show system piping in profile. Draw profiles to horizontal scale of not less than 1'=50' and to vertical scale of not less than 1'=5'. Indicate manholes and piping. Show types, sizes, materials, and elevations of other utilities crossing system piping.
- B. Product Certificates: For each type of pipe and fitting.  
C. Field quality-control reports.

**PART 2 - PRODUCTS**

**2.1 PVC PIPE AND FITTINGS**

- A. PVC Corrugated Sewer Piping:
1. Pipe: ASTM F949, PVC corrugated pipe with bell-and-spigot ends for gasketed joints.
  2. Fittings: ASTM F949, PVC molded or fabricated, socket type.
  3. Gaskets: ASTM F477, elastomeric seals.

B. PVC Type PSM Sewer Piping:

1. Pipe: ASTM D3034, SDR 35, PVC Type PSM sewer pipe with bell-and-spigot ends for gasketed joints.
2. Fittings: ASTM D3034, PVC with bell ends.
3. Gaskets: ASTM F477, elastomeric seals.

**2.2 PE PIPE AND FITTINGS**

- A. PE, ASTM Pipe: ASTM D2239, SIDR No. 11; with PE compound number required to give pressure rating not less than 200 psig.
1. Insert Fittings for PE Pipe: ASTM D2609, made of PA, PP, or PVC with serrated male insert ends matching inside of pipe. Include bands or crimp rings.
  2. Molded PE Fittings: ASTM D3350, PE resin, socket- or butt-fusion type, made to match PE pipe dimensions and class.

**2.3 NONPRESSURE-TYPE TRANSITION COUPLINGS**

- A. Comply with ASTM C1173, elastomeric, sleeve-type, reducing or transition coupling; for joining underground nonpressure piping. Include ends of same sizes as piping to be joined and include corrosion-resistant-metal tension band and tightening mechanism on each end.
- B. 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.
- C. Unshielded, Flexible Couplings:
1. Description: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
- D. Ring-Type, Flexible Couplings:
1. 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. Description: ASTM C1461, sleeve-type, reducing- or transition-type mechanical coupling; molded from ASTM C1440, TPE material; with corrosion-resistant-metal tension band and tightening mechanism on each end.

**2.4 BACKWATER VALVES**

A. Cast-Iron Backwater Valves:

1. Description: ASME A112.14.1, gray-iron body and bolted cover, with bronze seat.
2. Combination horizontal and manual gate-valve type; with swing check valve, integral gate valve, and hub-and-spigot ends.

3. Terminal type; with bronze seat, swing check valve, and hub inlet.

## **2.5 CLEANOUTS**

- A. Cast-Iron Cleanouts:
  1. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
  2. Top-Loading Classification(s): Heavy Duty.
  3. Sewer Pipe Fitting and Riser to Cleanout: ASTM A74, Service class, cast-iron soil pipe and fittings.

## **2.6 MANHOLES**

- A. Standard Precast Concrete Manholes:
  1. Description: ASTM C478, 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. For analysis of floatation use a design groundwater elevation of 394.5.
  4. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section; with separate base slab or base section with integral floor.
  5. Riser Sections: 4-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 C990, bitumen or butyl rubber.
  8. Resilient Pipe Connectors: ASTM C923, cast or fitted into manhole walls, for each pipe connection.
  9. Steps: Individual FRP steps or FRP ladder; 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- to 16-inch intervals. Omit steps if total depth from floor of manhole to finished grade is less than 60 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. Include indented top design with lettering cast into cover, using wording equivalent to "SANITARY SEWER."
  2. Material: ASTM A536, Grade 60-40-18 ductile iron unless otherwise indicated.

## **2.7 CONCRETE**

- A. General: Cast-in-place concrete complying with ACI 318, ACI 350, and the following:
  - 1. Cement: ASTM C150/C150M, Type II.
  - 2. Fine Aggregate: ASTM C33/C33M, sand.
  - 3. Coarse Aggregate: ASTM C33/C33M, crushed gravel.
  - 4. Water: Potable.
- B. Portland Cement Design Mix: 5000 psi minimum, with 0.45 maximum water/cementitious materials ratio.
  - 1. Reinforcing Fabric: ASTM A1064/A1064M, steel, welded wire fabric, plain.
  - 2. Reinforcing Bars: ASTM A615/A615M, Grade 60 deformed steel.
- C. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water/cementitious materials ratio.
  - 1. Reinforcing Fabric: ASTM A1064/A1064M, steel, welded wire fabric, plain.
  - 2. Reinforcing Bars: ASTM A615/A615M, Grade 60 deformed steel.

## **PART 3 - EXECUTION**

### **3.1 EARTHWORK**

- A. Excavating, trenching, and backfilling are specified in Section 312000 "Earth Moving."

### **3.2 PIPING INSTALLATION**

- A. General Locations and Arrangements: Drawing plans and details to 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 manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.
- D. 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.
- E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.
- F. Install gravity-flow, nonpressure, drainage piping according to the following:
  - 1. Install piping pitched down in direction of flow, at minimum slope of 2 percent unless otherwise indicated.
  - 2. Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors.
  - 3. Install piping with 48-inch minimum cover.

4. Install PVC corrugated sewer piping according to ASTM D2321 and ASTM F1668.
  5. Install PVC Type PSM sewer piping according to ASTM D2321 and ASTM F1668.
- G. Clear interior of piping and manholes 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 corrugated sewer piping according to ASTM D2321.
  2. Join PVC Type PSM sewer piping according to ASTM D2321 and ASTM D3034 for elastomeric-seal joints or ASTM D3034 for elastomeric-gasket joints.
  3. Join dissimilar pipe materials with nonpressure-type, flexible couplings.
- B. Pipe couplings, expansion joints, and deflection fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
  1. Use nonpressure flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.
    - a. Unshielded flexible couplings for pipes of same or slightly different OD.
    - b. Unshielded, increaser/reducer-pattern, flexible couplings for pipes with different OD.
    - c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

### **3.4 MANHOLE INSTALLATION**

- A. General: Install manholes complete with appurtenances and accessories indicated.
- B. Install precast concrete manhole sections with sealants according to ASTM C891.
- C. Form continuous concrete channels and benches between inlets and outlet.
- D. 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.

### **3.5 CONCRETE PLACEMENT**

- A. Place cast-in-place concrete according to ACI 318.

### **3.6 BACKWATER VALVE INSTALLATION**

- A. Install horizontal-type backwater valves in piping manholes or pits.
- B. Install combination horizontal and manual gate-type valves in piping and in manholes.
- C. Install terminal-type backwater valves on end of piping and in manholes. Secure units to sidewalls.

### **3.7 CLEANOUT INSTALLATION**

- A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and use cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
  - 1. Use Heavy-Duty, top-loading classification cleanouts.
- B. Set cleanout frames and covers in earth in cast-in-place-concrete block, 18 by 18 by 12 inches deep. Set with tops 1 inch above surrounding grade.
- C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

### **3.8 CONNECTIONS**

- A. Connect nonpressure, gravity-flow drainage piping to building's sanitary building drains specified in Section 221316 "Sanitary Waste and Vent Piping."
- B. Make connections to existing piping and underground manholes.
  - 1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye fitting plus 6-inch overlap with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
  - 2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 4000 psi.
  - 3. Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes by cutting opening into existing unit large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of, and be flush with, inside wall unless otherwise indicated. On outside of pipe or manhole wall, encase entering connection in 6 inches of concrete for minimum length of 12 to provide additional support of collar from connection to undisturbed ground.
    - a. Use concrete that will attain a minimum 28-day compressive strength of 4000 psi unless otherwise indicated.
    - b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.
  - 4. 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.

### **3.9 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 at least 8-inch-thick, brick masonry bulkheads.
  2. 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: Excavate around manhole as required and use either procedure below:
  1. Remove manhole and close open ends of remaining piping.
  2. Remove top of manhole down to at least 36 inches below final grade. Fill to within 12 inches of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete.
- C. Backfill to grade according to Section 312000 "Earth Moving."

### **3.10 IDENTIFICATION**

- A. Comply with requirements in Section 312000 "Earth Moving" for underground utility identification devices. Arrange for installation of green warning tapes directly over piping and at outside edges of underground manholes.
  1. Use detectable warning tape over ferrous piping.
  2. Use detectable warning tape over nonferrous piping and over edges of underground manholes.

### **3.11 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.
  5. 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 10-foot head of water 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. Manholes: Perform hydraulic test according to ASTM C969.
- 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.

**END OF SECTION**

**SECTION 221316**  
**SANITARY WASTE AND VENT PIPING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. PVC pipe and fittings.

**1.2 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
- B. Shop Drawings: For hubless, single-stack drainage system. Include plans, elevations, sections, and details.

**1.3 INFORMATIONAL SUBMITTALS**

- A. Coordination Drawings: Plans and elevations, or Building Information Model (BIM) drawn to scale, showing items described in this Section and coordinated with all building trades.
- B. Field quality-control reports.

**1.4 FIELD CONDITIONS**

- A. Interruption of Existing Sanitary Waste Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service in accordance with requirements indicated:
  - 1. Notify Owner no fewer than five days in advance of proposed interruption of sanitary waste service.
  - 2. Do not proceed with interruption of sanitary waste service without Owner's written permission.

**1.5 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 PVC PIPE AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Charlotte Pipe and Foundry Company.
  2. National Pipe and Plastic, Inc.
  3. North America Pipe Corporation.
- B. Comply with NSF 14 for plastic piping components. Include "NSF-dwv" marking for plastic drain, waste, and vent piping and "NSF-sewer" marking for plastic sewer piping.
- C. Solid-Wall PVC Pipe: ASTM D2665 drain, waste, and vent.
- D. Cellular-Core PVC Pipe: ASTM F891, Schedule 40.
- E. PVC Socket Fittings: ASTM D2665, made in accordance with ASTM D3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.
- F. Adhesive Primer: ASTM F656.
- G. Solvent Cement: ASTM D2564.

## PART 3 - EXECUTION

### 3.1 PIPING INSTALLATION

- 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. Install piping to allow application of insulation.
- J. 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.
- 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 3 and smaller; 2 percent downward in direction of flow for piping NPS 4 and 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 aboveground PVC piping in accordance with ASTM D2665.
- M. 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 221319 "Sanitary Waste Piping Specialties."
- N. Install escutcheons for piping penetrations of walls, ceilings, and floors.
  1. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

### 3.2 JOINT CONSTRUCTION

- A. Plastic, Nonpressure-Piping, Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings in accordance with the following:
  1. Comply with ASTM F402 for safe-handling practice of cleaners, primers, and solvent cements.
  2. ABS Piping: Join in accordance with ASTM D2235 and ASTM D2661 appendixes.
  3. PVC Piping: Join in accordance with ASTM D2855 and ASTM D2665 appendixes.

### 3.3 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 individual, straight, horizontal piping runs:
    - a. 100 Ft. and Less: MSS Type 1, adjustable, steel clevis hangers.
    - b. Longer Than 100 Ft.: MSS Type 43, adjustable roller hangers.
    - c. Longer Than 100 Ft. if Indicated: MSS Type 49, spring cushion rolls.
  3. Multiple, Straight, Horizontal Piping Runs 100 Ft. or Longer: MSS Type 44 pipe rolls. Support pipe rolls on trapeze.
  4. Base of Vertical Piping: MSS Type 52 spring hangers.
- B. Install hangers for **PVC** piping, with maximum horizontal spacing and minimum rod diameters, to comply with manufacturer's written instructions, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.
- C. Support horizontal piping and tubing within 12 inches of each fitting and coupling.

### 3.4 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.
- 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 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
  - 2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

### 3.5 IDENTIFICATION

- A. Identify exposed sanitary waste and vent piping.
- B. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

### 3.6 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.

### 3.7 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. Exposed PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.
- E. Repair damage to adjacent materials caused by waste and vent piping installation.

### 3.8 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. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

END OF SECTION 221316

**SECTION 22 1319**  
**SANITARY WASTE PIPING SPECIALTIES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section includes the following sanitary drainage piping specialties:

1. Cleanouts
2. Floor drains
3. Roof flashing assemblies
4. Flashing materials
5. Trap guard device

**1.2 SUBMITTALS**

- A. Product data and warranty information for each type of product indicated in this section and for the final O & M Manuals.
- B. Product Information: Product operation and maintenance data for the final O & M Manuals.

**1.3 QUALITY ASSURANCE**

- A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.
- B. Provide sanitary waste piping specialties in compliance with Chapters 7, 8, 9 and 10 the International Plumbing Code of New York State (2020).
- C. Provide all building plumbing systems in compliance with the International Plumbing Code of New York State (2020) and all New York State Amendments.

**PART 2 - PRODUCTS**

**2.1 CLEANOUTS**

- A. Exposed Cast-Iron Cleanouts (CO):

1. Basis-of-Design Product: Subject to compliance with requirements, provide Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc. Model #4402 or a comparable product by one of the following:
  - a. Wade.
  - b. Zurn Plumbing Products Group; Specification Drainage Operation.
2. Standard: ASME A112.36.2M for cast iron for cleanout test tee.
3. Size: Same as connected drainage piping
4. Body Material: Hub-and-spigot, cast iron soil pipe T-branch or hubless, cast iron soil pipe test tee as required to match connected piping.

5. Closure: Countersunk or raised-head, bronze plug.
6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.

B. Cast-Iron Floor Cleanouts (FCO):

1. Basis-of-Design Product: Subject to compliance with requirements, provide Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc. Model # 4028 or a comparable product by one of the following:
  - a. Wade.
  - b. Zurn Plumbing Products Group; Specification Drainage Operation.
2. Standard: ASME A112.36.2M for heavy-duty, adjustable housing cleanout.
3. Size: Same as connected branch.
4. Type: Heavy duty, adjustable housing.
5. Body or Ferrule: Cast iron.
6. Clamping Device: as Required.
7. Outlet Connection: Inside calk or Spigot.
8. Closure: Bronze plug with tapered threads.
9. Adjustable Housing Material: Cast iron with threads.
10. Frame and Cover Material and Finish: Nickel bronze, copper alloy.
11. Frame and Cover Shape: Round.
12. Top Loading Classification: Heavy Duty.
13. Riser: ASTM A 74, Service class, cast-iron drainage pipe fitting and riser to cleanout.

C. Cast-Iron Wall Cleanouts (WCO):

1. Basis-of-Design Product: Subject to compliance with requirements, provide Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc. Model # 4531 or a comparable product by one of the following:
  - a. Wade.
  - b. Zurn Plumbing Products Group; Specification Drainage Operation.
2. Standard: ASME A112.36.2M. Include wall access.
3. Size: Same as connected drainage piping.
4. Body: Hub-and-spigot, cast-iron soil pipe T-branch or hubless, cast iron soil pipe test tee as required to match connected piping.
5. Closure: Countersunk or raised head, bronze plug.
6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
7. Wall Access: Round, stainless steel cover plate with screw.

## 2.2 FLOOR DRAINS

A. Cast-Iron Floor Drains: (FD-A) – Finished spaces and toilet rooms.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc. Model # 2010-A or a comparable product by one of the following:
  - a. Wade.
  - b. Zurn Plumbing Products Group; Specification Drainage Operation.

2. Standard: ASME A112.6.3.
3. Pattern: Floor drain.
4. Body Material: Gray iron.
5. Anchor Flange: Not required.
6. Clamping Device: Flashing clamp.
7. Outlet: 4 inch bottom.
8. Coating on Interior and Exposed Exterior Surfaces: Acid resistant enamel.
9. Sediment Bucket: Not required.
10. Top or Strainer Material: 7 inch diameter nickel bronze.
11. Top of Body and Strainer Finish: Nickel bronze.
12. Top Shape: Round.
13. Dimensions of Top or Strainer: 7 inch diameter.
14. Top Loading Classification: Heavy Duty.
15. Funnel: Not required.
16. Inlet Fitting: Gray iron, with threaded inlet and threaded or spigot outlet, and trap-seal primer valve connection].
17. Trap Material: Cast iron.
18. Trap Pattern: Deep seal P-trap.
19. Trap Features: Trap guard device. Refer to item 2.6

## 2.3 ROOF FLASHING ASSEMBLIES

### A. Roof Flashing Assemblies:

1. Basis-of-Design Product: Subject to compliance with requirements, provide products by one of the following:
  - a. Acorn Engineering Company; Elmdor/Stoneman Div.
  - b. Thaler Metal Industries Ltd.
  - c. Milcor Inc.; Commercial Products Group of Hart and Cooley Inc.

### B. Description: Manufactured assembly made of 6.0-lb/sq. ft., 0.0938 inch thick, copper flashing collar and skirt extending at least 10 inches from pipe, with galvanized steel boot reinforcement and counter flashing fitting.

1. Open Top Vent Cap: Without cap.
2. Low Silhouette Vent Cap: With vandal-proof vent cap.
3. Extended Vent Cap: With field installed, vandal-proof vent cap.

## 2.4 FLASHING MATERIALS

### A. Copper Sheet: ASTM B 749, Type L51121, copper bearing, with the following minimum weights and thicknesses, unless otherwise indicated:

1. General Use: 4.0-lb/sq. ft., 0.0625 inch thickness.
2. Vent Pipe Flashing: 3.0-lb/sq. ft., 0.0469 inch thickness.
3. Burning: 6-lb/sq. ft., 0.0938 inch thickness.

### B. Fasteners: Metal compatible with material and substrate being fastened.

- C. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.
- D. Solder: ASTM B 32, lead-free alloy.
- E. Bituminous Coating: SSPC-Paint 12, solvent type, bituminous mastic.

## 2.5 TRAP GUARD DEVICE

- A. Trap Guard:
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide a Rectorseal - Sure Seal Model SS2009V or a comparable product by one of the following:
    - a. Mifab - MiGuard
    - b. Provent.
    - c. ProSet.
  - 2. HDPE (high density polyethylene) housing with heavy duty proprietary silicone diaphragm and soft EPDM rubber sealing gasket. Floor rating ASSE 1072 AF GW.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Provide 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. Provide 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 cleanouts at the base of each vertical soil and waste stack.
- B. For floor cleanouts for piping below floors, provide cleanout deck plates with top flush with finished floor.
- C. For cleanouts located in concealed piping, provide cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.
- D. Provide 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. 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-inch total 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.
- 3. Provide floor drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
- 4. Provide individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.
- 5. Provide a trap guard device inside floor drain bodies below strainer.
- 6. Provide vandal resistant tools, screwdrivers to RCSD Facilities.
- E. Provide roof flashing assemblies on sanitary stack vents and vent stacks that extend through roof.
- F. Assemble open drain indirect waste fittings and install with top of hub 2 inches above floor.
- G. Provide deep seal traps on floor drains and other waste outlets unless obstructed by ceilings, steel structure or ductwork.
- H. Provide floor-drains and floor sinks and seal with vapor barrier construction at floor slabs. Refer to Architectural Plans for floor construction.
- I. Provide air gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.
- J. Provide sleeve flashing device with each riser and stack passing through floors with waterproof membrane.
- K. Provide traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless a trap is indicated.
- L. Provide trap guard devices in all floor drains bodies below strainer.

### 3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Provide piping adjacent to plumbing equipment to allow removal, service and maintenance.

### 3.3 FLASHING INSTALLATION

- A. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:
  - 1. Copper Sheets: Braze joints of copper sheets 6.0-lb/sq. ft., 0.0938 inch thickness or thicker. Solder joints of copper sheets 4.0-lb/sq. ft., 0.0625 inch thickness or thinner.
- B. Provide sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.
  - 1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches, and skirt or flange extending at least 8 inches around pipe.
  - 2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches around sleeve.

3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches around specialty.
- C. Set flashing on floors and roofs in solid coating of bituminous cement.
- D. Secure flashing into sleeve and specialty clamping ring or device.
- E. Provide flashing for piping passing through roofs with counter flashing or commercially made flashing fittings, according to Division 07 Section "Sheet Metal Flashing and Trim."
- F. Extend flashing up vent pipe passing through roofs and turn down into pipe, or secure flashing into cast iron sleeve having calking recess.

#### 3.4 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 Division 22 Section "Identification for Plumbing Piping and Equipment."

#### 3.5 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. Provide plugs in the ends of uncompleted sanitary sewer piping at the end of each work day or when work stops.

END OF SECTION 22 1319

## **SECTION 221319.13 SANITARY DRAINS**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. Section Includes:

- 1. Floor drains.

#### **1.3 DEFINITIONS**

- A. ABS: Acrylonitrile-butadiene styrene.
- B. FRP: Fiberglass-reinforced plastic.
- C. HDPE: High-density polyethylene.
- D. PE: Polyethylene.
- E. PP: Polypropylene.
- F. PVC: Polyvinyl chloride.

#### **1.4 ACTION SUBMITTALS**

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

### **PART 2 - PRODUCTS**

#### **2.1 DRAIN ASSEMBLIES**

- A. Sanitary drains shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 14 for plastic sanitary piping specialty components.

## 2.2 FLOOR DRAINS

### A. Cast-Iron Floor Drains:

1. <Manufacturers: Subject to compliance with requirements provide products by one of the following:
  - a. Jay R. Smith Mfg Co; a division of Morris Group International.
  - b. MIFAB, Inc.
  - c. WATTS; A Watts Water Technologies Company.
  - d. Zurn Industries, LLC.
2. Standard: ASME A112.6.3.
3. Pattern: Floor drain.
4. Body Material: Gray iron.
5. Seepage Flange: Required.
6. Anchor Flange: Required.
7. Clamping Device: Required.
8. Outlet: Bottom.
9. Sediment Bucket: Not required.
10. Top or Strainer Material: Nickel bronze.
11. Top of Body and Strainer Finish: Nickel bronze.
12. Top Shape: Round.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- 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-inch total 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.

### 3.2 CONNECTIONS

- A. Comply with requirements in Section 221316 "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 220553 "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 221319.13

**SECTION 22 1343**  
**FACILITY PACKAGED SEWAGE PUMPING STATIONS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes wet-well pumping stations with submersible sewage pumps.

**1.3 PERFORMANCE REQUIREMENTS**

- A. Pressure Rating of Sewage Pumps and Discharge Piping Components: At least equal to sewage pump discharge pressure, but not less than 125 psig.
- B. Pressure Rating of Other Piping Components: At least equal to system operating pressure.

**1.4 ACTION SUBMITTALS**

- A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories.
- B. Shop Drawings: Show fabrication and installation details for each sewage pumping station. Detail equipment assemblies and indicate dimensions; shipping, installed, and operating weights; loads; required clearances; method of field assembly; components; electrical characteristics; and location and size of each field connection.
  - 1. Wiring Diagrams: Power, signal, and control wiring.

**1.5 INFORMATIONAL SUBMITTALS**

- A. Product Certificates: For each type of sewage pump, signed by product manufacturer.
  - 1. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
  - 2. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- B. Qualification Data: For Installer.
- C. Source quality-control test reports.
- D. Field quality-control test reports.
- E. Warranty: Special warranty specified in this Section.

**1.6 CLOSEOUT SUBMITTALS**

- A. Operation and Maintenance Data: For equipment to include in emergency, operation, and maintenance manuals.

**1.7 QUALITY ASSURANCE**

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

- B. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. Comply with HI 1.1-1.2, "Centrifugal Pumps for Nomenclature and Definitions"; HI 1.3, "Centrifugal Pumps for Design and Application"; and HI 1.4, "Centrifugal Pumps for Installation, Operation and Maintenance," for sewage pumps.
- E. Comply with UL 778, "Motor-Operated Water Pumps," for sewage pumps.

## **1.8 PROJECT CONDITIONS**

- A. Interruption of Existing Sanitary Sewer Service: Do not interrupt drainage facilities used by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary sanitary sewer service according to requirements indicated:
  - 1. Notify Architect and Owner no fewer than two days in advance of proposed interruption of service.
  - 2. Do not proceed with interruption of sanitary sewer service without Architect's written permission.

## **1.9 WARRANTY**

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of sewage pumping stations that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures including shell.
    - b. Faulty operation of sewage pumps, controls, or accessories.
    - c. Deterioration of metals, metal finishes, and other materials beyond normal use.
  - 2. Warranty Period for Shells: Two years from date of Substantial Completion.
  - 3. Warranty Period for Sewage Pumps and Controls: Two years from date of Substantial Completion.
  - 4. Warranty Period for Accessories: Two years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.1 WET-WELL, SEWAGE PUMPING STATIONS**

- A. Wet-Well Sewage Pumping Stations with Submersible Sewage Pumps:
  - 1. Description: Circular wet well pump station for sewage pumps and dry equipment chamber for controls and accessories.
    - a. Orientation: Shell underground with top flush with grade.
    - b. Shell: Precast concrete circular concrete by Kistner Concrete.
    - c. Opening: Square with 48" x 48" clear opening centered in manhole.

- d. Access Hatch: 48" x 48" cast iron hinged two-leaf hatch and frame with self-engaging safety bar, rated for H-20 loading, style 8218 by EJ Co. or equal.
- e. Guide Rails: GR20-FL Guide Rail, 1-1/4" cast iron rails and lifting chain.
- f. Sewage Pumps: Two submersible-type sewage pumps, with guide rail, quick-disconnect system, controls, and piping. Include ASTM A48/A48M, Class 25, non-clog, cast-iron impeller capable of passing solids of 4 inch minimum diameter; and hermetically sealed motor with moisture-sensing probe, mechanical seals, and waterproof power cable.

2. Capacities and Characteristics:

- a. Diameter of Concrete Shell: 120-inch I.D.
- b. Height of Shell: 180 inches.
- c. Pumping Station, Inlet Pipe Size: 12 inch.
- d. Pumping Station, Discharge Pipe Size: 4 inch.
- e. Communitron: Not required.
- f. Sewage Pumps: Two per station required.
- g. Each Sewage Pump:

	Model	Design Pump Rate (GPM)	Speed (RPM)	Impeller	Discharge Size	Motor Size (HP)
Pump Station	Goulds WS D4 Series 388D4 WS5032D4 Submersible Sewage Pump, by Goulds or approved equal	174	1750	7.25" diameter, cast-iron – class 25, semi-open design capable of passing min. 3" solids	4"	5

1) Electrical Characteristics:

	Volts	Phases	Hertz
Pump Station	230	3	60

- B. Control Sequence of Operation: Cycle each sewage pump on and off automatically to maintain wet-well sewage level. Automatic control operates both pumps in parallel if wet-well level rises above starting point of low-level pump, until shutoff level is reached. Automatic alternator, with manual disconnect switch, changes sequence of lead-lag sewage pumps at completion of each pumping cycle.
- C. Float-Switch System: Senses variations of sewage level in wet well. Include high and low adjustments capable of operating on 6-inch minimum differential of liquid level.
- D. Motor Controllers: Magnetic, full voltage, non-reversing. Include undervoltage release, thermal-overload heaters in each phase, manual reset buttons, and hand-automatic selector switches. Include circuit breakers to provide branch-circuit protection for each controller.
- E. 230-V accessory controls with three-phase circuit breakers or fuses for each item.
- F. Control Panel: K-series duplex pump control panel equipped for 3-phase motor operation. Enclosure complying with UL 508A with separate compartments and covers for controllers, circuit breakers, transformers, alternators, and three-phase controls.

1. Mounting: Exterior, adjacent to pump station, see electrical plans for detail.

2. Enclosure: NEMA 250, Type 4X.
3. Required components:
  - a. Motor protective switches that provide adjustable overload
  - b. Alternating circuit board to provide pump control and alternation
  - c. Pump run indicator lights
  - d. Float status indicator lights mounted on circuit board
  - e. Float switch terminal block mounted on circuit board
  - f. Float switch terminal block mounted on circuit board
  - g. HOA switches for manual pump control
  - h. LED red alarm beacon and horn
- G. Install labels on panel face to identify switches and controls.
- H. Wiring: Tin-copper wiring.

## **2.2 ACCESSORIES**

- A. High-Water Audio Alarm: Horn for audio indication of station high-water level, energized by separate level-detecting device. Include alarm silencer switch and relay in station.
- B. Remote Alarm Circuit: Include contacts for connection to remote alarm panel.
- C. Ventilation: Ventilation piping as shown on Drawings.
- D. High-Water Audio Alarm: Horn for audio indication of station high-water level, energized by separate level-detecting device. Include alarm silencer switch and relay in station.

## **2.3 MOTORS**

- A. Fully submerged in high-grade turbine oil for lubrication, designed for continuous operation with Class 10 overload protection.
- B. Insulation: Class B
- C. Bearings: Upper and lower heavy duty ball bearing construction
- D. Motor Cover O-ring
- E. Power Cable: Severe duty rated, oil and water resistant. Motor end features epoxy seal.

## **2.4 MISCELLANEOUS MATERIALS**

- A. Structural Steel: ASTM A6/A6M, W or HP shapes, or ASTM A36/A36M, plates or beams.
- B. Grout: ASTM C1107, Grade B, nonshrink cement grout.
  1. Design Mix: 5000-psi, 28-day compressive strength.
- C. Concrete: Concrete is specified in Section 033000 "Cast-in-Place Concrete."

## **2.5 SOURCE QUALITY CONTROL**

- A. Test and inspect sewage pumps according to HI 1.6, "Centrifugal Pump Tests." Include test recordings that substantiate correct performance of pumps at design head, capacity, suction lift, speed, and horsepower.
- B. Test accessories and controls through complete cycle. Include test recordings that substantiate correct performance.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine roughing-in of sewerage piping systems to verify actual locations of piping connections before sewage pumping station installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 EARTHWORK**

- A. Excavation, trenching, and backfilling are specified in Section 312000 "Earth Moving."

### **3.3 INSTALLATION**

- A. Install sewage pumping station components where indicated, according to specific equipment and piping arrangement indicated.
- B. Fill voids between shell sidewalls, sleeves, and piping and make watertight seal with grout.

### **3.4 CONNECTIONS**

- A. Sanitary sewer piping installation requirements are specified in Section 221313 "Facility Sanitary Sewers." Drawings indicate general arrangement of piping.
- B. Install piping adjacent to machine to allow service and maintenance.
- C. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- D. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

### **3.5 IDENTIFICATION**

- A. Install identifying labels permanently attached to equipment.
- B. Install operating instruction signs permanently attached to equipment or on pumping station wall near equipment.
- C. Arrange for installing green detectable warning tape over outside edges of underground sewage pumping stations. Tape materials and their installation are specified in Section 312000 "Earth Moving."

### **3.6 FIELD QUALITY CONTROL**

- A. Testing Agency: Engage a qualified testing agency to perform field tests/inspections and prepare test reports.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.
- C. Perform tests and inspections and prepare test reports.
  - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- D. Tests and Inspections:

1. After installing pumping stations and after electrical circuitry has been energized, test for compliance with requirements. Furnish water required for pump tests.
  2. Leak Test: After installation, charge systems 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 proper motor rotation and unit operation.
  4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Remove and replace sewage pumping stations that do not pass tests and inspections and retest as specified above.

### **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. Adjust pump, accessory, and control settings, and safety and alarm devices.

### **3.8      DEMONSTRATION**

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain sewage pumping stations.

**END OF SECTION**

## SECTION 221429 SUMP PUMPS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Submersible sump pumps.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of pump indicated in this section and for the final O & M Manuals. Include rated capacities, operating characteristics, accessories, and manufacturer written warranties to be included in the final O & M Manuals.
- B. Wiring Diagrams: For power, signal, and control wiring.

#### 1.3 QUALITY ASSURANCE

- 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: Comply with UL 778 for motor-operated water pumps.

### PART 2 - PRODUCTS

#### 2.1 SUBMERSIBLE SUMP PUMPS (SP-1 & 2):

- A. Manufacturers: Basis of design Liberty Pumps model #280 Series with Simplex Pump Controller model #SX-Series. 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. Bell & Gossett; a Xylem brand.
  2. Grundfos.
  3. Stancor, Inc.
- B. Description: Factory-assembled and -tested sump-pump system with remote control panel, sensor probes, and floats.
- C. Pump Construction:
1. Pump and Motor Assembly: Enclosed submersible, end-suction, single-stage, close-coupled, overhung-impeller, ASME A17.1 compliant centrifugal sump pump.

2. Casing: Cast Iron, with legs that elevate pump to permit flow into impeller, and vertical discharge for piping connection.
  3. Impeller: Statically and dynamically balanced, with stainless steel shaft.
  4. Motor: Induction, tested with pump as one unit by manufacturer.
  5. Pump shall have stainless steel sensor probes with alarms, lights, and contacts for remote monitoring for oil, high liquid, and high amperage conditions.
- D. Motor: Hermetically sealed, capacitor-start type; with built-in overload protection; lifting eye or lug; and three-conductor, waterproof power cable of length required and with grounding plug and cable-sealing assembly for connection at pump.
- E. Capacities and Characteristics:
1. Capacity: 25 gpm.
  2. Total Dynamic Head: 25 ft-H<sub>2</sub>O.
  3. Maximum Fluid Temperature: 104 °F.
  4. Outlet Size: 1-1/2 NPS.
  5. Pump Control: On/Off, High-Level Alarm.
  6. Motor Horsepower: 1/2 HP.
  7. Pump Controls:
    - a. Enclosure: NEMA Type 1X, wall-mounted.
    - b. Switch Type: Pump-mounted sensing probe with redundant float.
    - c. Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.
    - d. High-level alarm: High-level liquid alarm enabled by float switch at a level in the pit above normal acceptable liquid levels. The rising of this float shall cause the controller to energize the audible alarm, remote alarm contacts, and the high-level visual alarm.
    - e. Remote Alarm Contacts: For remote alarm interface.
    - f. Silence Button: An external control mounted silence alarm button shall be provided to de-energize the audible alarm for the convenience of maintenance personnel. Depressing this button shall not clear any fault, but shall silence the alarm for 5 minutes. If a fault is removed and returns, the audible alarm shall reenergize as expected.
    - g. Self Diagnostic: The control shall include a “push to test” feature for all pump and control diagnostic functions. This test helps ensure the system is installed properly and remains in working order.
8. Electrical Characteristics:
- a. Volts: 115.
  - b. Phases: Single.
  - c. Hertz: 60.
  - d. Full-Load Amperes: 8 A.

## PART 3 - EXECUTION

### 3.1 EARTHWORK

- A. Excavation and filling are specified in Division 31 section "Earth Moving."

### 3.2 INSTALLATION

- A. Pump Installation Standard: Comply with HI 1.4 for installation of sump pumps.
- B. Provide spring loaded check valve and ball valve in discharge piping at accessible location at least 24 inches above finish floor. Check and ball valve to be same size as discharge piping.
- C. Provide remote control panel in elevator machine equipment room 42 – 60 inches above finish floor.

### 3.3 IDENTIFICATION

- A. Equipment Nameplates and Signs: Provide engraved metal equipment nameplate or sign on or near each of the following:
  1. Submersible Sump Pump.
- B. Provide all nameplates or signs according to requirements specified in Section 220553 "Identification for Plumbing Piping and Equipment."

END OF SECTION 221429

**SECTION 223300**  
**ELECTRIC, DOMESTIC-WATER HEATERS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

A. Section Includes:

1. Electric, storage, water heaters.
2. Water heater accessories.

**1.2 SUBMITTALS**

- A. Product Data: For each type of water heater indicated. Include accessories, appurtenances, equipment, and equipment supports. Include all materials and finishes, dimensions, and construction installation details.
- B. Operation and Maintenance Data: For water heaters to include operation and maintenance manuals, certifications by testing agencies, and manufacturer written warranties to be included in the final O & M Manuals.
- C. Shop Drawings:
  1. Wiring Diagrams: For power, signal, and control wiring.
- D. Coordination Drawings: Water heaters, drawn to scale, and coordinated with each other, using input from installers of the items involved:
  1. Piping connections. Include size, location, and elevation of each.

**1.3 QUALITY ASSURANCE**

- 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. ASME Compliance:
  1. Where ASME-code construction is indicated, fabricate and label commercial, domestic-water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
  2. Where ASME-code construction is indicated, fabricate and label commercial, finned-tube, domestic-water heaters to comply with ASME Boiler and Pressure Vessel Code: Section IV.
- C. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61 Annex, "Drinking Water System Components - Health Effects."

## 1.4 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of electric, domestic-water heaters that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Periods: From date of Substantial Completion.
    - a. Commercial, Electric, Domestic-Water Booster Heaters:
      - 1) Controls and Other Components: Five years.
    - b. Commercial, Electric, Storage, Domestic-Water Heaters:
      - 1) Storage Tank: Five years.
      - 2) Controls and Other Components: Five years.
    - c. Electric, Tankless, Domestic-Water Heaters: Five year(s).
    - d. Compression Tanks: Five years.

## PART 2 - PRODUCTS

### 2.1 ELECTRIC, STORAGE WATER HEATERS (WH-1):

- 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. Rheem Manufacturing Co.
  - 2. A. O. Smith Corp.
  - 3. Laars Heating Systems, Inc.
  - 4. Lochinvar, LLC.
- B. Standard: UL 1453.
- C. Storage-Tank Construction: ASME-code, steel, vertical arrangement.
  - 1. Tappings: Factory fabricated of materials compatible with tank and piping connections. Attach tappings to tank before testing.
    - a. NPS 2 and Smaller: Threaded ends according to ASME B1.20.1.
    - b. NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.
  - 2. Pressure Rating: 150 psig.
  - 3. Interior Finish: Comply with NSF 61 Annex barrier materials for potable-water tank linings, including extending lining material into tappings.
- D. Factory-Installed Storage-Tank Appurtenances:

1. Anode Rod: Replaceable.
  2. Drain Valve: Corrosion-resistant metal complying with ASSE 1005.
  3. Insulation: Comply with ASHRAE/IESNA 90.1.
  4. Jacket: Steel with enameled finish.
  5. Heating Elements: Electric, screw-in or bolt-on immersion type arranged in multiples of three.
  6. Temperature Control: Adjustable thermostat.
  7. Safety Controls: High-temperature-limit and low-water cutoff devices or systems.
  8. Relief Valves: ASME rated and stamped for combination temperature-and-pressure relief valves. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select one relief valve with sensing element that extends into storage tank.
- E. Special Requirements: NSF 5 construction
- F. Capacity and Characteristics:
1. Capacity: 80 gal.
  2. Recovery: 174 GPH at 90 deg F temperature rise.
  3. Temperature Setting: 115 deg F.
  4. Power Demand: 6.0 kW.
  5. Heating Elements:
    - a. Number of Elements: Two.
    - b. Kilowatts Each Element: 4.5 kW.
  6. Electrical Characteristics:
    - a. Volts: 208.
    - b. Phases: Single.
    - c. Hertz: 60.

## 2.2 DOMESTIC-WATER HEATER ACCESSORIES

A. Domestic-Water Compression Tanks:

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. A. O. Smith Corporation.
  - b. Honeywell.
  - c. TACO Comfort Solutions, Inc.
2. Description: Steel pressure-rated tank constructed with welded joints and factory-installed butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.
3. 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 Annex barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
  - c. Air-Charging Valve: Factory installed.
4. Capacity and Characteristics:
- a. Working-Pressure Rating: 150 psig.
  - b. Capacity Acceptable: 2.1 gal minimum.
- B. Drain Pans: Corrosion-resistant metal with raised edge. Comply with ANSI/CSA LC 3. Include dimensions not less than base of domestic-water heater, and include drain outlet not less than NPS 3/4 with ASME B1.20.1 pipe threads or with ASME B1.20.7 garden-hose threads.
- C. Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE/IESNA 90.1.
- D. Heat-Trap Fittings: ASHRAE 90.2.
- E. Pressure-Reducing Valves: ASSE 1003 for water. Set at 25-psig-maximum outlet pressure unless otherwise indicated.
- F. 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 domestic-water heater working-pressure rating. Select relief valves with sensing element that extends into storage tank.
- G. Pressure Relief Valves: ASME rated and stamped. Include pressure setting less than domestic-water heater working-pressure rating.
- H. Vacuum Relief Valves: ANSI Z21.22/CSA 4.4.
- I. Shock Absorbers: ASSE 1010 or PDI-WH 201, Size A water hammer arrester.
- J. Domestic-Water Heater Stands: Manufacturer's factory-fabricated steel stand for floor mounting, capable of supporting domestic-water heater and water. Include dimension that will support bottom of domestic-water heater a minimum of **18 inches** above the floor.
- K. Domestic-Water Heater Mounting Brackets: Manufacturer's factory-fabricated steel bracket for wall mounting, capable of supporting domestic-water heater and water.

### 2.3 SOURCE QUALITY CONTROL

- A. Factory Tests: Test and inspect domestic-water heaters specified to be ASME-code construction, according to ASME Boiler and Pressure Vessel Code.
- B. Hydrostatically test domestic-water heaters to minimum of one and one-half times pressure rating before shipment.

- C. Electric, domestic-water heaters will be considered defective if they do not pass tests and inspections. Comply with requirements in Division 01 section "Quality Requirements" for retesting and re-inspecting requirements and Division 01 section "Execution" for requirements for correcting the Work.
- D. Prepare test and inspection reports.

## PART 3 - EXECUTION

### 3.1 DOMESTIC-WATER HEATER INSTALLATION

- A. Electric, Storage Water Heater Mounting: Install electric, storage water heaters on concrete base. Comply with requirements for concrete bases specified in Division 03 section "Cast-in-Place Concrete."
  - 1. Exception: Omit concrete bases for commercial, electric, domestic-water heaters if installation on stand, bracket, suspended platform, or directly on floor is indicated.
  - 2. Maintain manufacturer's recommended clearances.
  - 3. Arrange units so controls and devices that require servicing are accessible.
  - 4. 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.
  - 5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
  - 6. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 7. Install anchor bolts to elevations required for proper attachment to supported equipment.
  - 8. Anchor domestic-water heaters to substrate.
- B. Electric, Tankless, Water Heater Mounting: Install electric, tankless, domestic-water heaters at least 18 inches above floor on wall bracket.
  - 1. Maintain manufacturer's recommended clearances.
  - 2. Arrange units so controls and devices that require servicing are accessible.
  - 3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 4. Install anchor bolts to elevations required for proper attachment to supported equipment.
  - 5. Anchor domestic-water heaters to substrate.
- C. Install electric, domestic-water heaters level and plumb, according to 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 220523 "General Duty Valves for Plumbing Piping."
- D. Install combination temperature-and-pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend commercial-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.

- E. Install combination temperature-and-pressure relief valves in water piping for electric, domestic-water heaters without storage. Extend commercial-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.
- F. 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 221119 "Domestic Water Piping Specialties."
- G. Install thermometers on outlet piping of electric, domestic-water heaters. Comply with requirements for thermometers specified in Section 220519 "Meters and Gages for Plumbing Piping."
- H. Install pressure-reducing valve with integral bypass relief valve in electric, domestic-water booster-heater inlet piping and water hammer arrester in booster-heater outlet piping. Set pressure-reducing valve for outlet pressure of 25 psig. Comply with requirements for pressure-reducing valves and water hammer arresters specified in Section 221119 "Domestic Water Piping Specialties."
- I. Install piping-type heat traps on inlet and outlet piping of electric, domestic-water heater storage tanks without integral or fitting-type heat traps.
- J. Fill electric, domestic-water heaters with water.
- K. Charge domestic-water compression tanks with air.

### 3.2 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 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 220553 "Identification for Plumbing Piping and Equipment."

### 3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
  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 proper operation.
  4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
  5. Contractor shall verify and adjust delivery water temperatures at water heater to building mixing valve and plumbing fixtures. Supply temperature to the building mixing valve shall not exceed 140 °F. Supply temperatures to fixtures shall not exceed 115 °F. Provide test and inspection reports for final O & M manual.
  6. Contractor shall field verify all system thermometers and temperature settings. Replace thermometers that are damaged or not working.
  7. Contractor shall field verify and adjust all hot water circulation return balance valves in the building to provide uniform flow throughout out the system and minimize delivery time of hot water to fixtures.
- B. Electric, domestic-water heaters will be considered defective if they do not pass tests and inspections. Comply with requirements in Division 01 section "Quality Requirements" for retesting and re-inspecting requirements and Division 01 section "Execution" for requirements for correcting the Work.
- C. Prepare test and inspection reports.

END OF SECTION 223300

**SECTION 224213.13**  
**COMMERCIAL WATER CLOSETS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

A. Section Includes:

1. Wall-mounted water closets.
2. Flushometer valves.
3. Toilet seats.
4. Supports.

**1.2 DEFINITIONS**

- A. Standard-Efficiency Flush Volume: 1.6 gal. per flush.
- B. High-Efficiency Flush Volume: 1.28 gal. or less per flush.
- C. WaterSense Fixture: Water closet and/or flushometer valve/tank certified by the EPA to meet the WaterSense performance criteria.

**1.3 ACTION SUBMITTALS**

A. Product Data:

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for water closets.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: Include diagrams for power and control wiring.

**1.4 CLOSEOUT SUBMITTALS**

A. Operation and Maintenance Data: For flushometer valves and electronic sensors to include in operation and maintenance manuals.

**1.5 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. 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. Standards:

1. Comply with ASME A112.19.2/CSA B45.1 for water closets.
2. Comply with ASME A112.19.5/CSA B45.15 for flush valves and spuds for water closets and tanks.
3. Comply with ASSE 1037/ASME A112.1037/CSA B125.37 for flush valves.
4. Comply with IAMPO/ANSI Z124.5 for water-closet (toilet) seats.
5. Comply with ASME A112.6.1M for water-closet supports.
6. Comply with ICC A117.1 for ADA-compliant water closets.
7. Comply with ASTM A1045 for flexible PVC gaskets used in connection of vitreous china water closets to sanitary drainage systems.
8. Comply with ASME A112.4.3 for plastic fittings used in connection of vitreous china water closets to sanitary drainage systems.

### 2.2 WALL-MOUNTED WATER CLOSETS

#### A. Water Closets - Wall Mounted, Top Spud:

1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
  - a. American Standard.
  - b. Kohler Co.
  - c. TOTO USA, INC.
2. Source Limitations: Obtain water closets from single source from single manufacturer.
3. Bowl:
  - a. Material: Vitreous china.
  - b. Type: Siphon jet.
  - c. Style: Flushometer valve.
  - d. Mounting Height: ADA compliant.
  - e. Rim Contour: Elongated.
  - f. Water Consumption: 1.28 gal. per flush.
  - g. Spud Size and Location: NPS 1-1/2; top.
  - h. Color: White.

### 2.3 FLUSHOMETER VALVES

#### A. Flushometer Valves - Piston, Sensor Operated, Battery Powered:

1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
  - a. Sloan Valve Company.

- b. Zurn Industries, LLC.
2. Source Limitations: Obtain flushometer valve from single source from single manufacturer.
3. Minimum Pressure Rating: 125 psig.
4. Features: Include integral check stop and backflow-prevention device.
5. Material: Brass body with corrosion-resistant components.
6. Style: Exposed.
7. Exposed Flushometer-Valve Finish: Chrome-plated.
8. Panel Finish: Chrome-plated or stainless steel.
9. Trip Mechanism: Battery-powered electronic sensor; listed and labeled as defined in NFPA 70, by qualified testing agency, and marked for intended location and application.
10. Consumption: 1.28 gal. per flush.
11. Minimum Inlet: NPS 1.
12. Minimum Outlet: NPS 1-1/4.

## 2.4 TOILET SEATS

### A. Toilet Seats:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Bemis Manufacturing Company.
  - b. Church Seats; Bemis Manufacturing Company.
  - c. Kohler Co.
2. Source Limitations: Obtain toilet seat from single source from single manufacturer.
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.
10. Surface Treatment: Antimicrobial.

## 2.5 SUPPORTS

### A. Water-Closet Carrier:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Jay R. Smith Mfg Co; a division of Morris Group International.
  - b. MIFAB, Inc.
  - c. WATTS; A Watts Water Technologies Company.
  - d. Zurn Industries, LLC.

2. Source Limitations: Obtain water-closet carrier from single source from single manufacturer.
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.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine roughing-in for water-supply piping and sanitary drainage and vent piping systems to verify actual locations of piping connections before water-closet installation.
- B. Examine walls and floors for suitable conditions where water closets will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION, GENERAL

#### A. Water-Closet Installation:

1. Install level and plumb.
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.

#### B. Support Installation:

1. Install supports, affixed to building substrate, for floor-mounted, back-outlet water closets.
2. Use carrier supports with waste-fitting assembly and seal.
3. Install floor-mounted, back-outlet water closets attached to building floor substrate, onto waste-fitting seals; and attach to support.
4. Install wall-mounted, back-outlet water-closet supports with waste-fitting assembly and waste-fitting seals; and affix to building substrate.
5. Measure support height installation from finished floor, not structural floor.

#### C. Flushometer-Valve Installation:

1. Install flushometer-valve, water-supply fitting on each supply to each water closet.
2. Attach supply piping to supports or substrate within pipe spaces behind fixtures.
3. Install lever-handle flushometer valves for accessible water closets with handle mounted on open side of water closet.
4. Install actuators in locations easily reachable for people with disabilities.
5. Install new batteries in battery-powered, electronic-sensor mechanisms.

#### D. Install toilet seats on water closets.

E. Wall Flange and Escutcheon Installation:

1. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations and within cabinets and millwork.
2. Install deep-pattern escutcheons if required to conceal protruding fittings.
3. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

F. Joint Sealing:

1. Seal joints between water closets and walls and floors using sanitary-type, one-part, mildew-resistant silicone sealant.
2. Match sealant color to water-closet color.
3. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

### 3.3 PIPING CONNECTIONS

- A. Connect water closets with water supplies and soil, waste, and vent piping. Use size fittings required to match water closets.
- B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."
- C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."
- D. Where installing piping adjacent to water closets, allow space for service and maintenance.

### 3.4 ADJUSTING

- A. Operate and adjust water closets and controls. Replace damaged and malfunctioning water closets, fittings, and controls.
- B. Adjust water pressure at flushometer valves to produce proper flow.
- C. Install new batteries in battery-powered, electronic-sensor mechanisms.

### 3.5 CLEANING AND PROTECTION

- A. Clean water closets and fittings with manufacturers' recommended cleaning methods and materials.
- B. Install protective covering for installed water closets and fittings.
- C. Do not allow use of water closets for temporary facilities unless approved in writing by Owner.

END OF SECTION 224213.13

SECTION 224213.16  
COMMERCIAL URINALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Wall-hung urinals.
- 2. Supports.

B. Related Requirements:

- 1. Section 224600 "Security Plumbing Fixtures" for security urinals.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for urinals.
- 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: Include diagrams for power, signal, and control wiring.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For flushometer valves[ **and electronic sensors**] to include in operation and maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

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

- 1. Flushometer-Valve Repair Kits

## PART 2 - PRODUCTS

### 2.1 WALL-HUNG URINALS

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. American Standard.
  - b. Kohler Co.
2. Fixture:
  - a. Standards: ASME A112.19.2/CSA B45.1 and ASME A112.19.5/CSA B45.15.
  - b. Material: Vitreous china.
  - c. Strainer or Trapway: with integral trap.
  - d. Color: White
  - e. Supply Spud Size: NPS ¾
  - f. Outlet Size NPS 2
  - g. Water Consumption: [0.5 gpf] [1.25 gpf].
3. Support: with fixture support plates and coupling with seal and fixture bolts and hardware matching fixture. [ **Include rectangular, steel uprights.** ]
4. Urinal Mounting Height: [Standard] and [Handicapped/elderly according to **ICC A117.1**].

### 2.2 URINAL FLUSHOMETER VALVES

#### A. Lever-Handle, Diaphragm Flushometer Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. American Standard.
  - b. Sloan Valve Company.
  - c. Zurn Industries, LLC.
2. Standard: ASSE 1037/ASME 112.1037/CSA B125.37.
3. Minimum Pressure Rating: 125 psig .
4. Features: Include integral check stop and backflow-prevention device.
5. Material: Brass body with corrosion-resistant components.
6. Exposed Flushometer-Valve Finish: Chrome plated.
7. Panel Finish: Chrome plated or stainless steel.
8. Style: [Exposed].
9. Consumption: [0.5 gal.] [1.0 gal.] <Insert value> per flush.
10. Minimum Inlet: [NPS 3/4 (DN 20)] [NPS 1 (DN 25)].
11. Minimum Outlet: [NPS 3/4 (DN 20)] [NPS 1-1/4 (DN 32)].

## 2.3 SUPPORTS

### A. Type I Urinal Carrier:

1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
  - a. Jay R. Smith Mfg Co; a division of Morris Group International.
  - b. MIFAB, Inc.
  - c. Zurn Industries, LLC.
2. Standard: ASME A112.6.1M.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before urinal installation.
- B. Examine walls and floors for suitable conditions where urinals will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

#### A. Urinal Installation:

1. Install urinals level and plumb according to rough-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 for the handicapped/elderly, according to ICC A117.1.

#### B. Support Installation:

1. Install supports, affixed to building substrate, for wall-hung urinals.
2. Use off-floor carriers with waste fitting and seal for back-outlet urinals.
3. Use chair-type carrier supports with rectangular steel uprights for accessible urinals.

#### C. Flushometer-Valve Installation:

1. Install flushometer-valve water-supply fitting on each supply to each urinal.
2. Attach supply piping to supports or substrate within pipe spaces behind fixtures.
3. Install lever-handle flushometer valves for accessible urinals with handle mounted on open side of compartment.

#### D. Wall Flange and Escutcheon Installation:

1. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations.
  2. Install deep-pattern escutcheons if required to conceal protruding fittings.
  3. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."
- E. Joint Sealing:
1. Seal joints between urinals and walls and floors using sanitary-type, one-part, mildew-resistant silicone sealant.
  2. Match sealant color to urinal color.
  3. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

### 3.3 PIPING CONNECTIONS

- A. Connect urinals with water supplies and soil, waste, and vent piping. Use size fittings required to match urinals.
- B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."
- C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."
- D. Where installing piping adjacent to urinals, allow space for service and maintenance.

### 3.4 ADJUSTING

- A. Operate and adjust urinals and controls. Replace damaged and malfunctioning urinals, fittings, and controls.
- B. Adjust water pressure at flushometer valves to produce proper flow.
- C. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

### 3.5 CLEANING AND PROTECTION

- A. Clean urinals and fittings with manufacturers' recommended cleaning methods and materials.
- B. Install protective covering for installed urinals and fittings.
- C. Do not allow use of urinals for temporary facilities unless approved in writing by Owner.

END OF SECTION 224213.16

**SECTION 224216.13**  
**COMMERCIAL LAVATORIES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

A. Section Includes:

1. Vitreous-china, wall-mounted lavatories.
2. Automatically operated lavatory faucets.
3. Supply fittings.
4. Waste fittings.
5. Lavatory supports.

**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 for lavatories.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: Include diagrams for power, signal, and control wiring of automatic faucets.

**1.3 INFORMATIONAL SUBMITTALS**

A. Coordination Drawings: Counter cutout templates for mounting of counter-mounted lavatories.

**1.4 CLOSEOUT SUBMITTALS**

A. Operation and Maintenance Data: For lavatories and faucets to include in operation and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
  - a. Servicing and adjustments of automatic faucets.

**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. Faucet Washers and O-Rings: Equal to 10 percent 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.

## PART 2 - PRODUCTS

### 2.1 VITREOUS-CHINA, WALL-MOUNTED LAVATORIES

- A. Lavatory - Rectangular, Vitreous China, Wall Mounted, with Back:
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. American Standard.
    - b. Kohler Co.
  2. Fixture:
    - a. Standard: ASME A112.19.2/CSA B45.1.
    - b. Type: For wall hanging.
    - c. Color: White.
    - d. Mounting Material: Chair carrier.
  3. Lavatory Mounting Height: Handicapped/elderly in accordance with ICC A117.1.

### 2.2 AUTOMATICALLY OPERATED LAVATORY FAUCETS

- A. Lavatory faucets 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 (AHJ), and with NSF 61/NSF 372, or 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. Lavatory Faucets - Automatic Type: Battery Powered Electronic Sensor Operated, Mixing:
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Chicago Faucets; Geberit Company.
    - b. Kohler Co.
    - c. Sloan Valve Company.
  2. Standards: ASME A112.18.1/CSA B125.1 and UL 1951.
  3. 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.
  4. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and fixture receptor.
  5. Body Type: Single hole.

6. Body Material: Commercial, solid-brass, or die-cast housing with brazed copper and brass waterway.
7. Finish: Polished chrome plate.
8. Maximum Flow Rate: 0.5 gpm.
9. Mounting Type: Deck, concealed.
10. Spout: Rigid type.
11. Spout Outlet: Aerator.

## 2.3 SUPPLY FITTINGS

- A. NSF Standard: Comply with NSF 61 and NSF 372 for supply-fitting materials that will be in contact with potable water.
- B. Standard: ASME A112.18.1/CSA B125.1.
- C. 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.
- D. Supply Stops: Chrome-plated-brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.
- E. Operation: Loose key.
- F. Risers:
  1. NPS 3/8.
  2. Chrome-plated, rigid-copper-pipe and brass straight or offset tailpieces riser.

## 2.4 WASTE FITTINGS

- A. Standard: ASME A112.18.2/CSA B125.2.
- B. Drain: Grid type with NPS 1-1/4 offset and straight tailpiece.
- C. Trap:
  1. Size: NPS 1-1/2 by NPS 1-1/4.
  2. Material:
    - a. Chrome-plated, two-piece, cast-brass trap and swivel elbow with 0.032-inch-thick brass tube to wall and chrome-plated, brass or steel wall flange.

## 2.5 LAVATORY SUPPORTS

- A. Lavatory Carrier:
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Jay R. Smith Mfg Co; a division of Morris Group International.
  - b. WATTS.
  - c. Zurn Industries, LLC.
2. Standard: ASME A112.6.1M.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before lavatory installation.
- B. Examine counters and walls for suitable conditions where lavatories will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install lavatories level and plumb in accordance with roughing-in drawings.
- B. Install supports, affixed to building substrate, for wall-mounted lavatories.
- C. Install accessible wall-mounted lavatories at handicapped/elderly mounting height for people with disabilities or the elderly, in accordance with ICC A117.1.
- D. 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 220518 "Escutcheons for Plumbing Piping."
- E. 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 079200 "Joint Sealants."
- F. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible lavatories. Comply with requirements in Section 220719 "Plumbing Piping Insulation."

### 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 221116 "Domestic Water Piping."
- C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

**3.4 ADJUSTING**

- A. Operate and adjust lavatories and controls. Replace damaged and malfunctioning lavatories, fittings, and controls.
- B. Install new batteries in battery-powered, electronic-sensor mechanisms.

**3.5 CLEANING AND PROTECTION**

- A. After completing installation of lavatories, inspect and repair damaged finishes.
- B. Clean lavatories, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.
- C. Provide protective covering for installed lavatories and fittings.
- D. Do not allow use of lavatories for temporary facilities unless approved in writing by Owner.

END OF SECTION 224216.13

**SECTION 230593**  
**TESTING, ADJUSTING, AND BALANCING FOR HVAC**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section Includes:

1. Testing, Adjusting, and Balancing of Air Systems:
  - a. Constant-volume air systems.
2. Testing, Adjusting, and Balancing of Hydronic Piping Systems:
  - a. Constant-flow hydronic systems.
3. Testing, adjusting, and balancing of fuel oil systems for HVAC.
4. Duct leakage tests verification.

**1.3 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.

**1.4 INFORMATIONAL SUBMITTALS**

- A. Contract Documents Examination Report: Within 30 days of Contractor's Notice to Proceed, submit the Contract Documents review report, as specified in Part 3.

- B. Examination Report: Submit a summary report of the examination review required in "Examination" Article.
- C. Certified TAB reports.
- D. Sample report forms.
- E. 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.

## 1.5 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**:
- C. Instrumentation Type, Quantity, Accuracy, and Calibration: Comply with requirements in ASHRAE 111, Section 4, "Instrumentation."
- 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.

## 1.6 FIELD CONDITIONS

- A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.
- B. 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, 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 ceiling plenums and underfloor air plenums used for HVAC to verify that they are properly separated from adjacent areas and sealed.
- F. Examine equipment performance data, including fan and pump 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.
- G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- H. Examine test reports specified in individual system and equipment Sections.
- I. 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.
- J. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.
- K. Examine temporary and permanent strainers. Verify that temporary strainer screens used during system cleaning and flushing have been removed and permanent strainer baskets are installed and clean.
- L. Examine control valves for proper installation for their intended function of isolating, throttling, diverting, or mixing fluid flows.

- M. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
- N. Examine system pumps to ensure absence of entrained air in the suction piping.
- O. Examine operating safety interlocks and controls on HVAC equipment.
- P. Examine control dampers for proper installation for their intended function of isolating, throttling, diverting, or mixing air flows.
- Q. 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, smoke, and fire 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. 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 233300 "Air Duct Accessories."

3. Where holes for probes are required in piping or hydronic equipment, install pressure and temperature test plugs to seal systems.
  4. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish in accordance with Section 230713 "Duct Insulation," Section 230716 "HVAC Equipment Insulation," and Section 230719 "HVAC Piping Insulation."
- B. 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.
- C. 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.

#### 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. For variable-air-volume systems, develop a plan to simulate diversity.
- D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.
- E. 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.
- F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- G. Verify that motor starters are equipped with properly sized thermal protection.
- H. Check dampers for proper position to achieve desired airflow path.
- I. Check for airflow blockages.

#### 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. 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-cooling, full-heating, economizer, and any other operating 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. Test system in economizer mode. Verify proper operation and adjust if necessary.
  6. Measure and record all operating data.
  7. Record final fan-performance data.

### 3.7 PROCEDURES FOR VARIABLE-AIR-VOLUME SYSTEMS

- A. Adjust the variable-air-volume systems as follows:
  1. Verify that the system static pressure sensor is located two-thirds of the distance down the duct from the fan discharge.
  2. Verify that the system is under static pressure control.
  3. Select the terminal unit that is most critical to the supply-fan airflow. Measure inlet static pressure, and adjust system static pressure control set point so the entering static pressure for the critical terminal unit is not less than the sum of the terminal-unit manufacturer's recommended minimum inlet static pressure plus the static pressure needed to overcome terminal-unit discharge system losses.
  4. Calibrate and balance each terminal unit for maximum and minimum design airflow as follows:
    - a. Adjust controls so that terminal is calling for maximum airflow. Some controllers require starting with minimum airflow. Verify calibration procedure for specific project.
    - b. Measure airflow and adjust calibration factor as required for design maximum airflow. Record calibration factor.
    - c. When maximum airflow is correct, balance the air outlets downstream from terminal units.
    - d. Adjust controls so that terminal is calling for minimum airflow.
    - e. Measure airflow and adjust calibration factor as required for design minimum airflow. Record calibration factor. If no minimum calibration is available, note any deviation from design airflow.
    - f. On constant volume terminals, in critical areas where room pressure is to be maintained, verify that the airflow remains constant over the full range of full cooling to full heating. Note any deviation from design airflow or room pressure.
  5. After terminals have been calibrated and balanced, test and adjust system for total airflow. Adjust fans to deliver total design airflows within the maximum allowable fan speed listed by fan manufacturer.
    - a. Set outside-air, return-air, and relief-air dampers for proper position that simulates minimum outdoor-air conditions.
    - b. Set terminals for maximum airflow. If system design includes diversity, adjust terminals for maximum and minimum airflow, so that connected total matches fan selection and simulates actual load in the building.
    - c. 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.
    - d. Where duct conditions are unsuitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.
  6. 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 any artificial loading of filters at the time static pressures are measured.
7. Set final return and outside airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.
    - a. Balance the return-air ducts and inlets.
    - b. Verify that terminal units are meeting design airflow under system maximum flow.
  8. Re-measure the inlet static pressure at the most critical terminal unit, and adjust the system static pressure set point to the most energy-efficient set point to maintain the optimum system static pressure. Record set point and give to controls Contractor.
  9. Verify final system conditions as follows:
    - a. Re-measure and confirm that minimum outdoor, return, and relief airflows are within design. Readjust to match design if necessary.
    - b. Re-measure and confirm that total airflow is within design.
    - c. Re-measure final fan operating data, speed, volts, amps, and static profile.
    - d. Mark final settings.
    - e. Test system in economizer mode. Verify proper operation and adjust if necessary. Measure and record all operating data.
    - f. Verify tracking between supply and return fans.

### 3.8 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.

### 3.9 PROCEDURES FOR TESTING, ADJUSTING, AND BALANCING EXISTING SYSTEMS

- A. Perform a preconstruction inspection of existing equipment that is to remain and be reused.
  1. Measure and record the operating speed, airflow, and static pressure of each fan and equipment with fan(s).
  2. Measure and record flows, temperatures, and pressures of each piece of equipment in each hydronic system. Compare the values to design or nameplate information, where information is available.
  3. Measure motor voltage and amperage. Compare the values to motor nameplate information.
  4. Check the refrigerant charge.
  5. Check the condition of filters.
  6. Check the condition of coils.
  7. Check the operation of the drain pan and condensate-drain trap.
  8. Check bearings and other lubricated parts for proper lubrication.
  9. Report on the operating condition of the equipment and the results of the measurements taken. Report deficiencies.

- B. TAB After Construction: Before performing testing and balancing of renovated existing systems, inspect existing equipment that is to remain and be reused to verify that existing equipment has been cleaned and refurbished in accordance with renovation scope indicated by Contract Documents. Verify the following:
1. New filters are installed.
  2. Coils are clean and fins combed.
  3. Drain pans are clean.
  4. Fans are clean.
  5. Bearings and other parts are properly lubricated.
  6. Deficiencies noted in the preconstruction report are corrected.
- C. Perform testing and balancing of existing systems to the extent that existing systems are affected by the renovation work.
1. Compare the indicated airflow of the renovated work to the measured fan airflows, and determine the new fan speed and the face velocity of filters and coils.
  2. Verify that the indicated airflows of the renovated work result in filter and coil face velocities and fan speeds that are within the acceptable limits defined by equipment manufacturer.
  3. If calculations increase or decrease the airflow rates and water flow rates by more than [5] <Insert number> percent, make equipment adjustments to achieve the calculated rates. If increase or decrease is [5] <Insert number> percent or less, equipment adjustments are not required.
  4. Balance each air outlet.

### 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 HVAC systems and general construction to allow access for performance-measuring and -balancing devices.
- B. Status Reports: Prepare weekly progress reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

### 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. Fan curves.
3. Manufacturers' test data.
4. Field test reports prepared by system and equipment installers.
5. 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.
16. 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 air and hydronic distribution systems. Present each system with single-line diagram and include the following:

1. Quantities of outdoor, supply, return, and exhaust airflows.
2. Water and steam flow rates.
3. Duct, outlet, and inlet sizes.
4. Pipe and valve sizes and locations.
5. Terminal units.
6. Balancing stations.
7. Position of balancing devices.

E. 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. Sheave make, size in inches, and bore.
  - i. Center-to-center dimensions of sheave and amount of adjustments in inches.
  - j. Number, make, and size of belts.
  - k. 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. Preheat-coil static-pressure differential in inches wg.
  - g. Cooling-coil static-pressure differential in inches wg.
  - h. Heating-coil static-pressure differential in inches wg.
  - i. List for each internal component with pressure-drop, static-pressure differential in inches wg.
  - j. Outdoor airflow in cfm.
  - k. Return airflow in cfm.
  - l. Outdoor-air damper position.

- m. Return-air damper position.
- n. [Vortex damper position].

### 3.12 VERIFICATION OF TAB REPORT

- A. The TAB specialist's test and balance engineer shall conduct the inspection in the presence of Owner.
- B. 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."
- C. 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.
- D. 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.
- E. Prepare test and inspection reports.

### 3.13 ADDITIONAL TESTS

- A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.
- B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 230593

## **SECTION 230713**

### **DUCT INSULATION**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section includes insulating the following duct services:
  1. Indoor, concealed supply and outdoor air.

##### **1.2 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. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
  1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
  2. Detail insulation application at elbows, fittings, dampers, specialties and flanges for each type of insulation.
  3. Detail application of field-applied jackets.
  4. Detail application at linkages of control devices.
- C. Samples: For each type of insulation and jacket indicated. Identify each Sample, describing product and intended use. Sample sizes are as follows:
  1. Sheet Form Insulation Materials: 12 inches square.
  2. Sheet Jacket Materials: 12 inches square.
  3. Manufacturer's Color Charts: For products where color is specified, show the full range of colors available for each type of finish material.

##### **1.3 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For qualified Installer.
- B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.
- C. Field quality-control reports.

## 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or craft training program, certified by the Department of Labor, Bureau of Apprenticeship and Training.

## 1.5 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.

## 1.6 COORDINATION

- A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 230529 "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.
- C. Coordinate installation and testing of heat tracing.

## 1.7 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 "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. 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, 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 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 II with factory-applied vinyl 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. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.
- C. Glass-Fiber and Mineral Wool Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

## 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[, **unless otherwise approved by the engineer-of-record**].
- 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 2 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 Roof Penetrations: Install insulation continuously through roof penetrations.
  1. Seal penetrations with flashing sealant.
  2. For applications requiring only indoor insulation, terminate insulation above roof 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 roof flashing at least 2 inches below top of roof flashing.
  4. Seal jacket to roof flashing with flashing sealant.
- B. 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.

- C. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- D. 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 078413 "Penetration Firestopping."
- E. Insulation Installation at Floor Penetrations:
  - 1. Duct: For penetrations through fire-rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct insulation. Overlap damper sleeve and duct insulation at least 2 inches.
  - 2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

### 3.5 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

- A. Comply with manufacturer's written installation instructions and ASTM C1710.
- B. 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.
- C. Square and Rectangular Ducts and Plenums:
  - 1. Provide 1/4 inch more per side for a tight, compression fit.
  - 2. Cut sheet insulation with the following dimensions:
    - a. Width of duct plus 1/4 inch, one piece.
    - b. Height of duct plus 1/4 inch, plus thickness of insulation, two pieces.
    - c. Width of duct plus 1/4 inch, plus two times the thickness of insulation, one piece.
  - 3. Insulate the bottom of the duct with the sheet from (a) above, then the sides with the two sheets from (b) above, and finally the top of the duct with the sheet from (c) above.
  - 4. Insulation without self-adhering backing:
    - a. Apply 100 percent coverage of manufacturer adhesive on the metal surface, then the insulation, except for the last 1/4 inch where sheets will butt together.
    - b. Roll sheet down into position.
    - c. Press two sheets together under compression and apply adhesive at the butt joint to seal the two sheets together.
  - 5. Insulation with self-adhering backing:
    - a. Peel back release paper in 6- to 8-inch increments and line up sheet.
    - b. Press firmly to activate adhesive.
    - c. Align material and continue to line up correctly, pressing firmly while slowly removing release paper.
    - d. Allow 1/4-inch overlap for compression at butt joints.

- e. Apply adhesive at the butt joint to seal the two sheets together.
  6. Insulate duct brackets following manufacturer's written installation instructions.
- D. Circular Ducts:
1. Determine the circumference of the duct, using a strip of insulation the same thickness as to be used.
  2. Cut the sheet to the required size.
  3. Apply 100 percent coverage of manufacturer adhesive on the metal surface then the insulation.
  4. Apply manufacturer adhesive to the cut surfaces along 100 percent of the longitudinal seam. Press together the seam at the ends and then the middle. Close the entire seam starting from the middle.

### 3.6 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.
  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 [100] [50] <Insert number> percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
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.

### 3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. Tests and Inspections:
  1. Inspect ductwork, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection is limited to one location(s) for each duct system defined in the "Duct Insulation Schedule, General" Article.
- D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

### 3.8 DUCT INSULATION SCHEDULE, GENERAL

- A. Plenums and Ducts Requiring Insulation:
  1. Indoor, concealed supply and outdoor air.
- 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.

### 3.9 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

- A. Concealed, round and flat-oval, supply-air duct insulation is one of the following:
  1. Flexible Elastomeric: 1 inch thick.

2. Glass-Fiber Blanket: 1-1/2 inches thick and 0.75 lb/cu. ft. nominal density.
- B. Concealed, rectangular, supply-air duct insulation is one of the following:
1. Flexible Elastomeric: 1 inch thick.
  2. Glass-Fiber Blanket: 1-1/2 inches thick and 0.75 lb/cu. ft. nominal density.

END OF SECTION 230713

## **SECTION 233113 METAL DUCTS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

A. Section Includes:

1. Single-wall rectangular ducts and fittings.
2. Sheet metal materials.
3. Hangers and supports.

#### **1.2 ACTION SUBMITTALS**

A. Shop Drawings:

1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
2. Factory- and shop-fabricated ducts and fittings.
3. Duct layout indicating sizes, configuration, liner material, and static-pressure classes.

#### **1.3 INFORMATIONAL SUBMITTALS**

- A. Coordination Drawings: A single set of plans or BIM model, drawn to scale, showing the items described in this Section, and coordinated with all building trades.
- B. Welding certificates.
- C. Field quality-control reports.

#### **1.4 QUALITY ASSURANCE**

- A. Welding Qualifications: Qualify procedures and personnel in accordance with the following:

### **PART 2 - PRODUCTS**

#### **2.1 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.
  - 2. For ducts with longest side 36 inches or greater, use flange joint connector Type T-22, T-24, T-24A, T-25a, or T-25b. Factory-fabricated flanged duct connection system may be used if submitted and approved by engineer of record.
- 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."
- 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."

## 2.2 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 A603.
- E. Steel Cables for Stainless Steel Ducts: Stainless steel complying with ASTM A492.
- F. Steel Cable End Connections: Galvanized-steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
- G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- H. Trapeze and Riser Supports:
  - 1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
  - 2. Supports for Stainless Steel Ducts: Stainless steel shapes and plates.
  - 3. 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. 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.
- K. 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 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.
  - 5. Do not use powder-actuated concrete fasteners for seismic restraints. Coordinate with Section 230548 "Vibration and Seismic Controls for HVAC."
- 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.

### 3.4 DUCTWORK CONNECTIONS

- A. Make connections to equipment with flexible connectors complying with Section 233300 "Air Duct Accessories."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

### 3.5 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 099113 "Exterior Painting" and Section 099123 "Interior Painting."

### 3.6 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.
- 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 is to 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.

### 3.7 DUCT CLEANING

- A. Clean new duct system(s) before testing, adjusting, and balancing.
- B. For cleaning of existing ductwork, see Section 230130.52 "Existing HVAC Air Distribution System Cleaning."
- C. Use duct cleaning methodology as indicated in NADCA ACR.
- D. 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 233300 "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.

E. 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.

F. 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.

G. 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 fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
5. 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.
6. Provide drainage and cleanup for wash-down procedures.
7. 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.

3.8 STARTUP

- A. Air Balance: Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

3.9 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, seal class, and leakage class as indicated below.

B. Supply Ducts:

1. Ducts Connected to Variable-Air-Volume Air-Handling Units:

- a. Pressure Class: Positive 3-inch wg.
- b. Minimum SMACNA Seal Class: A.
- c. SMACNA Leakage Class for Rectangular: 2.
- d. SMACNA Leakage Class for Round and Flat Oval: 2.

C. Exhaust Ducts:

1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:

- a. Pressure Class: Negative 1-inch wg.
- b. Minimum SMACNA Seal Class: A if negative pressure, and A if positive pressure.
- c. SMACNA Leakage Class for Rectangular: 2.
- d. SMACNA Leakage Class for Round and Flat Oval: 2.

END OF SECTION 233113

**SECTION 23 3400**  
**HVAC FANS**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Section Includes
  1. The ceiling-mounted circulation fan is the model scheduled with the capacities indicated. The fan shall be furnished with mounting hardware and a remote control.
- B. Summary of Work
  1. Installation of the fan, miscellaneous or structural metal work (if required), field electrical wiring, cable, conduit, fuses and disconnect switches, other than those addressed in the installation scope of work, shall be provided by others.

**1.02 RELATED SECTIONS**

- A. Division 23 0000 Heating, Ventilating, and Air Conditioning (HVAC)
- B. Division 26 0000 Electrical

**1.03 REFERENCES**

- A. International Organization for Standardization (ISO)
- B. National Electrical Code (NEC)
- C. National Fire Protection Association (NFPA)
- D. Norma Oficial Mexicana (NOM)
- E. Underwriters Laboratories (UL)

**1.04 SUBMITTALS**

- A. Shop Drawings: Drawings detailing product dimensions, weight, and attachment methods
- B. Product Data: Specification sheets on the ceiling-mounted fan, specifying electrical and installation requirements, features and benefits, and controller information
- C. Product Documentation: The manufacturer shall furnish a copy of all installation, operation, and maintenance instructions for the fan.

**1.05 QUALITY ASSURANCE**

- A. Certifications
  1. Safety
    - a. The fan assembly, as a system, shall be Intertek/ETL-certified and built pursuant to the following standards.
      - 1) United States
        - (a) UL 507. Standard for Safety for Electric Fans.
    - b. The fan motor shall be Intertek/ETL-certified and built pursuant to the following standards.
      - 1) United States
        - (a) UL 1004-1. Standard for Safety for Rotating Electrical Machines - Part 1 General Requirements.
        - (b) UL 1004-3. Standard for Safety for Thermally Protected Motors.
        - (c) UL 1004-7. Standard for Safety for Electronically Protected Motors.
  - B. Manufacturer Qualifications
    1. The fan and any accessories shall be supplied by Big Ass Fans, which has a minimum of twenty (20) years of product experience.
    2. ISO 9001-compliant

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver product in original, undamaged packaging with identification labels intact. The fan shall be new, free from defects, and factory tested.

- B. The fan and its components must be stored in a safe, dry location until installation.

## 1.07 WARRANTY

- A. The manufacturer shall replace any products or components defective in material or workmanship, free of charge to the customer (including transportation charges within the USA, FOB Lexington, KY), pursuant to the complete terms and conditions of the Big Ass Fans Warranty in accordance to the following schedule:
- |                               |  |
|-------------------------------|--|
| 1. Application                | Period of Coverage   |
| 2. Residential                | 3 years  |
| 3. Non-Residential            | 2 years  |
| 4. Labor to repair the defect | will be provided free of charge at the Big Ass Fans service center for defects arising during the Warranty Period. |

## PART 2 PRODUCT

### 2.01 2.1 MANUFACTURER

- A. Delta T LLC, dba Big Ass Fans, PO Box 11307, Lexington, Kentucky 40575.  
Phone (877) 244-3267. Fax (859) 233-0139. Website: [www.bigassfans.com](http://www.bigassfans.com)

### 2.02 2.2 HAIKU® OUTDOOR FANS

- A. Complete Unit
1. Regulatory Requirements: The fan assembly, as a system, shall be Intertek/ETL-certified and built pursuant to relevant safety standards as described above. The fan shall be suitable for use in wet locations when installed in a GFCI protected branch circuit.
  2. Quality: The fan shall display good workmanship in all aspects of its construction. Field balancing of the airfoils shall not be necessary.
  3. Colors: Airfoil colors may be selected by the architect or owner as described in 2.2.C, "Airfoils."
  4. Optional Accessories
    - a. An LED light as indicated on the drawings.
- B. Mounting System
1. Low Profile Mount
    - a. The low profile mount shall be suitable for flat ceilings with heights ranging from 8–10.5 ft (2.4–3.2 m).
    - b. The fan shall be equipped with a mounting plate, rubber bumpers, mounting brackets, a compact, low-profile motor hub assembly, and mounting hardware.
    - c. The fan shall be available with a diameter of 52" (132 cm) or 60" (152 cm).
  2. Universal Mount
    - a. The universal mount shall be suitable for flat or sloped ceilings with heights ranging from 10.5–14+ ft (3.2–4.3+ m).
    - b. The fan shall be equipped with a mounting bracket, canopy, mounting ball and wedge, extension tubes, wiring cover, motor hub, and mounting hardware.
    - c. A 7-inch (178-mm), 20-inch (508-mm), and 32-inch (813-mm) extension tube shall be included with 52-inch (132-cm) and 60-inch (152-cm) fans. A 20-inch (508-mm) and 32-inch (813-mm) extension tube shall be included with 84-inch (213-cm) fans.
    - d. The fan shall be available with a diameter of 52" (132 cm), 60" (152 cm), or 84" (213 cm).
- C. Airfoils
1. The fan shall be equipped with three airfoils spanning a total diameter of 52" (132 cm), 60" (152 cm), or 84" (213 cm), as specified by the Owner's Representative.
  2. Airfoils shall be made of aluminum.
  3. Airfoils shall be available in a caramel wood grain, cocoa wood grain, oil-rubbed bronze, satin nickel, white, or black finish, as specified by the architect or owner.
- D. Motor

1. The fan shall have an electronically commutated motor (ECM) rated for 100–240 VAC, single-phase.
  2. For 52" (132-cm) and 60" (152-cm) fans, the motor shall draw 1.2–30 watts depending on the speed at which the fan is operated.
  3. For 84" (213-cm) fans, the motor shall draw 3.7–60 watts depending on the speed at which the fan is operated.
  4. The fan shall be designed for continuous operation in ambient temperatures of 32–104°F (0–40°C) and a humidity range of 20–90% (non-condensing).
- E. Safety Cable**
1. The fan shall be equipped with a safety cable that provides an additional means of securing the fan assembly to the building structure. The safety cable shall be 1.5 mm in diameter and fabricated of aircraft steel.
  2. Field construction of safety cables is not permitted.
- F. Remote Control**
1. The fan shall be equipped with a compact IR remote control that allows intuitive operation of the fan in the following modes:
    - a. Speeds 0 (Off) through 7 (High).
    - b. Sleep Mode: Sleep Mode shall reduce the fan speed by one increment every hour until the lowest speed is reached. When the programmed time period ends, the fan automatically turns off. Sleep Mode is only active when Timer Mode is used.
    - c. Timer Mode: In Timer Mode, the fan runs at a set speed until the programmed time period ends.
    - d. Whoosh Mode: Silently varies fan speed to mimic cooling natural breezes.
  2. Each operating mode shall be indicated by a pattern on the fan mode indicators, which shall be located on the bottom of the fan and shall be visible from the floor. All indicators shall automatically turn off approximately five seconds after the last control button is pressed.
  3. The remote shall be 1.6 in. wide × 5.5 in. tall × 0.9 in. thick (40 mm wide x 140 mm tall x 23 mm thick) and shall operate on two AAA batteries (included).

### PART 3 EXECUTION

#### 3.01 PREPARATION

- A. The fan location must have an appropriate ceiling-mounted outlet box marked, "Acceptable for Fan Support." If there is not an appropriate outlet box already installed at the location, one must be installed on a ceiling joist or beam and be properly wired. Additional mounting options may be available. Consult the installation guide for additional details.
- B. The fan location must be free from obstacles such as lights, cables, or other building components.
- C. Check the fan location for proper electrical requirements. Consult the installation guide for appropriate circuit requirements.

#### 3.02 INSTALLATION

- A. Install the fan according to the manufacturer's installation guide, which includes acceptable mounting methods.
- B. Required Distances
  1. For 52-inch (132-cm) and 60-inch (152-cm) fans, the airfoils must be at least 7 ft (2.1 m) above the floor.
  2. For 84-inch (213-cm) fans, the airfoils must be at least 8 ft (2.4 m) above the floor.
  3. The airfoils must have at least 2 ft (0.6 m) clearance from all obstructions.

#### END OF SECTION

## **SECTION 233713.13**

### **AIR DIFFUSERS**

#### **PART 1 - GENERAL**

##### **1.1 RELATED DOCUMENTS**

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

##### **1.2 SUMMARY**

- A. Section Includes:

- 1. Rectangular and square ceiling diffusers.

##### **1.3 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. Diffuser Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

##### **1.4 INFORMATIONAL SUBMITTALS**

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

- 1. Ceiling suspension assembly members.
  - 2. Method of attaching hangers to building structure.
  - 3. Size and location of initial access modules for acoustical tile.
  - 4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
  - 5. Duct access panels.

- B. Source quality-control reports.

#### **PART 2 - PRODUCTS**

##### **2.1 RECTANGULAR AND SQUARE CEILING DIFFUSERS**

- A. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:

1. Krueger-HVAC; brand of Johnson Controls International plc, Global Products.
  2. Price Industries Limited.
  3. Titus; brand of Johnson Controls International plc, Global Products.
- B. Devices shall be specifically designed for variable-air-volume flows.
- C. Material: Aluminum.
- D. Finish: Baked enamel, white.
- E. Pattern: Fixed.
- F. Dampers: Radial opposed blade.
- G. Accessories:
1. Equalizing grid.
  2. Plaster ring.
  3. Safety chain.
  4. Wire guard.
  5. Sectorizing baffles.
  6. Operating rod extension.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas where diffusers 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 diffusers level and plumb.
- B. Ceiling-Mounted Outlets and Inlets: 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 diffusers 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 diffusers to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 233713.13

**SECTION 26 0519**  
**LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES**

**PART 1 GENERAL**

**1.01 SUMMARY**

A. Section Includes:

1. Copper building wire rated 600 V or less.

**PART 2 PRODUCTS**

**2.01 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. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. General Cable; Prysmian Group North America.
2. Okonite Company (The).
3. Southwire Company, LLC.

C. 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."

D. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.

E. Conductor Insulation:

1. Type NM: Comply with UL 83 and UL 719.
2. Type RHH and Type RHW-2: Comply with UL 44.
3. Type USE-2 and Type SE: Comply with UL 854.
4. Type THHN and Type THWN-2: Comply with UL 83.
5. Type THW and Type THW-2: Comply with NEMA WC-70/ICEA S-95-658 and UL 83.
6. Type XHHW-2: Comply with UL 44.

## **PART 3 EXECUTION**

### **3.01 CONDUCTOR MATERIAL APPLICATIONS**

- A. Feeders:
  - 1. Copper; solid or stranded for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits:
  - 1. Copper, Solid or stranded for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

### **3.02 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS**

- A. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway .

### **3.03 INSTALLATION OF CONDUCTORS AND CABLES**

- 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 260533 "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 260529 "Hangers and Supports for Electrical Systems."
- G. conduit between the fire-alarm control panel and the transmitter. Install number of conductors and electrical supervision for connecting wiring as needed to suit monitoring function.

### **3.04 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 and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inch of slack.

**3.05 IDENTIFICATION**

- A. Identify and color-code conductors and cables according to Section 260553 "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.

**3.06 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS**

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

**END OF SECTION**

**SECTION 26 0526**  
**GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Section Includes:
  - 1. Grounding and bonding conductors.
  - 2. Grounding and bonding clamps.
  - 3. Grounding and bonding bushings.
  - 4. Grounding and bonding hubs.
  - 5. Grounding and bonding connectors.
  - 6. Grounding and bonding busbars.
  - 7. Signal reference grids.
  - 8. Grounding (earthing) electrodes.
- B. Related Requirements:
  - 1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

**1.02 ACTION SUBMITTALS**

- A. Product Data:
  - 1. For each type of product indicated.
- B. Shop Drawings: Plans showing dimensioned locations of grounding features described in "Field Quality Control" Article, including the following:
  - 1. Test wells.
  - 2. Rod electrodes.
- C. Field Quality-Control Submittals:
  - 1. Field quality-control reports.

**1.03 CLOSEOUT SUBMITTALS**

- A. Operation and Maintenance Data:
  - 1. In addition to items specified in Section 260010 "Supplemental Requirements for Electrical," include the following:
    - A. Plans showing locations of grounding features described in "Field Quality Control" Article, including the following:

- 1. Test wells.
  - 2. Rod electrodes.
  - 3. Grounding arrangements and connections for separately derived systems.
- B. Instructions for periodic testing and inspection of grounding features at test wells grounding connections for separately derived systems based on NFPA 70B.
- 1. Tests must determine if ground-resistance or impedance values remain within specified maximums, and instructions must recommend corrective action if values do not.
  - 2. Include recommended testing intervals.

## PART 2 PRODUCTS

### **2.01 GROUNDING AND BONDING CONDUCTORS**

- A. Equipment Grounding Conductor:
  - 1. General Characteristics: 600 V, THHN/THWN-2, copper wire or cable, green color, in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- B. Isolated Equipment Grounding Conductor:
  - 1. General Characteristics: 600 V, THHN/THWN-2, copper wire or cable, green color with one or more yellow stripes, in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- C. ASTM - Bare Copper Grounding and Bonding Conductor:
  - 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. ERICO; brand of nVent Electrical plc.
    - B. Harger Lightning & Grounding; business of Harger, Inc.
  - 2. Referenced Standards: Complying with one or more of the following:
    - A. Soft or Annealed Copper Wire: ASTM B3
    - B. Concentric-Lay Stranded Copper Conductor: ASTM B8.
    - C. Tin-Coated Soft or Annealed Copper Wire: ASTM B33.

### **2.02 GROUNDING AND BONDING CLAMPS**

- A. Description: Clamps suitable for attachment of grounding and bonding conductors to grounding electrodes, pipes, tubing, and rebar. Grounding and bonding clamps specified in this article are also suitable for use with communications applications; see

- Section 270526 "Grounding and Bonding for Communications Systems," for selection and installation guidelines.
- B. Source Limitations: Obtain products from single manufacturer.
  - C. Performance Criteria:
    - 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. Listing Criteria:
      - A. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.
      - B. Grounding and Bonding Equipment for Communications: UL CCN KDSH; including UL 467.

## **2.03 GROUNDING AND BONDING BUSHINGS**

- A. Description: Bonding bushings connect conduit fittings, tubing fittings, threaded metal conduit, and unthreaded metal conduit to metal boxes and equipment enclosures, and have one or more bonding screws intended to provide electrical continuity between bushing and enclosure. Grounding bushings have provision for connection of bonding or grounding conductor and may or may not also have bonding screws.
- B. Source Limitations: Obtain products from single manufacturer.
- C. Performance Criteria:
  - 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. Listing Criteria:
    - A. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.
- D. UL KDER - Bonding Bushing:
  - 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. Crouse-Hinds; brand of Eaton, Electrical Sector.
    - B. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
    - C. Raco Taymac Bell; brand of Hubbell Electrical Solutions; Hubbell Incorporated.

2. General Characteristics: Threaded bushing with insulated throat.
- E. UL KDER - Grounding Bushing:
  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. Crouse-Hinds; brand of Eaton, Electrical Sector.
    - B. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
    - C. Raco Taymac Bell; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
  2. General Characteristics: Threaded bushing with insulated throat and mechanical-type wire terminal.

## **2.04 GROUNDING AND BONDING HUBS**

- A. Description: Hubs with certified grounding or bonding locknut.
- B. Source Limitations: Obtain products from single manufacturer.
- C. Performance Criteria:
  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. Listing Criteria:
    - A. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.
- D. UL KDER - Grounding and Bonding Hub:
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - A. Crouse-Hinds; brand of Eaton, Electrical Sector.
    - B. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
    - C. Penn-Union Corp.; subsidiary of Nesco, Inc.
  2. General Characteristics: Insulated, gasketed, watertight hub with mechanical-type wire terminal.

## **2.05 GROUNDING AND BONDING CONNECTORS**

- A. Source Limitations: Obtain products from single manufacturer.

B. Performance Criteria:

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. Listing Criteria:

- A. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.  
B. Grounding and Bonding Equipment for Communications: UL CCN KDSH; including UL 467.

C. UL KDER - Pressure-Type Grounding and Bonding Busbar Cable Connector:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- A. Crouse-Hinds; brand of Eaton, Electrical Sector.  
B. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.  
C. Penn-Union Corp.; subsidiary of NESCO, Inc.

2. General Characteristics: Copper or copper alloy, for compression bonding of one or more conductor directly to copper busbar. Listed for direct burial.

D. UL KDER - Lay-In Lug Mechanical-Type Grounding and Bonding Busbar Terminal:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- A. Crouse-Hinds; brand of Eaton, Electrical Sector.  
B. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.  
C. Penn-Union Corp.; subsidiary of NESCO, Inc.

2. General Characteristics: Mechanical-type, copper rated for direct burial terminal with set screw.

E. UL KDER - Crimped Lug Pressure-Type Grounding and Bonding Busbar Terminal:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- A. Crouse-Hinds; brand of Eaton, Electrical Sector.  
B. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.  
C. Penn-Union Corp.; subsidiary of NESCO, Inc.
2. General Characteristics: Cast silicon bronze, solderless compression-type wire terminals; with long barrel and two holes spaced on 5/8 or 1 inch centers for two-bolt connection to busbar.

F. UL KDER - Signal Reference Grid Grounding and Bonding Connector:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- A. Crouse-Hinds; brand of Eaton, Electrical Sector.

- B. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
- C. Penn-Union Corp.; subsidiary of NESCO, Inc.
- 2. General Characteristics: Combination of compression wire connectors, access floor grounding clamps, bronze U-bolt grounding clamps, and copper split-bolt connectors, designed for the purpose.

## 2.06 GROUNDING AND BONDING BUSBARS

- A. Description: Miscellaneous grounding and bonding device that serves as common connection for multiple grounding and bonding conductors.
- B. Source Limitations: Obtain products from single manufacturer.
- C. Performance Criteria:
  - 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. Listing Criteria:
    - A. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.
  - 3. Sustainability Characteristics:
- D. UL KDER - Equipment Room Grounding and Bonding Busbar:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - A. Crouse-Hinds; brand of Eaton, Electrical Sector.
    - B. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
    - C. Penn-Union Corp.; subsidiary of NESCO, Inc.
  - 2. General Characteristics:
    - A. Bus: Rectangular bar of annealed copper.
    - B. Mounting Stand-Off Insulators: Lexan or PVC.
      - 1. Comply with UL 891 for use in 600 V switchboards, impulse tested at 5000 V.
  - 3. Options:
    - A. Dimensions: 1/4 by 4 inch in cross section; length as indicated on Drawings.
    - B. Predrilled Hole Pattern: 9/32 inch holes spaced 1-1/8 inch apart.
    - C. Mounting Hardware: Stand-off brackets that provide 2 inch clearance to access rear of bus. Brackets and bolts must be stainless steel.
- E. UL KDER - Rack and Cabinet Bonding Busbar:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - A. Crouse-Hinds; brand of Eaton, Electrical Sector.
  - B. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
  - C. Penn-Union Corp.; subsidiary of NESCO, Inc.
2. General Characteristics:
  - A. Bus: Rectangular bar of hard-drawn solid copper.
  - B. Horizontal Mounting Dimensions: Designed for mounting in 19 inch wide equipment racks or cabinets.
  - C. Vertical Mounting Dimensions: Designed for mounting in 72 inch high equipment racks or cabinets.
  - D. Predrilled Hole Pattern: Accepts connectors for grounding and bonding conductor sizes 14 AWG to 2/0 AWG.
  - E. Mounting Hardware: Stainless steel or copper-plated, for attachment to rack.

## 2.07 GROUNDING (EARTHING) ELECTRODES

- A. Description: Grounding electrodes include rod electrodes, ring electrodes, metal underground water pipes, metal building frames, concrete-encased electrodes, and pipe and plate electrodes.
- B. Source Limitations: Obtain products from single manufacturer.
- C. Performance Criteria:
  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. Listing Criteria:
    - A. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.
- D. UL KDER - Rod Electrode Insert drawing designation:
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - A. Crouse-Hinds; brand of Eaton, Electrical Sector.
    - B. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
    - C. Penn-Union Corp.; subsidiary of NESCO, Inc.
  2. General Characteristics: Copper-clad steel; 5/8 inch by 8 ft.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Examine facility's grounding electrode system and equipment grounding for compliance with requirements for maximum ground-resistance level and other conditions affecting performance of grounding and bonding of electrical system.
- B. Inspect test results of grounding system measured at point of electrical service equipment connection.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with connection of electrical service equipment only after unsatisfactory conditions have been corrected.

### **3.02 SELECTION OF BUSBARS**

- A. Grounding Bus: Install in electrical equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
  1. Install bus horizontally, on insulated spacers 2 inch minimum from wall, 6 inch above finished floor unless otherwise indicated.
  2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down; connect to horizontal bus.

### **3.03 SELECTION OF GROUNDING AND BONDING CONDUCTORS**

- A. Conductors: Install solid conductor for 8 AWG and smaller, and stranded conductors for 6 AWG and larger unless otherwise indicated.
- B. Custom-Length Insulated Equipment Bonding Jumpers: 6 AWG, 19-strand, Type THHN.
- C. Bonding Conductor: 4 AWG or 6 AWG, stranded conductor.
- D. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inch wide and 1/16 inch thick.
- E. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inch wide and 1/16 inch thick.
- F. Underground Grounding Conductors: Install bare copper conductor, 2/0 AWG 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.

### **3.04 SELECTION OF CONNECTORS**

- A. Conductor Terminations and Connections:
  - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
  - 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
  - 3. Connections to Ground Rods at Test Wells: Bolted connectors.
  - 4. Connections to Structural Steel: Welded connectors.

### **3.05 INSTALLATION**

- A. Comply with manufacturer's published instructions.
- B. Reference Standards:
  - 1. Consult Architect for resolution of conflicting requirements.
- C. Special Techniques:
  - 1. Conductors:
    - A. 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.
    - 2. 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.
      - A. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
      - B. Make connections with clean, bare metal at points of contact.
      - C. Make aluminum-to-steel connections with stainless steel separators and mechanical clamps.
      - D. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
      - E. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
      - F. 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 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 disconnect-type connection is required, use bolted clamp.
    - G. 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 bolted clamp connector or bolt lug-type connector to pipe flange by using one of lug bolts of flange. Where 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.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with bolted connector.
  3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.
- H. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.
- I. Grounding for Steel Building Structure: Install driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 ft apart.
3. Electrodes:
- A. 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 below-grade connections.
  - B. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least same distance from other grounding electrodes, and connect to service grounding electrode conductor.
  - C. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes are specified in Section 260543 "Underground Ducts and Raceways for Electrical Systems," and must be at least 12 inch deep, with cover.
    1. Install at least one test well for each service unless otherwise indicated. Install at ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.
  - D. Concrete-Encased Electrode (Ufer Ground):
    1. Fabricate in accordance with NFPA 70; use minimum of 20 ft of bare copper conductor not smaller than 4 AWG.
      - A. If concrete foundation is less than 20 ft long, coil excess conductor within base of foundation.
      - B. Bond grounding conductor to reinforcing steel in at least four locations and to anchor bolts. Extend grounding conductor below grade and connect to building's grounding grid or to grounding electrode external to concrete.
    2. Fabricate in accordance with NFPA 70; using electrically conductive coated steel reinforcing bars or rods, at least 20 ft long. If reinforcing

is in multiple pieces, connect together by usual steel tie wires or exothermic welding to create required length.

4. Grounding Underground Distribution System Components:

- A. Comply with IEEE C2 grounding requirements.
- B. Grounding Handholes: Install driven ground rod through handhole floor, close to wall, and set rod depth so 4 inch will extend above finished floor. If necessary, install ground rod before manhole is placed and provide 1/0 AWG bare, tinned-copper conductor from ground rod into manhole through waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with double wrapping of pressure-sensitive insulating tape or heat-shrunk insulating sleeve from 2 inch above to 6 inch below concrete. Seal floor opening with waterproof, nonshrink grout.
- C. Grounding Connections to Manhole Components: Bond exposed-metal parts such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole, to ground rod or grounding conductor. Make connections with 4 AWG minimum, stranded, hard-drawn copper bonding conductor. Train conductors level or plumb around corners and fasten to manhole walls. Connect to cable armor and cable shields in accordance with manufacturer's published instructions with splicing and termination kits.

5. Equipment Grounding:

- A. Install insulated equipment grounding conductors with feeders and branch circuits.
- B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
  - 1. Feeders and branch circuits.
  - 2. Lighting circuits.
  - 3. Receptacle circuits.
  - 4. Single-phase motor and appliance branch circuits.
  - 5. Three-phase motor and appliance branch circuits.
  - 6. Flexible raceway runs.
  - 7. Metal-clad cable runs.
- C. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.
- D. Isolated Equipment Enclosure Circuits: For designated equipment supplied by branch circuit or feeder, isolate equipment enclosure from supply circuit raceway with nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure, and install separate insulated equipment grounding conductor. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of applicable derived system or service unless otherwise indicated.
- E. Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

### **3.06 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 calibrated torque wrench in accordance with manufacturer's published instructions.
  3. Test completed grounding system at each location where maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells. Make tests at ground rods before conductors are connected.
    - A. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
    - B. Perform tests by fall-of-potential method in accordance with IEEE Std 81.
    - C. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.
  4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to record of tests and observations. Include number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.
- B. Nonconforming Work:
1. Grounding system will be considered defective if it does not pass tests and inspections.
  2. Remove and replace defective components and retest.
- C. Collect, assemble, and submit test and inspection reports.
1. Report measured ground resistances that exceed the following values:
    - A. Power and Lighting Equipment or System with Capacity of 500 kVA and Less:  $10 \Omega$ .

### **3.07 PROTECTION**

- A. After installation, protect grounding and bonding cables and 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 26 0533**  
**RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

A. Section Includes:

1. Type EMT-S raceways and elbows.
2. Type ERMC-S raceways, elbows, couplings, and nipples.
3. Type PVC raceways and fittings.
4. Fittings for conduit, tubing, and cable.
5. Threaded metal joint compound.
6. Solvent cements.
7. Surface metal raceways and fittings.
8. Wireways and auxiliary gutters.
9. Cabinets, cutout boxes, junction boxes, and pull boxes.

**1.02 ACTION SUBMITTALS**

A. Product Data: For the following:

1. Wireways and auxiliary gutters.
2. Surface metal raceways.
3. Floor boxes.
4. Cabinets and cutout boxes.

**PART 2 - PRODUCTS**

**2.01 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. 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. Allied Tube & Conduit; Atkore International.
  - b. Calconduit; Atkore International.
  - c. Topaz Lighting & Electric.
2. Material: Steel.
3. Options:

- a. Exterior Coating: Zinc .
- b. Interior Coating: Zinc .
- c. Minimum Trade Size: Metric designator 21 (trade size 3/4).
- d. Colors: As indicated on Drawings.

## **2.02 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. 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. Allied Tube & Conduit; Atkore International.
  - b. Crouse-Hinds; brand of Eaton, Electrical Sector.
  - c. Topaz Lighting & Electric.
- 2. Exterior Coating: Zinc.
- 3. Options:
  - a. Interior Coating: Zinc with organic top coating .
  - b. Minimum Trade Size: Metric designator 21 (trade size 3/4).
  - c. Colors: As indicated on Drawings.

## **2.03 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 80 Rigid PVC Conduit (PVC-80) and Fittings:

- 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. ABB, Electrification Business.
  - b. Calconduit; Atkore International.
  - c. Topaz Lighting & Electric.
- 2. Dimensional Specifications: Schedule 80.
- 3. Options:
  - a. Minimum Trade Size: Metric designator 21 (trade size 3/4).
  - b. Markings: For use with maximum 90 deg C wire.

### C. Type EB Rigid PVC Concrete-Encased Underground Conduit (PVC-EB) and Fittings:

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. JM Eagle; J-M Manufacturing Co., Inc.
  - b. Southern Pipe, Inc.
2. Dimensional Specifications: Type EB.
3. Options:
  - a. Minimum Trade Size: Metric designator 53 (trade size 2) .

## **2.04 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. 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. Crouse-Hinds; brand of Eaton, Electrical Sector.
  - b. Raco Taymac Bell; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
  - c. Topaz Lighting & Electric.
2. General Characteristics: UL 514B and UL Category Control Number DWTT.
3. Options:
  - a. Material: Steel .
  - b. Coupling Method: Raintight compression coupling with distinctive color gland nut .
  - 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. 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. Allied Tube & Conduit; Atkore International.
  - b. Crouse-Hinds; brand of Eaton, Electrical Sector.
  - c. Raco Taymac Bell; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
2. General Characteristics: UL 514B and UL Category Control Number FKAV.
3. Options:
  - a. Material: Steel .
  - b. Coupling Method: Raintight compression coupling with distinctive color gland nut .
  - 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 LFMC Raceways:

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. Liquid Tight Connector Co.
2. General Characteristics: UL 514B and UL Category Control Number DXAS.

**2.05 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.

B. 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. ABB, Electrification Business.

**2.06 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.

**2.07 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. 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. ABB, Electrification Business.
  - b. Cooper B-line; brand of Eaton, Electrical Sector.
  - c. Hoffman; brand of nVent Electrical plc.
2. 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.
- 3. Options:
  - a. Degree of Protection: Type 3R unless otherwise indicated.
  - b. Wireway Covers: Flanged-and-gasketed type unless otherwise indicated.

## **2.08 CABINETS, CUTOUT BOXES, JUNCTION BOXES, AND PULL 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. Non-Environmental Characteristics: UL 50.
    - b. Environmental Characteristics: UL 50E.
- B. Outdoor Polymeric Junction and Pull Boxes:
  - 1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.
  - 2. 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. Allied Tube & Conduit; Atkore International.
    - b. Hubbell Wiring Device-Kellems; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
    - c. Topaz Lighting & Electric.
  - 3. Additional Characteristics: UL Category Control Number BGUZ.
  - 4. Options:
    - a. Degree of Protection: Type 3SX .

## **PART 3 - EXECUTION**

### **3.01 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. Direct Buried: PVC-80 .
  - 2. Concrete Encased in Trench: PVC-80 PVC-EB.
- C. Raceway Fittings: Select fittings in accordance with NEMA FB 2.10 guidelines.
  - 1. ERMC and IMC: Provide threaded type fittings unless otherwise indicated.

### **3.02 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 3R unless otherwise indicated.
- C. Exposed Boxes Installed Less Than 2.5 m Above Floor:
  1. Boxes with knockouts or unprotected openings are prohibited.
  2. Provide exposed cover. Flat covers with angled mounting slots or knockouts are prohibited.

### **3.03 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 260529 "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..
  9. Raceway Terminations at Locations Subject to Moisture or Vibration:
- 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. 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 raceways or electrical items on "explosion-relief" walls or rotating equipment.
10. Do not install conduits within 2 inch of the bottom side of a metal deck roof.
11. 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.
12. 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.
13. 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 EMT-A, ERMC-A, and FMC-A:
  - a. Do not install aluminum raceways or fittings in contact with concrete or earth.
2. 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.
3. 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.
4. Types FMC and LFMC:

- a. Comply with NEMA RV 3. Provide a maximum of 36 inch of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
- 5. Type PVC:
  - a. Do not install Type PVC 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) parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place raceway close to slab support. Secure raceways to reinforcement at maximum 10 ft intervals.
  - 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.
  - 5. Change from ENT to PVC-80, ERMC before rising above floor.
- E. Stub-ups to Above Recessed Ceilings:
  - 1. Provide EMT, IMC, or ERMC for raceways.
  - 2. Provide a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- F. 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.
- G. Raceways Penetrating Rooms or Walls with Acoustical Requirements:
  - 1. Seal raceway openings on both sides of rooms or walls with acoustically rated putty or firestopping.

### **3.04 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.

### **3.05 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 top 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. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.
- K. Do not install aluminum boxes, enclosures, or fittings in contact with concrete or earth.
- L. 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.
- M. Boxes and Enclosures in Areas or Walls with Acoustical Requirements:
  - 1. Seal openings and knockouts in back and sides of boxes and enclosures with acoustically rated putty.
  - 2. Provide gaskets for wallplates and covers.

### **3.06 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.

### **3.07 CLEANING**

- A. Boxes: Remove construction dust and debris from device boxes, outlet boxes, and floor-mounted enclosures before installing wallplates, covers, and hoods.

**END OF SECTION**

**SECTION 26 0553**  
**IDENTIFICATION FOR ELECTRICAL SYSTEMS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section Includes:
  - 1. Labels.
  - 2. Bands and tubes.
  - 3. Tapes and stencils.
  - 4. Tags.
  - 5. Signs.
  - 6. Cable ties.
  - 7. Miscellaneous identification products.
- B. Related Requirements:
  - 1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

**1.02 ACTION SUBMITTALS**

- A. Product Data:
  - 1. Labels.
  - 2. Bands and tubes.
  - 3. Tapes and stencils.
  - 4. Tags.
  - 5. Signs.
  - 6. Cable ties.
  - 7. Miscellaneous identification products.
- B. Identification Schedule: For each piece of electrical equipment and electrical system components to be index of nomenclature for electrical equipment and system components used in identification signs and labels. Use same designations indicated on Drawings.

**PART 2 - PRODUCTS**

**2.01 PERFORMANCE REQUIREMENTS**

- A. Comply with ASME A13.1 and IEEE C2.
- B. Comply with 29 CFR 1910.144 for color identification of hazards; 29 CFR 1910.145 for danger, caution, warning, and safety instruction signs and tags; and the following:

1. Fire-protection and fire-alarm equipment, including raceways, must be finished, painted, or suitably marked safety red.
  2. Ceiling-mounted hangers, supports, cable trays, and raceways must be finished, painted, or suitably marked safety yellow where less than 7.7 ft above finished floor.
- C. Signs, labels, and tags required for personnel safety must comply with the following standards:
1. Safety Colors: NEMA Z535.1.
  2. Facility Safety Signs: NEMA Z535.2.
  3. Safety Symbols: NEMA Z535.3.
  4. Product Safety Signs and Labels: NEMA Z535.4.
  5. Safety Tags and Barricade Tapes for Temporary Hazards: NEMA Z535.5.
- D. Comply with NFPA 70E requirements for arc-flash warning labels.
- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, must comply with UL 969.
- F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
  1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

## **2.02 COLOR AND LEGEND REQUIREMENTS**

- A. Raceways and Cables Carrying Circuits at 1000 V or Less:
1. Black letters on orange field.
  2. Legend: Indicate voltage and system or service type.
- B. Color-Coding for Phase- and Voltage-Level Identification, 1000 V or Less: Use colors listed below for ungrounded service feeder and branch-circuit conductors.
1. Color must be factory applied or field applied for sizes larger than 8 AWG if authorities having jurisdiction permit.
  2. Colors for 208Y/120 V Circuits:
    - a. Phase A: Black.
    - b. Phase B: Red.
    - c. Phase C: Blue.
  3. Color for Neutral: White.
  4. Color for Equipment Grounds: Green.
- C. Warning Label Colors:
1. Identify system voltage with black letters on orange background.
- D. Warning labels and signs must include, but are not limited to, the following legends:
1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."

2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 3 FEET MINIMUM."
- E. Equipment Identification Labels:
1. Black letters on white field.

## **2.03    LABELS**

- A. Self-Adhesive Labels: Polyester, thermal, transfer-printed, 3 mil thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.
1. Minimum Nominal Size:
    - a. 1-1/2 by 6 inch for raceway and conductors.
    - b. 3-1/2 by 5 inch for equipment.
    - c. As required by authorities having jurisdiction.

## **2.04    TAPES AND STENCILS**

- A. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
- B. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; not less than 3 mil thick by 1 to 2 inch wide; compounded for outdoor use.
- C. Floor Marking Tape: 2 inch wide, 5 mil pressure-sensitive vinyl tape, with yellow and black stripes and clear vinyl overlay.
- D. Underground-Line Warning Tape:
1. Tape:
    - a. Recommended by manufacturer for method of installation and suitable to identify and locate underground electrical and communications utility lines.
    - b. Printing on tape must be permanent and may not be damaged by burial operations.
    - c. Tape material and ink must be chemically inert and not be subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.
  2. Color and Printing:
    - a. Comply with APWA Uniform Color Code using NEMA Z535.1 safety colors.
    - b. Inscriptions for Red Tapes: "CAUTION BURIED ELECTRIC LINE BELOW".
    - c. Inscriptions for Orange Tapes: "CAUTION BURIED COMMUNICATION LINE BELOW".
  3. Tape:
    - a. Reinforced, detectable three-layer laminate, consisting of printed pigmented woven scrim, solid aluminum-foil core, and clear protective film that allows inspection of continuity of conductive core; bright-colored, compounded for direct-burial service.
    - b. Width: 3 inch.

- c. Overall Thickness: 8 mil.
  - d. Foil Core Thickness: 0.35 mil.
  - e. Weight: 34 lb/1000 sq. ft.
  - f. Tensile in accordance with ASTM D882: 300 lbf and 12,500 psi.
- E. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height must be.

## **2.05 TAGS**

- A. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking cable tie fastener.
- B. Nonmetallic Preprinted Tags: Polyethylene tags, 0.023 inch thick, color-coded for phase and voltage level, with factory printed permanent designations; punched for use with self-locking cable tie fastener.
- C. Write-on Tags:
  - 1. Polyester Tags: 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment.
  - 2. Marker for Tags:
    - a. Permanent, waterproof, black ink marker recommended by tag manufacturer.
    - b. Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

## **2.06 SIGNS**

- A. Laminated Acrylic or Melamine Plastic Signs:
  - 1. Engraved legend.
  - 2. Thickness:
    - a. For signs up to 20 sq. inch, minimum 1/16 inch thick.
    - b. For signs larger than 20 sq. inch, 1/8 inch thick.
    - c. Engraved legend with black letters on white face.
    - d. Punched or drilled for mechanical fasteners with 1/4 inch grommets in corners for mounting.
    - e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

## **2.07 CABLE TIES**

- A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.
  - 1. Minimum Width: 3/16 inch.
  - 2. Tensile Strength at 73 deg F in accordance with ASTM D638: 12,000 psi.
  - 3. Temperature Range: Minus 40 to plus 185 deg F.
  - 4. Color: Black, except where used for color-coding.
- B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.

1. Minimum Width: 3/16 inch.
  2. Tensile Strength at 73 deg F in accordance with ASTM D638: 12,000 psi.
  3. Temperature Range: Minus 40 to plus 185 deg F.
  4. Color: Black.
- C. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, and self-locking.
1. Minimum Width: 3/16 inch.
  2. Tensile Strength at 73 deg F in accordance with ASTM D638: 7000 psi.
  3. UL 94 Flame Rating: 94V-0.
  4. Temperature Range: Minus 50 to plus 284 deg F.
  5. Color: Black.

## **2.08 MISCELLANEOUS IDENTIFICATION PRODUCTS**

- A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless steel screws or stainless steel machine screws with nuts and flat and lock washers.

## **PART 3 - EXECUTION**

### **3.01 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 manufacturer of identification product.

### **3.02 INSTALLATION**

- A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.
- B. Install identifying devices before installing acoustical ceilings and similar concealment.
- C. Verify identity of item before installing identification products.
- D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.
- E. Apply identification devices to surfaces that require finish after completing finish work.
- F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.

- G. System Identification for Raceways and Cables under 1000 V: Identification must completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.
  - 1. Secure tight to surface of conductor, cable, or raceway.
- H. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
- I. Emergency Operating Instruction Signs: Install instruction signs with white legend on red background with minimum 3/8 inch high letters for emergency instructions at equipment used for power transfer.
- J. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from floor.
- K. 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."
  - 2. "UPS."
- L. Self-Adhesive Wraparound Labels: Secure tight to surface at location with high visibility and accessibility.
- M. Self-Adhesive Labels:
  - 1. Install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
  - 2. Unless otherwise indicated, provide single line of text with 1/2 inch high letters on 1-1/2 inch high label; where two lines of text are required, use labels 2 inch high.
- N. Marker Tapes: Secure tight to surface at location with high visibility and accessibility.
- O. Self-Adhesive Vinyl Tape: Secure tight to surface at location with high visibility and accessibility.
  - 1. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for minimum distance of 6 inch where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding.
- P. Tape and Stencil: Comply with requirements in painting Sections for surface preparation and paint application.
- Q. Floor Marking Tape: Apply stripes to finished surfaces following manufacturer's instructions.
- R. Underground Line Warning Tape:
  - 1. During backfilling of trenches, install continuous underground-line warning tape directly above cable or raceway at 6 to 8 inch below finished grade. Use multiple tapes where width of multiple lines installed in common trench or concrete envelope exceeds 16 inch overall.
  - 2. Limit use of underground-line warning tape to direct-buried cables.
  - 3. Install underground-line warning tape for direct-buried cables and cables in raceways.
- S. Metal Tags:

1. Place in location with high visibility and accessibility.
  2. Secure using general-purpose UV-stabilized cable ties.
- T. Nonmetallic Preprinted Tags:
1. Place in location with high visibility and accessibility.
  2. Secure using general-purpose cable ties.
- U. Write-on Tags:
1. Place in location with high visibility and accessibility.
  2. Secure using general-purpose cable ties.
- V. Laminated Acrylic or Melamine Plastic Signs:
1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to location and substrate.
  2. Unless otherwise indicated, provide single line of text with 1/2 inch high letters on 1-1/2 inch high sign; where two lines of text are required, use labels 2 inch high.
- W. Cable Ties: General purpose, for attaching tags, except as listed below:
1. Outdoors: UV-stabilized nylon.
  2. In Spaces Handling Environmental Air: Plenum rated.

### **3.03 IDENTIFICATION SCHEDULE**

- A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.
- B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.
- C. 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 raceway 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.
- D. Power-Circuit Conductor Identification, 1000 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use self-adhesive vinyl tape 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.
- E. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive labels with conductor or cable designation, origin, and destination.
- F. Control-Circuit Conductor Termination Identification: For identification at terminations, provide self-adhesive labels with conductor designation.

- G. Conductors to Be Extended in Future: Attach marker tape to conductors and list source.
- H. Auxiliary Electrical Systems Conductor Identification: Self-adhesive vinyl tape that is uniform and consistent with system used by manufacturer for factory-installed connections.
  - 1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
- I. Locations of Underground Lines: Underground-line warning tape for power, lighting, communication, and control wiring and optical-fiber cable.
- J. Workspace Indication: Apply floor marking tape to finished surfaces. Show working clearances in direction of access to live parts. Workspace must comply with NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- K. Instructional Signs: Self-adhesive labels, including color code for grounded and ungrounded conductors.
- L. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive labels.
  - 1. Apply to exterior of door, cover, or other access.
  - 2. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:
    - a. Power-transfer switches.
    - b. Controls with external control power connections.
- M. Arc Flash Warning Labeling: Self-adhesive labels.
- N. Operating Instruction Signs: Self-adhesive labels.
- O. Equipment Identification Labels:
  - 1. Indoor Equipment: Self-adhesive label.
  - 2. Outdoor Equipment: Laminated acrylic or melamine sign.
  - 3. Equipment to Be Labeled:
    - a. 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.
    - b. Enclosures and electrical cabinets.
    - c. Transformers: Label that includes tag designation indicated on Drawings for transformer, feeder, and panelboards or equipment supplied by secondary.

#### **END OF SECTION**

**SECTION 26 0923**  
**LIGHTING CONTROL DEVICES**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section Includes:
  - 1. Indoor occupancy and vacancy sensors.
  - 2. Switchbox-mounted occupancy sensors.
- B. Related Requirements:
  - 1. Section 262726 "Wiring Devices" for wall-box dimmers, non-networkable wall-switch occupancy sensors, and manual light switches.

**1.02 ACTION SUBMITTALS**

- A. Product Data:
  - 1. Indoor occupancy and vacancy sensors.
  - 2. Switchbox-mounted occupancy sensors.
- B. Shop Drawings:
  - 1. Show installation details for the following:
    - a. Occupancy sensors.
    - b. Vacancy sensors.
  - 2. Interconnection diagrams showing field-installed wiring.
  - 3. Include diagrams for power, signal, and control wiring.
- C. Field quality-control reports.

**1.03 INFORMATIONAL SUBMITTALS**

- A. Sample Warranty: For manufacturer's warranties.

**1.04 WARRANTY**

- A. Special Extended Warranty: Manufacturer and Installer warrant that installed lighting control devices perform in accordance with specified requirements and agree to repair or replace, including labor, materials, and equipment, devices that fail to perform as specified within extended warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Faulty operation of lighting control software.

- b. Faulty operation of lighting control devices.
2. Extended Warranty Period: Three year(s) from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.01 INDOOR OCCUPANCY AND VACANCY SENSORS

- 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. Eaton.
  2. Hubbell Control Solutions; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
  3. WattStopper; Legrand North America, LLC.
- B. General Requirements for Sensors:
  1. Wall and/or Ceiling-mounted, solid-state indoor occupancy and vacancy sensors.
  2. Dual technology.
  3. Integrated or Separate power pack.
  4. Hardwired 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 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.
    - c. Combination Sensor: Unless otherwise indicated, sensor must be programmed to turn lights on when coverage area is occupied and turn them off when unoccupied, or to turn off lights that have been manually turned on; 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.
  8. Power: Line voltage.
  9. Power Pack: Dry contacts rated for 20 A ballast or 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.
  - 13. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc; turn lights off when selected lighting level is present.
- C. PIR Type: Wall 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 2000 sq. ft. when mounted 48 inch above finished floor.
- D. Ultrasonic Type: Wall or Ceiling 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 (Large Room): Detect occupancy anywhere within a circular area of 2000 sq. ft. when mounted on a 96 inch high ceiling.
  - 5. Detection Coverage (Corridor): Detect occupancy anywhere within 90 ft. when mounted on a 10 ft. high ceiling in a corridor not wider than 14 ft..
  - 6. Detection Coverage (Room, Wall Mounted): Detect occupancy anywhere within a 180-degree pattern centered on the sensor over an area of 2000 sq. ft. when mounted 84 inch above finished floor.
- E. Dual-Technology Type: 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 2000 sq. ft. when mounted 48 inch above finished floor.

## **2.02 SWITCHBOX-MOUNTED VACANCY/OCCUPANCY SENSORS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Eaton.
  - 2. Hubbell Control Solutions; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
  - 3. WattStopper; Legrand North America, LLC.
- B. General Requirements for Sensors: Automatic-wall-switch occupancy sensor with manual on-off switch, suitable for mounting in a single gang switchbox using hardwired connection.
  - 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. Occupancy Sensor Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn lights off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
  - 3. Operating Ambient Conditions: Dry interior conditions, 32 to 120 deg F.
  - 4. Switch Rating: Not less than 800 VA ballast or LED load at 120 V, 1200 VA ballast or LED load at 277 V, and 800 W incandescent.
- C. Wall-Switch Sensor Tag:
  - 1. Standard Range: 180-degree field of view, field adjustable from 180 to 40 degrees; with a minimum coverage area of 2100 sq. ft..
  - 2. Sensing Technology: Dual technology - PIR and ultrasonic.
  - 3. Switch Type: SP, SP, dual circuit, SP ST with Dimming.
  - 4. Capable of controlling load in three-way application.
  - 5. Voltage: Dual voltage - 120 and 277 V.
  - 6. Ambient-Light Override: Concealed, field-adjustable, light-level sensor from 10 to 150 fc. The switch prevents the lights from turning on when the light level is higher than the set point of the sensor.
  - 7. Concealed, field-adjustable, "off" time-delay selector at up to 30 minutes.
  - 8. Concealed, "off" time-delay selector at 30 seconds and 5, 10, and 20 minutes.
  - 9. Adaptive Technology: Self-adjusting circuitry detects and memorizes usage patterns of the space and helps eliminate false "off" switching.
  - 10. Color: White.
  - 11. Faceplate: Color matched to switch.

## **PART 3 - EXECUTION**

### **3.01 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.

### **3.02 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.

### **3.03 INSTALLATION OF WIRING**

- A. Wiring Method: Comply with Section 260519 "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.

### **3.04 IDENTIFICATION**

- A. Identify components and power and control wiring in accordance with Section 260553 "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.

### **3.05 FIELD QUALITY CONTROL**

- A. Field tests must be witnessed by authorities having jurisdiction.
- B. 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.
- C. 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.
- D. Prepare test and inspection reports.

### **3.06 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 Owner's operations.

### **3.07 MAINTENANCE**

- A. Software and Firmware Service Agreement:
  - 1. Technical Support: Beginning at Substantial Completion, verify that software and firmware service agreement includes software support for two years.
  - 2. Upgrade Service: At Substantial Completion, update software and firmware to latest version. Install and program software upgrades that become available within two years from date of Substantial Completion. Verify upgrading software includes operating system and new or revised licenses for using software.
    - a. Upgrade Notice: No fewer than 30 days to allow Owner to schedule and access the system and to upgrade computer equipment if necessary.
  - 3. Upgrade Reports: Prepare written report after each update, documenting upgrades installed.

END OF SECTION

## **SECTION 26 2416 PANELBOARDS**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Section Includes:
  - 1. Power panelboards.
  - 2. Lighting and appliance branch-circuit panelboards.
  - 3. Electronic-grade panelboards.
  - 4. Disconnecting and overcurrent protective devices.
- B. Related Requirements:
  - 1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

#### **1.02 DEFINITIONS**

- A. GFEP: Ground-fault equipment protection.
- B. MCCB: Molded-case circuit breaker.
- C. VPR: Voltage protection rating.

#### **1.03 ACTION SUBMITTALS**

- A. Product Data:
  - 1. Power panelboards.
  - 2. Lighting and appliance branch-circuit panelboards.
  - 3. Electronic-grade panelboards.
  - 4. Disconnecting and overcurrent protective devices.
  - 5. Include materials, switching and overcurrent protective devices, SPDs, accessories, and components indicated.
  - 6. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For each panelboard and related equipment.
  - 1. Include dimensioned plans, elevations, sections, and details.
  - 2. Show tabulations of installed devices with nameplates, conductor termination sizes, equipment features, and ratings.
  - 3. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
  - 4. Detail bus configuration, current, and voltage ratings.
  - 5. Short-circuit current rating of panelboards and overcurrent protective devices.

6. Include evidence of listing, by qualified electrical testing laboratory recognized by authorities having jurisdiction, for series rating of installed devices.
  7. Include evidence of listing, by qualified electrical testing laboratory recognized by authorities having jurisdiction, for SPD as installed in panelboard.
  8. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
  9. Include wiring diagrams for power, signal, and control wiring.
- C. Field Quality-Control Submittals:
1. Field quality-control reports.

#### **1.04 INFORMATIONAL SUBMITTALS**

- A. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.
- B. Manufacturers' Published Instructions: Record copy of official installation and testing instructions issued to Installer by manufacturer for the following:
  1. Recommended procedures for installing panelboards.
  2. Recommended torque settings for bolted connections on panelboards.
  3. Recommended temperature range for energizing panelboards.
- C. Sample warranties.

#### **1.05 CLOSEOUT SUBMITTALS**

- A. Warranty documentation.

#### **1.06 MAINTENANCE MATERIAL SUBMITTALS**

- A. Spare Parts: Furnish to Owner spare parts, for repairing panelboards, that are packaged with protective covering for storage on-site and identified with labels describing contents. Include the following:
  1. Keys: Two spares for each type of panelboard cabinet lock.
  2. Circuit Breakers Including GFCI and GFEP Types: Two spares for each panelboard.

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

- A. Handle and prepare panelboards for installation in accordance with NEMA PB 1.

#### **1.08 WARRANTY**

- A. Special Installer Extended Warranty: Installer warrants that fabricated and installed panelboards perform in accordance with specified requirements and agrees to repair or replace components or products that fail to perform as specified within extended-warranty period.

- 1. Extended-Warranty Period: Two years from date of Substantial Completion; full coverage for labor, materials, and equipment.
- B. Special Manufacturer Extended Warranty: Manufacturer warrants that panelboards perform in accordance with specified requirements and agrees to provide repair or replacement of components or products that fail to perform as specified within extended-warranty period.
  - 1. Extended-Warranty Period: Three years from date of Substantial Completion; full coverage for labor, materials, and equipment.

## PART 2 - PRODUCTS

### 2.01 PANELBOARDS 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 in accordance with NFPA 70, by qualified electrical testing agency recognized by authorities having jurisdiction, 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: UL 50E, Type 1.
  - 2. Height: 7 ft maximum.
  - 3. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box. Trims must cover live parts and may have no exposed hardware.
  - 4. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims must cover live parts and may have no exposed hardware.
  - 5. Skirt for Surface-Mounted Panelboards: Same gage and finish as panelboard front with flanges for attachment to panelboard, wall, and ceiling or floor.
  - 6. Gutter Extension and Barrier: Same gage and finish as panelboard enclosure; integral with enclosure body. Arrange to isolate individual panel sections.
  - 7. Finishes:
    - a. Panels and Trim: Steel and galvanized 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: Convertible between top and bottom.
  2. Main Breaker: Main lug interiors up to 400 A must be field convertible to main breaker.
- G. Phase, Neutral, and Ground Buses:
1. Material: Hard-drawn copper, 98 percent conductivity.
    - a. Plating must run entire length of bus.
    - b. Bus must be fully rated for entire length.
  2. Interiors must be factory assembled into unit. Replacing switching and protective devices may not disturb adjacent units or require removing main bus connectors.
  3. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
  4. Full-Sized Neutral: Equipped with full-capacity bonding strap for service entrance applications. Mount electrically isolated from enclosure.
  5. 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: Hard-drawn copper, 98 percent conductivity.
  2. Terminations must 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: Mechanical type, with lug on neutral bar for each pole in panelboard.
  5. Ground Lugs and Bus-Configured Terminators: Mechanical type, with lug on bar for each pole in panelboard.
  6. Feed-Through Lugs: Mechanical type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
- I. Quality-Control Label: Panelboards must be labeled, by qualified electrical testing laboratory recognized by authorities having jurisdiction, for use as service equipment with one or more main service disconnecting and overcurrent protective devices. Panelboards or load centers must have meter enclosures, wiring, connections, and other provisions for utility metering. Coordinate with utility company for exact requirements.
- J. Future Devices: Panelboards must have mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.
1. Percentage of Future Space Capacity: 10 percent.
- K. Panelboard Short-Circuit Current Rating:
1. Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed, by qualified electrical testing laboratory recognized by authorities having jurisdiction, for 100 percent interrupting capacity.
    - a. Panelboards and overcurrent protective devices rated 240 V or less must have short-circuit ratings as shown on Drawings, but not less than 10 000 A(rms) symmetrical.

- b. Panelboards and overcurrent protective devices rated above 240 V and less than 600 V must have short-circuit ratings as shown on Drawings, but not less than 14 000 A(rms) symmetrical.

## **2.02 POWER PANELBOARDS**

- 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. Eaton.
  2. Siemens Industry, Inc., Energy Management Division.
  3. Square D; Schneider Electric USA.
- B. Listing Criteria: NEMA PB 1, distribution type.
- C. Doors: Secured with vault-type latch with tumbler lock; keyed alike.
  1. For doors more than 36 inch high, provide two latches, keyed alike.
- D. Mains: Circuit breaker.
- E. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.
- F. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers.
- G. Branch Overcurrent Protective Devices: Fused switches.

## **2.03 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS**

- 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. Eaton.
  2. Siemens Industry, Inc., Energy Management Division.
  3. Square D; Schneider Electric USA.
- B. Listing Criteria: NEMA PB 1, lighting and appliance branch-circuit type.
- C. Mains: Circuit breaker or lugs only.
- D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
- E. Doors: Door-in-door construction with concealed hinges; secured with flush or multipoint latch with tumbler lock; keyed alike.

## **2.04 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES**

- 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. Eaton.
  2. Siemens Industry, Inc., Energy Management Division.
  3. Square D; Schneider Electric USA.
- B. 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. GFCI Circuit Breakers: Single- and double-pole configurations with Class A ground-fault protection (6 mA trip).
  4. GFEP Circuit Breakers: Class B ground-fault protection (30 mA trip).
  5. Arc-Fault Circuit Interrupter Circuit Breakers: Comply with UL 1699; 120/240 V, single-pole configuration.
  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: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
    - e. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and HID lighting circuits.
    - f. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
    - g. Shunt Trip: 120 V trip coil energized from separate circuit, set to trip at 75 percent of rated voltage.
    - h. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in on or off position.
    - i. Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.
    - j. Rating Plugs: Three-pole breakers with ampere ratings greater than 150 A must have interchangeable rating plugs or electronic adjustable trip units.
    - k. 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.
    - l. Multipole units enclosed in single housing with single handle.

## PART 3 - EXECUTION

### 3.01 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 in accordance with 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.

### 3.02 INSTALLATION

- A. Comply with manufacturer's published instructions.
- B. Reference Standards:
  1. Panelboards: Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with NEMA PB 1.1.
  2. Consult Architect for resolution of conflicting requirements.
- C. Special Techniques:
  1. Equipment Mounting:
    - a. Attach panelboard to vertical finished or structural surface behind panelboard.
    - b. Mount surface-mounted panelboards to steel slotted supports 5/8 inch in depth. Orient steel slotted supports vertically.
  2. Mount top of trim 7 ft. above finished floor unless otherwise indicated.
  3. Mount panelboard cabinet plumb and rigid without distortion of box.
  4. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
  5. Install overcurrent protective devices and controllers not already factory installed.
    - a. Set field-adjustable, circuit-breaker trip ranges.
    - b. Tighten bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver in accordance with manufacturer's published instructions.
  6. 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.
  7. Install filler plates in unused spaces.
  8. Stub four 1 inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in future. Stub four 1 inch empty conduits into raised floor space or below slab not on grade.

9. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.
  10. Mount spare fuse cabinet in accessible location.
- D. Interfaces with Other Work:
1. 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.

### **3.03 IDENTIFICATION**

- A. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems."
- B. Panelboard Nameplates: Label each panelboard with nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- C. Install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems" identifying source of remote circuit.
- D. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles must be located on interior of panelboard door.
- E. Breaker Labels: Faceplate must list current rating, UL and IEC certification standards, and AIC rating.
- F. Circuit Directory:
  1. Provide directory card inside panelboard door, mounted in metal frame with transparent protective cover.
    - a. Circuit directory must identify specific purpose with detail sufficient to distinguish it from other circuits.
  2. Provide computer-generated circuit directory mounted inside panelboard door with transparent plastic protective cover.
    - a. Circuit directory must identify specific purpose with detail sufficient to distinguish it from other circuits.
  3. Create 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.

### **3.04 FIELD QUALITY CONTROL**

- A. Acceptance Testing Preparation:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
  2. Test continuity of each circuit.
- B. Tests and Inspections:
1. Perform each visual and mechanical inspection and electrical test for low-voltage air circuit breakers and low-voltage surge arrestors stated in NETA ATS, Paragraph 7.6 Circuit Breakers and Paragraph 7.19.1 Surge Arrestors, Low-Voltage. Perform optional tests. Certify compliance with test parameters.
  2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
  3. Perform the following infrared scan tests and inspections and prepare reports:
    - a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform infrared scan of each panelboard. Remove front panels so joints and connections are accessible to portable scanner.
    - b. Follow-up Infrared Scanning: Perform additional follow-up infrared scan of each panelboard 11 months after date of Substantial Completion.
    - c. Instruments and Equipment:
      - 1) Use infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
- C. Nonconforming Work:
1. Panelboards will be considered defective if they do not pass tests and inspections.
  2. Remove and replace defective units and retest.
- D. Collect, assemble, and submit test and inspection reports, including certified report that identifies panelboards included and that describes scanning results, with comparisons of two scans. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

### **3.05 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 specified in Section 260573.16 "Coordination Studies."
- C. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes. Prior to making circuit changes to achieve load balancing, inform Architect of effect on phase color coding.
  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 Architect. 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 panelboard, may not exceed 20 percent.

END OF SECTION

## **SECTION 26 2726 WIRING DEVICES**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Section Includes:
  - 1. General-use switches.
  - 2. General-grade duplex straight-blade receptacles.
  - 3. Special-purpose power outlet assemblies.
  - 4. Connectors, cords, and plugs.
- B. Related Requirements:
  - 1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

#### **1.02 ACTION SUBMITTALS**

- A. Product Data:
  - 1. General-use switches.
  - 2. General-grade duplex straight-blade receptacles.
  - 3. Hospital-grade straight-blade receptacles.
  - 4. Receptacles with arc-fault and ground-fault protective devices.
  - 5. Connectors, cords, and plugs.
- B. Shop Drawings:
  - 1. Wiring diagrams for duplex straight-blade receptacles with integral switching means.
- C. Field quality-control reports.

#### **1.03 INFORMATIONAL SUBMITTALS**

- A. Manufacturers' Instructions: Record copy of official installation and testing instructions issued to Installer by manufacturer for the following:
  - 1. Switches.
  - 2. Duplex straight-blade receptacles.
  - 3. Receptacles with GFCI device.
- B. Sample warranties.

### **PART 2 - PRODUCTS**

#### **2.01 GENERAL-USE SWITCHES**

- A. Toggle Switch :

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. Hubbell Wiring Device-Kellems; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
  - b. Leviton Manufacturing Co., Inc.
  - c. Pass & Seymour; Legrand North America, LLC.
2. 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.
3. General Characteristics:
  - a. Reference Standards: UL CCN WMUZ and UL 20.
4. Options:
  - a. Device Color: White
  - b. Configuration:
    - 1) Heavy-duty, 120-277 V, 20 A, single pole and three way.
5. 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.

## **2.02 DUPLEX STRAIGHT-BLADE RECEPTACLES**

- A. Tamper-Resistant Duplex Straight-Blade Receptacle:
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. Hubbell Wiring Device-Kellems; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
    - b. Leviton Manufacturing Co., Inc.
    - c. Pass & Seymour; Legrand North America, LLC.
  2. 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.
  3. General Characteristics:
    - a. Reference Standards: UL CCN RTRT and UL 498.
  4. Options:
    - a. Device Color: White.
    - b. Configuration:
      - 1) Heavy-duty, NEMA 5-20R.
  5. 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.

## **2.03 RECEPTACLES WITH GROUND-FAULT PROTECTIVE DEVICES**

### A. Tamper-Resistant Duplex Straight-Blade Receptacle with GFCI Device :

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. Hubbell Wiring Device-Kellems; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
  - b. Leviton Manufacturing Co., Inc.
  - c. Pass & Seymour; Legrand North America, LLC.
2. 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.
3. General Characteristics:
  - a. Reference Standards: UL CCN KCXS, UL 498, and UL 943.
4. Options:
  - a. Device Color: White.
  - b. Configuration: Heavy-duty, NEMA 5-20R.
5. 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**

### **3.01 EXAMINATION**

- #### A. Receptacles:
1. Verify that receptacles to be procured and installed for Owner-furnished equipment are compatible with mating attachment plugs on equipment.

### **3.02 SELECTION OF GFCI RECEPTACLES**

- #### A. Healthcare Facilities: Unless protection of downstream branch-circuit wiring, cord sets, and power-supply cords is required by NFPA 70 or NFPA 99, provide non-feed-through GFCI receptacles.

### **3.03 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 in accordance with Section 260553 "Identification for Electrical Systems."
    - 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.
    - b. 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.

### **3.04 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 260553 "Identification for Electrical Systems."
    - 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.
    - b. 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.

### **3.05 FIELD QUALITY CONTROL OF SWITCHES**

- A. Tests and Inspections:
  1. Perform tests and inspections in accordance with manufacturers' instructions.
- B. Nonconforming Work:
  1. Unit will be considered defective if it does not pass tests and inspections.
  2. Remove and replace defective units and retest.
- C. Assemble and submit test and inspection reports.

### **3.06 FIELD QUALITY CONTROL OF STRAIGHT-BLADE RECEPTACLES**

- A. Tests and Inspections:
  - 1. Insert and remove test plug to verify that device is securely mounted.
  - 2. Verify polarity of hot and neutral pins.
  - 3. Measure line voltage.
  - 4. Measure percent voltage drop.
  - 5. Measure grounding circuit continuity; impedance must be not greater than 2 ohms.
  - 6. Healthcare Facilities: Test straight-blade receptacles in patient care spaces with receptacle pin tension test instrument in accordance with NFPA 99. Retention force of ground pin must be not less than 115 g (4 oz).
  - 7. Perform additional installation and maintenance inspections and diagnostic tests in accordance with NECA NEIS 130 and manufacturers' instructions.
- B. Nonconforming Work:
  - 1. Device will be considered defective if it does not pass tests and inspections.
  - 2. Remove and replace defective units and retest.
- C. Assemble and submit test and inspection reports.

### **3.07 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 Owner.

**END OF SECTION**

**SECTION 26 5119**  
**LED INTERIOR LIGHTING**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

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

**1.02 SUMMARY**

- A. Section Includes:
  1. LED luminaires.

**1.03 DEFINITIONS**

- A. CCT: Correlated color temperature.
- B. CRI: Color Rendering Index.
- C. Fixture: See "Luminaire."
- D. IP: International Protection or Ingress Protection Rating.
- E. LED: Light-emitting diode.
- F. Lumen: Measured output of lamp and luminaire, or both.
- G. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

**1.04 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
  1. Arrange in order of luminaire designation.
  2. Include data on features, accessories, and finishes.
  3. Include physical description and dimensions of luminaires.
  4. Include life, output (lumens, CCT, and CRI), and energy-efficiency data.
  5. Photometric data and adjustment factors based on laboratory tests, complying with IES "Lighting Measurements Testing and Calculation Guides" for each luminaire type. The adjustment factors shall be for lamps and accessories identical to those indicated for the luminaire as applied in this Project IES LM-79 and IES LM-80.
    - a. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.

- b. Testing Agency Certified Data: For indicated luminaires, photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.
- B. Shop Drawings: For nonstandard or custom luminaires.
  - 1. Include plans, elevations, sections, and mounting and attachment details.
  - 2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - 3. Include diagrams for power, signal, and control wiring.
- C. Product Schedule: For luminaires and lamps. Use same designations indicated on Drawings.

## **1.05 INFORMATIONAL SUBMITTALS**

- A. Coordination Drawings: Reflected ceiling plan(s) 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. Luminaires.
  - 2. Suspended ceiling components.
  - 3. Partitions and millwork that penetrate the ceiling or extend to within 12 inches of the plane of the luminaires.
  - 4. Structural members to which equipment and or luminaires will be attached.
  - 5. Initial access modules for acoustical tile, including size and locations.
  - 6. Items penetrating finished ceiling, including the following:
    - a. Other luminaires.
    - b. Air outlets and inlets.
- B. Qualification Data: For testing laboratory providing photometric data for luminaires.
- C. Product Certificates: For each type of luminaire.
- D. Sample warranty.

## **1.06 CLOSEOUT SUBMITTALS**

- A. Operation and Maintenance Data: For luminaires and lighting systems to include in operation and maintenance manuals.
  - 1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

## **1.07 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. Diffusers and Lenses: One for every 100 of each type and rating installed. Furnish at least one of each type.
  - 2. Globes and Guards: One for every 20 of each type and rating installed. Furnish at least one of each type.

## **1.08 QUALITY ASSURANCE**

- A. Luminaire Photometric Data Testing Laboratory Qualifications:
  - 1. Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.
  - 2. Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7, accredited under the NVLAP for Energy Efficient Lighting Products, and complying with the applicable IES testing standards.
- B. Provide luminaires from a single manufacturer for each luminaire type.
- C. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.

## **1.09 DELIVERY, STORAGE, AND HANDLING**

- A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

## **1.010 WARRANTY**

- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
- B. Warranty Period: Five year(s) from date of Substantial Completion.

# **PART 2 - PRODUCTS**

## **2.01 PERFORMANCE REQUIREMENTS**

- A. Ambient Temperature: 41 to 104 deg F.
  - 1. Relative Humidity: Zero to 95 percent.

## **2.02 LUMINAIRE REQUIREMENTS**

- A. Refer to drawings for lighting fixture schedule.
- 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. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
  - 1. Label shall include the following lamp characteristics:
    - a. "USE ONLY" and include specific lamp type.

- b. Lamp diameter, shape, size, wattage, and coating.
  - c. CCT and CRI.
- D. Recessed luminaires shall comply with NEMA LE 4.
- E. NRTL Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by an NRTL.

## **2.03 MATERIALS**

- A. Metal Parts:
  - 1. Free of burrs and sharp corners and edges.
  - 2. Sheet metal components shall be steel unless otherwise indicated.
  - 3. Form and support to prevent warping and sagging.
- B. Steel:
  - 1. ASTM A36/A36M for carbon structural steel.
  - 2. ASTM A568/A568M for sheet steel.
- C. Stainless Steel:
  - 1. Manufacturer's standard grade.
  - 2. Manufacturer's standard type, ASTM A240/240M.
- D. Galvanized Steel: ASTM A653/A653M.
- E. Aluminum: ASTM B209.

## **2.04 METAL FINISHES**

- A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

## **2.05 LUMINAIRE SUPPORT**

- A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.
- B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.
- C. Wires: ASTM A641/A641M, Class 3, soft temper, zinc-coated steel, 12 gage.
- D. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.
- E. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. 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.

### **3.02 TEMPORARY LIGHTING**

- A. If approved by the Architect, use selected permanent luminaires for temporary lighting. When construction is sufficiently complete, clean luminaires used for temporary lighting and install new lamps.

### **3.03 INSTALLATION**

- A. Comply with NECA 1.
- B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.
- C. Install lamps in each luminaire.
- D. Supports:
  - 1. Sized and rated for luminaire weight.
  - 2. Able to maintain luminaire position after cleaning and relamping.
  - 3. Provide support for luminaire without causing deflection of ceiling or wall.
  - 4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.
- E. Flush-Mounted Luminaires:
  - 1. Secured to outlet box.
  - 2. Attached to ceiling structural members at four points equally spaced around circumference of luminaire.
  - 3. Trim ring flush with finished surface.
- F. Suspended Luminaires:
  - 1. Ceiling Mount:
    - a. Two 5/32-inch- diameter aircraft cable supports adjustable to 10 feet in length.
    - b. Pendant mount with 5/32-inch- diameter aircraft cable supports adjustable to 10 feet in length.
    - c. Hook mount.
  - 2. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.

3. 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.
  4. Continuous Rows of Luminaires: Use 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.
  5. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.
- G. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.

#### **3.04 IDENTIFICATION**

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

#### **3.05 FIELD QUALITY CONTROL**

- A. Perform the following tests and inspections:
1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
- B. Luminaire will be considered defective if it does not pass operation tests and inspections.
- C. Prepare test and inspection reports.

#### **3.06 ADJUSTING**

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.
1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
  2. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
  3. Adjust the aim of luminaires in the presence of the Architect.

**END OF SECTION**

**SECTION 26 5613**  
**LIGHTING POLES AND STANDARDS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section Includes:
  - 1. Poles and accessories for support of luminaires.

**1.02 DEFINITIONS**

- A. EPA: Equivalent projected area.
- B. Luminaire: Complete luminaire.
- C. Pole: Luminaire-supporting structure, including tower used for large-area illumination.
- D. Standard: See "Pole."

**1.03 ACTION SUBMITTALS**

- A. Product Data: For each pole, accessory, and luminaire-supporting and -lowering device.

**1.04 WARRANTY**

- A. Special Warranty: Manufacturer agrees to repair or replace components of pole(s) that fail in materials or workmanship; that corrode; or that fade, stain, perforate, erode, or chalk due to effects of weather or solar radiation within a specified warranty period. Manufacturer may exclude lightning damage, hail damage, vandalism, abuse, or unauthorized repairs from special warranty period.
  - 1. Warranty Period: Five years from date of Substantial Completion.

**PART 2 - PRODUCTS**

**2.01 PERFORMANCE REQUIREMENTS**

- A. Structural Characteristics: Comply with AASHTO LTS-6-M.
- B. Dead Load: Weight of luminaire and its horizontal and vertical supports, lowering devices, and supporting structure, applied according to AASHTO LTS-6-M.

- C. Live Load: Single load of 500 lbf distributed according to AASHTO LTS-6-M.
- D. Ice Load: Load of 3 lbf/sq. ft., applied according to AASHTO LTS-6-M for applicable areas on the Ice Load Map.
- E. Strength Analysis: For each pole, multiply the actual EPA of luminaires and brackets by a factor of 1.1 to obtain the EPA to be used in pole selection strength analysis.
- F. Luminaire Attachment Provisions: Comply with luminaire manufacturers' mounting requirements. Use stainless-steel fasteners and mounting bolts unless otherwise indicated.

## **2.02 ALUMINUM POLES**

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - 1. Cyclone Lighting
- B. Poles: extruded structural tube complying with ASTM B 221, Alloy 6063-T6, with access handhole in pole wall.
- C. Poles: Seamless, extruded structural tube complying with ASTM B 221, Alloy 6061-T6, with access handhole in pole wall.
  - 1. Shape: Round, straight .
  - 2. Mounting Provisions: Butt flange for bolted mounting on foundation or breakaway support.
- D. Pole-Top Tenons: Fabricated to support luminaire or luminaires and brackets indicated, and securely fastened to pole top.
- E. Grounding and Bonding Lugs: Bolted 1/2-inch threaded lug, complying with requirements in Section 260526 "Grounding and Bonding for Electrical Systems," listed for attaching grounding and bonding conductors of type and size listed in that Section, and accessible through handhole.
- F. Fasteners: Stainless steel , size and type as determined by manufacturer. Corrosion-resistant items compatible with support components.
  - 1. Materials: Compatible with poles and standards as well as to substrates to which poles and standards are fastened and shall not cause galvanic action at contact points.
  - 2. Anchor Bolts, Leveling Nuts, Bolt Caps, and Washers: Hot-dip galvanized after fabrication unless otherwise indicated.
- G. Handhole: Oval shaped, with minimum clear opening of 2-1/2 by 5 inches, with cover secured by stainless-steel captive screws.
- H. Powder-Coat Finish: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" recommendations for applying and designating finishes.

1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1 to remove dirt, oil, grease, and other contaminants that could impair powder coat bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, according to SSPC-SP 5/NACE No. 1 or SSPC-SP 8.
2. Powder coat shall comply with AAMA 2604.
- a. Electrostatic applied powder coating; single application with a minimum 2.5- to 3.5-mils dry film thickness; cured according to manufacturer's instructions. Coat interior and exterior of pole for equal corrosion protection.
- b. Color: As indicated by manufacturer's designations .

## **2.03 POLE ACCESSORIES**

- A. Base Covers: Manufacturers' standard metal units, finished same as pole, and arranged to cover pole's mounting bolts and nuts.

## **2.04 MOUNTING HARDWARE**

- A. Anchor Bolts: Manufactured to ASTM F 1554, Grade 55, with a minimum yield strength of 55,000 psi.
  1. Galvanizing: Hot dip galvanized according to ASTM A 153, Class C .
  2. Bent rods 3/4 in diameter by 20" in length.
  3. Threading: Uniform National Coarse , Class 2A.
- B. Nuts: ASTM A 563, Grade A, Heavy-Hex
  1. Galvanizing: Hot dip galvanized according to ASTM A 153, Class C .
  2. Four nuts provided per anchor bolt , shipped with nuts pre-assembled to the anchor bolts.
- C. Washers: ASTM F 436, Type 1.
  1. Galvanizing: Hot dip galvanized according to ASTM A 153, Class C .
  2. Two washers provided per anchor bolt.

## **2.05 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 unacceptable. 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**

### **3.01 POLE FOUNDATION**

- A. Pre-Cast Foundations: Factory fabricated, with structural steel complying with ASTM A 36/A 36M and hot-dip galvanized according to ASTM A 123/A 123M; and with top-plate and mounting bolts to match pole-base flange and strength required to support pole, luminaire, and accessories. Concrete, reinforcement, and formwork are specified in Section 033000 "Cast-in-Place Concrete."
- B. Anchor Bolts: Install plumb using manufacturer-supplied steel template, uniformly spaced.

### **3.02 POLE INSTALLATION**

- A. Foundation-Mounted Poles: Mount pole with leveling nuts and tighten top nuts to torque level according to pole manufacturer's written instructions.
- B. Raise and set pole using web fabric slings (not chain or cable) at locations indicated by manufacturer.

### **3.03 CORROSION PREVENTION**

- A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum using insulating fittings or treatment.
- B. Steel Conduits: Comply with requirements in Section 260533 "Raceways and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch- thick, pipe-wrapping plastic tape applied with a 50-percent overlap.

### **3.04 GROUNDING**

- A. Ground Metal Poles and Support Structures: Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."
  1. Install grounding electrode for each pole unless otherwise indicated.
  2. Install grounding conductor pigtail in the base for connecting luminaire to grounding system.
- B. Ground Nonmetallic Poles and Support Structures: Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."
  1. Install grounding electrode for each pole.
  2. Install grounding conductor and conductor protector.
  3. Ground metallic components of pole accessories and foundation.

### **END OF SECTION**

**SECTION 265619**  
**LED EXTERIOR LIGHTING**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section Includes:
  - 1. Exterior solid-state luminaires that are designed for and exclusively use LED lamp technology.
  - 2. Luminaire-mounted photoelectric relays.
- B. Related Requirements:
  - 1. Section 265613 "Lighting Poles and Standards" for poles and standards used to support exterior lighting equipment.

**1.02 DEFINITIONS**

- A. CCT: Correlated color temperature.
- B. CRI: Color rendering index.
- C. Fixture: See "Luminaire."
- D. IP: International Protection or Ingress Protection Rating.
- E. Lumen: Measured output of lamp and luminaire, or both.
- F. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

**1.03 ACTION SUBMITTALS**

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

**1.04 FIELD CONDITIONS**

- A. Mark locations of exterior luminaires for approval by Architect prior to the start of luminaire installation.

**1.05 WARRANTY**

- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 2 year(s) from date of Substantial Completion.

## PART 2 - PRODUCTS

### **2.01 PERFORMANCE REQUIREMENTS**

### **2.02 LUMINAIRE 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. NRTL Compliance: Luminaires shall be listed and labeled for indicated class and division of hazard by an NRTL.
- C. UL Compliance: Comply with UL 1598 and listed for wet location.
- D. Lamp base complying with ANSI C81.61 or IEC 60061-1.
- E. CRI of 80. CCT of 4000 K.
- F. L70 lamp life of 100,000 hours.
- G. Lamps dimmable from 100 percent to 0 percent of maximum light output.
- H. Nominal Operating Voltage: 240 V ac .
- I. In-line Fusing: Separate in-line fuse for each luminaire.
- J. Lamp Rating: Lamp marked for outdoor use .
- K. Source Limitations:
  1. Obtain luminaires from single source from a single manufacturer.

### **2.03 LUMINAIRE TYPES**

- A. Area and Site:
  1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Cyclone Lighting.
  2. Luminaire Shape: Round .
  3. Luminaire-Mounting Height: 20' .
  4. Distribution: Type III .

### **2.04 MATERIALS**

- A. Metal Parts: Free of burrs and sharp corners and edges.

- B. Sheet Metal Components: Corrosion-resistant aluminum . Form and support to prevent warping and sagging.
- C. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses.
- D. Diffusers and Globes:
  - 1. Glass: Annealed crystal glass unless otherwise indicated.
  - 2. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.
- E. Lens and Refractor Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.
- F. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:
  - 1. White Surfaces: 85 percent.
  - 2. Specular Surfaces: 83 percent.
  - 3. Diffusing Specular Surfaces: 75 percent.
- G. Housings:
  - 1. Rigidly formed, weather- and light-tight enclosure that will not warp, sag, or deform in use.
  - 2. Provide filter/breather for enclosed luminaires.

## **2.05 FINISHES**

- A. Variations in Finishes: Noticeable variations in same piece are unacceptable. 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.
- B. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.
- C. Factory-Applied Finish for Aluminum Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
  - 1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
  - 2. Class I, Color-Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: Medium satin; Chemical Finish: Etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker), complying with AAMA 611.
    - a. Color: Black .

## PART 3 - EXECUTION

### **3.01 GENERAL INSTALLATION REQUIREMENTS**

- A. Comply with NECA 1.
- B. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.
- C. Install lamps in each luminaire.
- D. Fasten luminaire to structural support.
- E. Wiring Method: Install cables in raceways. Conceal raceways and cables.
- F. Install luminaires level, plumb, and square with finished grade unless otherwise indicated.
- G. Coordinate layout and installation of luminaires with other construction.
- H. 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.
- I. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" and Section 260533 "Raceways and Boxes for Electrical Systems" for wiring connections and wiring methods.

### **3.02 INSTALLATION OF INDIVIDUAL GROUND-MOUNTED LUMINAIRES**

- A. Aim as indicated on Drawings.
- B. Install on concrete base with top 6" and 36" above finished grade or surface at luminaire location. Cast conduit into base, and finish by troweling and rubbing smooth. Concrete materials, installation, and finishing are specified in Section 033000 "Cast-in-Place Concrete."

### **3.03 CORROSION PREVENTION**

- A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.
- B. Steel Conduits: Comply with Section 260533 "Raceways and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch- thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

### **3.04 IDENTIFICATION**

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

END OF SECTION 265619

Schenectady – Central Park  
Pool and Spray Park

265619

LED EXTERIOR LIGHTING

**SECTION 27 1323**  
**COMMUNICATIONS OPTICAL FIBER CABLING**

**PART 1 - GENERAL**

**1.01 SUMMARY**

A. Section Includes:

1. Type OFNR optical fiber cable.
2. Type OFNP optical fiber cable.
3. Types OFN and OFNG optical fiber cable.
4. Optical fiber cable hardware.

**1.02 DEFINITIONS**

- A. Conductive Cable: Cable containing non-current-carrying electrically-conductive members such as metallic strength members and metallic vapor barriers.
- B. Cross-Connect: A facility enabling termination of cable elements and their interconnection or cross-connection.
- C. Type OFNP: Nonconductive cable for use in plenums, ducts, and other spaces used for environmental air.
- D. Type OFNR: Nonconductive cable for use as riser in vertical shafts or from floor to floor.

**1.03 COORDINATION**

- A. Coordinate layout and installation of telecommunications pathways and cabling with Owner's telecommunications and LAN equipment and service suppliers.

**1.04 ACTION SUBMITTALS**

A. Product Data:

1. Type OFNR optical fiber cable.
2. Type OFNP optical fiber cable.
3. Types OFN and OFNG optical fiber cable.
4. Optical fiber cable hardware.

B. Shop Drawings:

1. System Labeling Schedules:

- a. Electronic copy of labeling schedules, in software and format selected by Owner.
- b. Electronic copy of labeling schedules that are part of cabling and asset identification system of software.

2. Cabling administration drawings and printouts.
  3. Wiring diagrams showing typical schematic arrangement, including the following:
    - a. Telecommunications rooms plans and elevations.
    - b. Telecommunications pathways.
    - c. Telecommunications system access points.
    - d. Telecommunications grounding system.
    - e. Cross-connects.
    - f. Patch panels.
    - g. Patch cords.
  4. Cross-Connect and Patch-Panel Drawings: Detail mounting assemblies and show elevations and physical relationship between installed components.
- C. Certificates: For each type of product.
  - D. Field Quality-Control Reports: Optical fiber cable testing plan.

#### **1.05 INFORMATIONAL SUBMITTALS**

- A. Source quality-control reports.

#### **1.06 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For optical fiber cable, splices, and connectors.

#### **1.07 MAINTENANCE MATERIAL SUBMITTALS**

- A. Extra Stock Material: Furnish to Owner extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  1. Plugs: 10 of each type.
  2. Jacks: 10 of each type.

#### **1.08 DELIVERY, STORAGE, AND HANDLING**

- A. Environmental Limitations: Do not deliver or install cables and connecting materials until wet-work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during remainder of construction period.
- B. Test cables upon receipt at Project site.
  1. Test optical fiber cable while on reels. Use optical time domain reflectometer to verify cable length and locate cable defects, splices, and connector, including loss value of each. Retain test data and include record in maintenance data.

## PART 2 - PRODUCTS

### 2.01 TYPE OFNR OPTICAL FIBER CABLE

- A. Type OFNR Optical Fiber Cable: This category covers jacketed optical fiber cable for use as risers in vertical runs in shaft or between floors within buildings in accordance with Article 770 of NFPA 70 containing no electrically conductive materials.
- B. 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 QAYK; including UL 1651.
  - 3. General Characteristics:
    - a. Performance: TIA-568.3.
    - b. Inside Plant Mechanical Properties: ICEA S-83-596.
    - c. Inside-Outside Plant Mechanical Properties: ICEA S-104-696.
    - d. Jacket:
      - 1. Cable cordage jacket, fiber, unit, and group color in accordance with TIA-598.
      - 2. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inch.
- C. Type OFNR, Designation OM1, Multimode Optical Fiber Cable:
  - 1. Source Limitations: Obtain products from single manufacturer.
  - 2. Additional Characteristics:
    - a. Construction: TIA-492AAAA; 62.5 µm core diameter, 125 µm cladding diameter.
    - b. Minimum Overfilled Modal Bandwidth-Length Product: 200 MHz-km at 850 nm wavelength; 500 MHz-km at 1300 nm wavelength.
  - 3. Options:
    - a. Configuration: 24-fiber, tight buffer, optical fiber cable.
    - b. Maximum Attenuation: 3.50 dB/km at 850 nm wavelength; 1.5 dB/km at 1300 nm wavelength.
    - c. Jacket Color: Orange.

### 2.02 TYPE OFNP OPTICAL FIBER CABLE

- A. Type OFNP Optical Fiber Cable: This category covers jacketed optical fiber cable for use in vertical runs in plenums, ducts, or other spaces used for environmental air within buildings in accordance with Article 770 of NFPA 70 containing no electrically conductive materials.
- B. 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 QAYK; including UL 1651.
3. General Characteristics:
  - a. Performance: TIA-568.3.
  - b. Inside Plant Mechanical Properties: ICEA S-83-596.
  - c. Inside-Outside Plant Mechanical Properties: ICEA S-104-696.
  - d. Jacket:
    1. Cable cordage jacket, fiber, unit, and group color in accordance with TIA-598.
    2. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inch.

C. Type OFNP, Designation OM2, Multimode Optical Fiber Cable:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Belden Inc.
  - b. CommScope, Inc.
  - c. Corning Optical Communications; Corning Incorporated.
2. Source Limitations: Obtain products from single manufacturer.
3. Additional Characteristics:
  - a. Construction: TIA-492AAAA; 62.5 µm core diameter, 125 µm cladding diameter.
  - b. Minimum Overfilled Modal Bandwidth-Length Product: 200 MHz-km at 850 nm wavelength; 500 MHz-km at 1300 nm wavelength.
4. Options:
  - a. Configuration: 24-fiber, tight buffer, optical fiber cable.
  - b. Maximum Attenuation: 3.50 dB/km at 850 nm wavelength; 1.5 dB/km at 1300 nm wavelength.
  - c. Jacket Color: Orange .

A. Type OFNP, Designation OM3, Multimode Optical Fiber Cable:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Belden Inc.
  - b. CommScope, Inc.
  - c. Corning Optical Communications; Corning Incorporated.
2. Source Limitations: Obtain products from single manufacturer.
3. Additional Characteristics:
  - a. Construction: TIA-492AAAA; 62.5 µm core diameter, 125 µm cladding diameter.
  - b. Minimum Overfilled Modal Bandwidth-Length Product: 200 MHz-km at 850 nm wavelength; 500 MHz-km at 1300 nm wavelength.

4. Options:

- a. Configuration: 24-fiber, tight buffer, optical fiber cable.
- b. Maximum Attenuation: 3.50 dB/km at 850 nm wavelength; 1.5 dB/km at 1300 nm wavelength.
- c. Jacket Color: Aqua .

## 2.03 TYPES OFN AND OFNG OPTICAL FIBER CABLE

- A. Types OFN and OFNG Optical Fiber Cable: This category covers jacketed optical fiber cable for general use within buildings in accordance with Article 770 of NFPA 70 containing no electrically conductive materials.
- B. 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 QAYK; including UL 1651.
  3. General Characteristics:
    - a. Performance: TIA-568.3.
    - b. Inside Plant Mechanical Properties: ICEA S-83-596.
    - c. Inside-Outside Plant Mechanical Properties: ICEA S-104-696.
    - d. Jacket:
      1. Cable cordage jacket, fiber, unit, and group color in accordance with TIA-598.
      2. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inch.
- C. Types OFN and OFNG, Designation OM3, Multimode Optical Fiber Cable:
  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. CommScope, Inc.
    - b. Corning Optical Communications; Corning Incorporated.
  2. Source Limitations: Obtain products from single manufacturer.
  3. Additional Characteristics:
    - a. Construction: TIA-492AAAB; 50 µm core diameter, 125 µm cladding diameter.
    - b. Minimum Overfilled Modal Bandwidth-Length Product: 500 MHz-km at 850 nm wavelength; 500 MHz-km at 1300 nm wavelength.
- 4. Options:
  - a. Configuration: 24-fiber, tight buffer, optical fiber cable.
  - b. Maximum Attenuation: 3.50 dB/km at 850 nm wavelength; 1.5 dB/km at 1300 nm wavelength.
  - c. Jacket Color: Aqua .

D. Types OFN and OFNG, Designation OM4, Multimode Optical Fiber Cable:

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. CommScope, Inc.
  - b. Corning Optical Communications; Corning Incorporated.
2. Source Limitations: Obtain products from single manufacturer.
3. Additional Characteristics:
  - a. Construction: TIA-492AAAB; 50 µm core diameter, 125 µm cladding diameter.
  - b. Minimum Overfilled Modal Bandwidth-Length Product: 500 MHz-km at 850 nm wavelength; 500 MHz-km at 1300 nm wavelength.
4. Options:
  - a. Configuration: 4-fiber, tight buffer, optical fiber cable.
  - b. Maximum Attenuation: 3.50 dB/km at 850 nm wavelength; 1.5 dB/km at 1300 nm wavelength.
  - c. Jacket Color: Yellow.

**2.04 OPTICAL FIBER CABLE HARDWARE**

- 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. Belden Inc.
  2. CommScope, Inc.
  3. Corning Optical Communications; Corning Incorporated.
  4. Hubbell Premise Wiring; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
- B. Performance Criteria:
1. Fiber Optic Connector Intermateability Standard (FOCIS) specifications of TIA-604 series.
  2. TIA-568.3.
- C. Cross-Connects and Patch Panels: Modular panels housing multiple-numbered, duplex cable connectors.
1. Number of Connectors per Field: One for each fiber of cable or cables assigned to field, plus spares and blank positions adequate to suit specified expansion criteria.
- D. Patch Cords: Factory-made, dual-fiber cables in 36 inch lengths.
- E. Connector Type: Provide connectors as prescribed by Owner's IT and LAN manager.
- F. Plugs and Plug Assemblies:

1. Male; color-coded modular telecommunications connector designed for termination of single optical fiber cable.
  2. Marked to indicate transmission performance.
- G. Jacks and Jack Assemblies:
1. Female; quick-connect, simplex and duplex; fixed telecommunications connector designed for termination of single optical fiber cable.
  2. Marked to indicate transmission performance.
  3. Designed to snap-in to patch panel or faceplate.

## **2.05 SOURCE QUALITY CONTROL**

- A. Owner will witness required factory tests. Notify Architect at least 14 days before date of tests and indicate their approximate duration.
- B. Testing Administrant: Engage qualified testing agency to evaluate cables.
- C. Factory Tests and Inspections:
  1. Test and inspect multimode optical fiber cables, by, or under supervision of, qualified electrical testing laboratory recognized by authorities having jurisdiction, in accordance with TIA-526-14 and TIA-568.3 before delivering to site. Affix label with name and date of qualified electrical testing laboratory's certification of system compliance.
- D. Nonconforming Work:
  1. Cables that do not pass tests and inspections will be considered defective.
- E. Prepare test and inspection reports.

## **PART 3 - EXECUTION**

### **3.01 PREPARATION**

- A. Coordinate backbone cabling with protectors and demarcation point provided by communications service provider.

### **3.02 SELECTION OF OPTICAL FIBER TYPE**

- A. Installed in Plenum, Duct, or Other Space Handling Environmental Air:
  1. Nonconductive:
    - a. Type OFNP.
- B. Installed in Location Other Than Riser or Plenum:
  1. Nonconductive: Type OFN in cable tray.

C. Installed in Data Closets for Equipment Interconnect

1. Nonconductive: Type OFN i.

**3.03 INSTALLATION OF OPTICAL FIBER BACKBONE CABLES**

- A. Optical fiber backbone cabling system must provide interconnections between communications equipment rooms, main terminal space, and entrance facilities in telecommunications cabling system structure. Cabling system consists of backbone cables, intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for backbone-to-backbone cross-connection.
- B. Backbone cabling cross-connects may be located in communications equipment rooms or at entrance facilities. Bridged taps and splitters may not be used as part of backbone cabling.
- C. Comply with BICSI N1, NECA NEIS 1, and NECA NEIS 301.
- D. Backbone cabling system must comply with transmission standards in TIA-568.1.
- E. Telecommunications Pathways and Spaces: Comply with TIA-569.
- F. Wiring Methods:
  1. Not in Raceway: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
  2. In Raceway: Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces, in attics, and in gypsum board partitions where unenclosed wiring method may be used. Conceal raceway and cables except in unfinished spaces.
    - a. Install plenum cable in environmental airspaces, including plenum ceilings.
    - b. Comply with requirements for pathways specified in Section 260528 "Pathways for Electrical Systems."
  3. In Enclosures: Bundle, lace, and train cables within enclosures. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.
- G. Optical Fiber Cabling Installation:
  1. Comply with TIA-568.1 and TIA-568.3.
  2. Comply with BICSI ITSIMM, Ch. 6, "Cable Termination Practices."
  3. Terminate all cables; no cable may contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
  4. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inch and not more than 6 inch from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
  5. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
  6. Bundle, lace, and train cable to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIMM, "Cabling Termination Practices" Chapter. Use lacing bars and distribution spools.

7. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
  8. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps may not be used for heating.
  9. In communications equipment room, provide 10 ft long service loop on each end of cable.
  10. Pulling Cable: Comply with BICSI ITSIMM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.
  11. Cable may be terminated on connecting hardware that is rack or cabinet mounted.
- H. Open-Cable Installation:
1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
  2. Cable may not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.
- I. Group connecting hardware for cables into separate logical fields.

### **3.04 FIRESTOPPING**

- A. Comply with requirements in Section 078413 "Penetration Firestopping."
- B. Comply with TIA-569, Annex A, "Firestopping."
- C. Comply with BICSI ITSIMM, "Firestopping" Chapter.

### **3.05 GROUNDING**

- A. Install grounding in accordance with BICSI ITSIMM, "Grounding (Earthing), Bonding, and Electrical Protection" Chapter.
- B. Comply with TIA-607 and NECA/BICSI-607.
- C. Locate grounding bus bar to minimize length of bonding conductors. Fasten to wall allowing at least 2 inch clearance behind grounding bus bar. Connect grounding bus bar with minimum 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.
- D. Bond metallic equipment to grounding bus bar, using not smaller than 6 AWG equipment grounding conductor.

### **3.06 IDENTIFICATION**

- A. Identify system components, wiring, and cabling complying with TIA-606. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- B. Cable and Wire Identification:

1. Label each cable within 4 inch of each termination and tap, where it is accessible in cabinet or junction or outlet box, and elsewhere as indicated.
  2. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.
  3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 ft.
  4. Label each unit and field within distribution racks and frames.
  5. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use different color for jacks and plugs of each service.
- C. Labels must be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA 606, for the following:
1. Flexible vinyl or polyester that flexes as cables are bent.

### **3.07 FIELD QUALITY CONTROL**

- A. Field tests and inspections must be witnessed by Owner's IT or LAN manager.
- B. Tests and Inspections:
  1. Visually inspect optical fiber jacket materials for qualified electrical testing laboratory certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA-568.1.
  2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
  3. Optical Fiber Cable Tests:
    - a. Test instruments must meet or exceed applicable requirements in TIA-568.1. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
    - b. Link End-to-End Attenuation Tests:
      1. Horizontal and multimode backbone link measurements: Test at 850 or 1300 nm in one direction in accordance with TIA-526-14, Method B, One Reference Jumper.
      2. Attenuation test results for backbone links must be less than 2.0 dB. Attenuation test results must be less than those calculated in accordance with equation in TIA-568.1.
- C. Nonconforming Work:
  1. Cables will be considered defective if they do not pass tests and inspections.
  2. Remove and replace defective cables and retest.
- D. Collect, assemble, and submit test and inspection reports.
  1. Data for each measurement must be documented.

2. Data for field quality-control report submittals must be printed in summary report that is formatted similar to Table 10.1 in BICSI TDMM, or transferred from instrument to computer, saved as text files, and printed and submitted.

**END OF SECTION**

**SECTION 271513**  
**COMMUNICATIONS COPPER HORIZONTAL CABLING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

A. Section Includes:

1. Category 6 twisted pair cable.
2. Twisted pair cable hardware.
3. Surge protection products.
4. Identification products.

B. Related Requirements:

1. Section 260513 "Conductors and Cables for Electrical Systems" for data cabling associated with system panels and devices.

**1.2 DEFINITIONS**

- A. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.
- B. EMI: Electromagnetic interference.
- C. FTP: Shielded twisted pair.
- D. F/FTP: Overall foil screened cable with foil screened twisted pair.
- E. F/UTP: Overall foil screened cable with unscreened twisted pair.
- F. IDC: Insulation displacement connector.
- G. Jack: Also commonly called an "outlet," it is the fixed, female connector.
- H. LAN: Local area network.
- I. Plug: Also commonly called a "connector," it is the removable, male telecommunications connector.
- J. RCDD: Registered Communications Distribution Designer.
- K. Screen: A metallic layer, either a foil or braid, placed around a pair or group of conductors.
- L. Shield: A metallic layer, either a foil or braid, placed around a pair or group of conductors.

- M. S/FTP: Overall braid screened cable with foil screened twisted pair.
- N. S/UTP: Overall braid screened cable with unscreened twisted pairs.
- O. UTP: Unscreened (unshielded) twisted pair.

### 1.3 COPPER HORIZONTAL CABLING DESCRIPTION

- A. Horizontal cable cabling system shall provide interconnections between Distributor A, Distributor B, or Distributor C, and the equipment outlet, otherwise known as "Cabling Subsystem 1," in the telecommunications cabling system structure. Cabling system consists of horizontal cables, intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for horizontal-to-horizontal cross-connection.
  - 1. TIA-568-C.1 requires that a minimum of two equipment outlets be installed for each work area.
  - 2. Horizontal cabling shall contain no more than one transition point or consolidation point between the horizontal cross-connect and the telecommunications equipment outlet.
  - 3. Bridged taps and splices shall not be installed in the horizontal cabling.
- B. A work area is approximately 100 sq. ft., and includes the components that extend from the equipment outlets to the station equipment.
- C. The maximum allowable horizontal cable length is 295 feet. This maximum allowable length does not include an allowance for the length of 16 feet to the workstation equipment or in the horizontal cross-connect.

### 1.4 ACTION SUBMITTALS

- A. Product Data:
  - 1. Category 6 twisted pair cable.
  - 2. Cable management system.
  - 3. Identification products.
- B. Shop Drawings: Reviewed and stamped by RCDD.
  - 1. System Labeling Schedules:
    - a. Electronic copy of labeling schedules, in software and format selected by Owner.
    - b. Electronic copy of labeling schedules that are part of cabling and asset identification system of software.
  - 2. Cabling administration Drawings and printouts.
  - 3. Wiring diagrams and installation details of telecommunications equipment, to show location and layout of telecommunications equipment, including the following:
    - a. Telecommunications rooms plans and elevations.
    - b. Telecommunications pathways.

- c. Telecommunications system access points.
  - d. Telecommunications grounding system.
  - e. Telecommunications conductor drop locations.
  - f. Typical telecommunications details.
  - g. Mechanical, electrical, and plumbing systems.
- C. Twisted pair cable testing plan.
- D. Field Quality-Control Submittals:
- 1. Field quality-control reports.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For RCDD, Installer, installation supervisor, and field inspector.
- B. Product Certificates: For each type of product.
- C. Source quality-control reports.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For splices and connectors to include in maintenance manuals.
- B. Software and Firmware Operational Documentation:
  - 1. Software operating and upgrade manuals.
  - 2. Program Software Backup: On USB media or compact disk, complete with data files.
  - 3. Device address list.
  - 4. Printout of software application and graphic screens.

#### 1.7 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. Connecting Blocks: Five of each type.
  - 2. Cover Plates: Five of each type.
  - 3. Jacks: Twenty of each type.
  - 4. Plugs: Twenty of each type.

#### 1.8 QUALITY ASSURANCE

- A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
  - 1. Layout Responsibility: Preparation of Shop Drawings by an RCDD.

2. Installation Supervision: Installation shall be under the direct supervision of Level 2 Installer, who shall be present at all times when Work of this Section is performed at Project site.
  3. Testing Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.
- B. Testing Agency Qualifications: Testing agency must have personnel certified by BICSI on staff.
1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD.

#### 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Test cables upon receipt at Project site.
1. Test each pair of twisted pair cable for open and short circuits.

#### 1.10 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

#### 1.11 COORDINATION

- A. Coordinate layout and installation of telecommunications pathways and cabling with Owner's telecommunications and LAN equipment and service suppliers.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Horizontal cabling system shall comply with transmission standards in TIA-568-C.1, when tested according to test procedures of this standard.
- B. Telecommunications Pathways and Spaces: Comply with TIA-569-D.
- C. Grounding: Comply with TIA-607-B.

#### 2.2 GENERAL CABLE CHARACTERISTICS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with the applicable standard and NFPA 70 for the following types:
1. Communications, Plenum Rated:

- a. Type CMP complying with UL 1685.
2. Communications, Non-Plenum Rated:
  - a. Type CMP or Type CMR in metallic conduit installed according to NFPA 70, Article 300.22, "Wiring in Ducts, Plenums, and Other Air-Handling Spaces."
- B. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  1. Flame-Spread Index: 25 or less.
  2. Smoke-Developed Index: 50 or less.
- C. RoHS compliant.

#### 2.3 CATEGORY 6 TWISTED PAIR CABLE

- A. Category 6 Twisted Pair Cable: Four-pair, balanced twisted pair cable, certified to meet transmission characteristics of Category 6a cable at frequencies up to 500 MHz.
- B. 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. 3M.
  2. Belden Inc.
  3. CommScope, Inc.
  4. Genesis Cable Products; Honeywell International, Inc.
- C. Standard: Comply with TIA-568-C.2 for Category 6a cables.
- D. Conductors: 100-ohm, 23 AWG solid copper.
- E. Shielding/Screening: Unshielded twisted pairs (UTP).
- F. Cable Rating: Plenum.
- G. Jacket: Thermoplastic, coordinate color requirements with Owner's IT or LAN manger.

#### 2.4 TWISTED PAIR CABLE HARDWARE

- A. Twisted Pair Cable Hardware: Hardware designed to connect, splice, and terminate twisted pair copper communications cable.
- B. 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. 3M.
  2. Belden Inc.
  3. CommScope, Inc.

4. General Cable; Prysmian Group North America.
- C. General Requirements for Twisted Pair Cable Hardware:
1. Comply with the performance requirements of Category 6a.
  2. Comply with TIA-568-C.2, IDC type, with modules designed for punch-down caps or tools.
  3. Cables shall be terminated with connecting hardware of same category or higher.
- D. Source Limitations: Obtain twisted pair cable hardware from same manufacturer as twisted pair cable, from single source.
- E. Connecting Blocks:
1. 110-style IDC for Category 6a.
  2. Provide blocks for the number of cables terminated on the block, plus 25 percent spare, integral with connector bodies, including plugs and jacks where indicated.
- F. Cross-Connect: Modular array of connecting blocks arranged to terminate building cables and permit interconnection between cables.
1. Number of Terminals per Field: One for each conductor in assigned cables.
- G. Patch Panel: Modular panels housing numbered jack units with IDC-type connectors at each jack location for permanent termination of pair groups of installed cables.
1. Features:
    - a. Universal T568A and T568B wiring labels.
    - b. Labeling areas adjacent to conductors.
    - c. Replaceable connectors.
    - d. 24 or 48 ports.
  2. Construction: 16-gauge steel and mountable on 19-inch equipment racks.
- H. Patch Cords: Factory-made, four-pair cables in 48-inch lengths; terminated with an eight-position modular plug at each end.
1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure performance. Patch cords shall have latch guards to protect against snagging.
  2. Patch cords shall have color-coded boots for circuit identification.
- I. Plugs and Plug Assemblies:
1. Male; eight position; color-coded modular telecommunications connector designed for termination of a single four-pair, 100-ohm, unshielded or shielded twisted pair cable.
  2. Standard: Comply with TIA-568-C.2.
  3. Marked to indicate transmission performance.
- J. Jacks and Jack Assemblies:

1. Female; eight position; modular; fixed telecommunications connector designed for termination of a single four-pair, 100-ohm, unshielded or shielded twisted pair cable.
  2. Designed to snap-in to a patch panel or cover plate.
  3. Standard: Comply with TIA-568-C.2.
  4. Marked to indicate transmission performance.
- K. Cover Plate:
1. Two port, vertical single gang cover plates designed to mount to single gang wall boxes.
  2. Plastic Cover Plate: High-impact plastic. Coordinate color with Section 260533.16 "Boxes and Covers for Electrical Systems."
- L. Legend:
1. Machine printed, in the field, using adhesive-tape label.
  2. Snap-in, clear-label covers and machine-printed paper inserts.

## 2.5 SURGE PROTECTION PRODUCTS

- A. Provide surge protection for all cables entering the building from outdoor locations.
1. Refer to drawings for requirements.

## 2.6 IDENTIFICATION PRODUCTS

- A. Comply with TIA-606-B and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

## 2.7 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate cables.
- B. Factory test cables on reels according to TIA-568-C.1.
- C. Factory test twisted pair cables according to TIA-568-C.2.
- D. Cable will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

## PART 3 - EXECUTION

### 3.1 APPLICATION

- A. Parking gate control Ethernet Extenders: Category 5e

- B. All other applications: Category 6a unless noted otherwise in drawings.

### 3.2 WIRING METHODS

- A. Routing:

1. Install cables in raceways and cable trays, except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces, attics, and gypsum board partitions where unenclosed wiring method may be used. Conceal raceway and cables, except in unfinished spaces.
  - a. Install plenum cable in environmental air spaces, including plenum ceilings.
2. Conceal conductors and cables in accessible ceilings, walls, and floors where possible.

- B. Wiring within Enclosures: Bundle, lace, and train cables within enclosures. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools. Install conductors parallel with or at right angles to sides and back of enclosure.

### 3.3 INSTALLATION OF PATHWAYS

- A. Comply with requirements for demarcation point, cabinets, and racks specified in Section 271100 "Communications Equipment Room Fittings."
- B. Comply with Section 260528 "Pathways for Electrical Systems."
- C. Comply with Section 260529 "Hangers and Supports for Electrical Systems."
- D. Drawings indicate general arrangement of pathways and fittings.

### 3.4 INSTALLATION OF TWISTED PAIR HORIZONTAL CABLES

- A. Comply with NECA 1 and NECA/BICSI 568.

- B. General Requirements for Cabling:

1. Comply with TIA-568-C.0, TIA-568-C.1, and TIA-568-C.2.
2. Comply with BICSI's "Information Transport Systems Installation Methods Manual (ITSIMM), Ch. 5, "Copper Structured Cabling Systems," "Cable Termination Practices" Section.
3. Install 110-style IDC termination hardware unless otherwise indicated.
4. Do not untwist twisted pair cables more than 1/2 inch from the point of termination to maintain cable geometry.
5. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
6. Consolidation points may be used only for making a direct connection to equipment outlets:

- a. Do not use consolidation point as a cross-connect point, as a patch connection, or for direct connection to workstation equipment.
    - b. Locate consolidation points for twisted pair cables at least 49 feet from communications equipment room.
  7. Cables may not be spliced. 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.
  8. Install lacing bars to restrain cables, prevent straining connections, and prevent bending cables to smaller radii than minimums recommended by manufacturer.
  9. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI Information Transport Systems Installation Methods Manual, Ch. 5, "Copper Structured Cabling Systems," "Cable Termination Practices" Section. Use lacing bars and distribution spools.
  10. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation, and replace it with new cable.
  11. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
  12. In the communications equipment room, install a 10-foot-long service loop on each end of cable.
  13. Pulling Cable: Comply with BICSI Information Transport Systems Installation Methods Manual, Ch. 5, "Copper Structured Cabling Systems," "Pulling and Installing Cable" Section. Monitor cable pull tensions.
  14. Maintain minimum bend radius for all installations.
- C. Open-Cable Installation:
1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
  2. Suspend twisted pair cabling, not in a wireway or pathway, a minimum of 8 inches above ceilings by cable supports not more than 60 inches apart.
  3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.
- D. Group connecting hardware for cables into separate logical fields.
- E. Separation from EMI Sources:
1. Comply with recommendations from BICSI's "Telecommunications Distribution Methods Manual" and TIA-569-D for separating unshielded copper communication cable from potential EMI sources, including electrical power lines and equipment.
  2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
    - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches.
    - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches.
    - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches.
  3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:

- a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches.
  - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches.
  - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches.
4. Separation between communications cables in grounded metallic raceways, power lines, and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
- a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
  - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches.
  - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches.
5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches.
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches.

### 3.5 FIRESTOPPING

- A. Comply with requirements in Section 078413 "Penetration Firestopping."
- B. Comply with TIA-569-D, Annex A, "Firestopping."
- C. Comply with "Firestopping Systems" Article in BICSI's "Telecommunications Distribution Methods Manual."

### 3.6 GROUNDING

- A. "Communications Systems" for grounding conductors and connectors.
- B. Install grounding according to the "Grounding, Bonding, and Electrical Protection" chapter in BICSI's "Telecommunications Distribution Methods Manual."
- C. Comply with TIA-607-B and NECA/BICSI-607.
- D. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall, allowing at least a 2-inch clearance behind the grounding bus bar. Connect grounding bus bar to suitable electrical building ground, using a minimum No. 4 AWG grounding electrode conductor.
- E. Bond metallic equipment to the grounding bus bar, using not smaller than a No. 6 AWG equipment grounding conductor.

### 3.7 IDENTIFICATION

- A. Cable and Wire Identification:
  1. Label each cable within 4 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.

- 2. Each wire connected to building-mounted devices is not required to be numbered at the device if wire color is consistent with associated wire connected and numbered within panel or cabinet.
  - 3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet.
  - 4. Label each terminal strip, and screw terminal in each cabinet, rack, or panel.
    - a. Individually number wiring conductors connected to terminal strips, and identify each cable or wiring group, extended from a panel or cabinet to a building-mounted device, with the name and number of a particular device.
    - b. Label each unit and field within distribution racks and frames.
  - 5. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and -connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.
- B. Labels shall be preprinted or computer-printed type, with a printing area and font color that contrast with cable jacket color but still comply with TIA-606-B requirements for the following:
- 1. Cables use flexible vinyl or polyester that flexes as cables are bent.

### 3.8 FIELD QUALITY CONTROL

- A. Field tests and inspections must be witnessed by Owner's IT or LAN manager.
- B. Tests and Inspections:
  - 1. Visually inspect jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA-568-C.1.
  - 2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
  - 3. Test twisted pair cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.
    - a. Test instruments shall meet or exceed applicable requirements in TIA-568-C.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
- C. Data for each measurement shall be documented. Data for submittals shall be printed in a summary report that is formatted similarly to Table 10.1 in BICSI's "Telecommunications Distribution Methods Manual," or shall be transferred from the instrument to the computer, saved as text files, printed, and submitted.
- D. Nonconforming Work:

1. End-to-end cabling will be considered defective if it does not pass tests and inspections.
  2. Remove and replace cabling where test results indicate that they do not comply with specified requirements.
- E. Collect, assemble, and submit test and inspection reports.

END OF SECTION

## **SECTION 31 1000**

### **SOIL MATERIALS**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Subsoil Materials.
- B. Topsoil Materials.
- C. Bio-Retention and Rain Garden Soil Mix.

##### **1.02 RELATED SECTIONS**

- A. Section 31 2200 – Earthwork and Site Grading
- B. Section 32 9218 – Landscape Grading.
- C. Section 32 9219 – Seeding.
- D. Section 32 9222 –Landscape Planting

##### **1.03 REFERENCES**

- A. ASTM D2487 - Classification of Soils for Engineering Purposes.
- B. NYSDOT Standard Specifications (latest edition), Section 203 - Excavation and Embankment.

##### **1.04 SUBMITTALS FOR REVIEW**

- A. Submit gradation and mechanical analysis of soil materials to Director's Representative for approval.
- B. Materials Source: Submit name and location of imported materials source to Director's Representative.

##### **1.05 QUALITY ASSURANCE**

- A. Perform Work in accordance with all applicable standards.

#### **PART 2 PRODUCTS**

##### **2.01 SUBSOIL MATERIALS**

- A. Excavated and re-used native material. Import topsoil if reused material is not sufficient to meet project requirements.
- B. Free of clay, rock or gravel larger than 2 inches in any dimension, debris, waste, frozen materials, vegetation and other deleterious matter.
- C. Satisfactory soil materials are defined as those complying with ASTM D2487, soil classification groups GW, GP, GM, SM, SW, and SP.

##### **2.02 TOPSOIL MATERIALS**

- A. Excavated and re-used native material in accordance with NYSDOT Item 610.1401, or imported borrow in accordance with NYSDOT Item 610.1403.
- B. Topsoil shall be fertile, friable, natural loam, surface soil, free of subsoil, clay lumps, brush, weeds, and other litter, and free of roots, stumps, stones larger than 1/2" in any dimension, and other extraneous or toxic material harmful to plant growth. Topsoil shall not be used in a frozen or muddy condition.

C. Topsoil shall have an acidity range of pH 5.5 to 7.5 and shall contain not less than 6% or more than 12% organic matter as determined by loss on ignition of moisture-free samples dried at 100 degrees Centigrade.

D. Topsoil shall meet the following mechanical analysis:

<u>Sieve</u>	<u>% passing</u>
1/2" screen	100
#100 mesh	40-60
#200 mesh	40-50

E. Conforming to ASTM D2487 Soil classification groups Symbol OH and PT.

## **2.03 BIO-RETENTION AND RAIN GARDEN SOIL MIX**

1. Shall be a sandy loam, loamy sand or a loam/sand mixture, free of subsoil, clay lumps, brush, weeds, and other litter, and free of roots, stumps, stones larger than 1/2" in any dimension.

2. Shall have an acidity range of pH 5.2 to 7.0 and shall contain 4% organic matter as determined by loss on ignition of moisture-free samples dried at 100 degrees Centigrade.

3. Shall meet the following mechanical analysis:

Clay 10%

Silt 35%

Sand 55%

4. Conforming to Unified Soil Classification System (USCS) Soil classification group Symbols SM or ML.

## **2.04 SOURCE QUALITY CONTROL**

A. Subsoil and Topsoil material shall consist of any suitable material complying with the specifications contained herein.

B. If testing and analysis indicate materials do not meet specified requirements, change material and retest.

C. Provide materials of each type from same source throughout the Work.

## **PART 3 EXECUTION**

### **3.01 SOIL REMOVAL**

A. Remove turf and strip topsoil to an approximate depth of 4" under areas to be graded as shown on the grading plan. Stockpile on site and coordinate location with Director's Representative.

B. Cut and fill subsoil in the areas shown on the grading plan.

### **3.02 STOCKPILING**

A. Temporarily stockpile excavated material to be reused on site where indicated by the Director's Representative.

B. Stockpile excavated material to be reused in sufficient quantities to meet Project schedule and requirements.

C. Separate differing materials with dividers or stockpile apart to prevent mixing.

D. Prevent intermixing of soil types or contamination.

- E. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

### **3.03 STOCKPILE CLEANUP**

- A. Remove stockpile, leave area in a clean and neat condition. Grade site surface to prevent free standing surface water.

**END OF SECTION**

## SECTION 31 1100 AGGREGATE MATERIALS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Aggregate subbase material for asphalt and concrete pavement, granite curb bedding.
- B. Drainage stone for artificial turf, Geocell surface, Bioretention Areas.
- C. Utility pipe bedding and backfill.
- D. Stabilization and Filtration Geotextiles.
- E. Rip Rap.

#### 1.02 RELATED SECTIONS

- A. Section 31 2200 – Earthwork and Site Grading.

#### 1.03 REFERENCES

- A. NYSDOT Standard Specifications (latest edition), Section 300 - Bases and Subbases, Section 703 - Aggregates.
- B. AASHTO - M147 - Materials for Aggregate and Soil-Aggregate.
- C. ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.
- D. ASTM D2487 - Classification of Soils for Engineering Purposes

#### 1.04 SUBMITTALS FOR REVIEW

- A. Submit gradation and material analysis for ALL types of aggregate materials to Director's Representative, for approval prior to ordering or delivering to site.
- B. Materials Source: Submit name of imported materials suppliers to Director's Representative.

#### 1.05 QUALITY ASSURANCE

- A. Perform work in accordance with applicable state and local standards.

### PART 2 PRODUCTS

#### 2.01 COARSE AGGREGATE MATERIALS

- A. Aggregate subbase material for asphalt and concrete pavements and granite curbing bedding: Properly graded, non-frost susceptible, crushed stone mixture, NYSDOT type 2, item 304.12 and conforming to the following gradation requirements:

<u>Sieve Size</u>	<u>Percent Passing</u>
2"	100
1/4"	30-65
#40	5-40
#200	0-10

- B. Drainage Stone for utility pipe bedding and initial backfill, bio-retention drainage stone, artificial turf and geocell surface: Properly graded, non-frost susceptible crushed stone mixture, NYSDOT #1 and #2 crushed stone mix conforming to NYSDOT 703-02 Requirements.
- C. Rip Rap: Properly graded, fractured, angular, sound, rock. Average 6" dia. Installed to a depth of 12" where shown on plans.

## **2.02 FILTRATION GEOTEXTILE**

- A. Filtration Geotextile: Non-biodegradable, high modulus woven polypropylene fabric that is inert to naturally encountered chemicals, alkalies and acids. Fabric shall be Mirafi 160N, or approved equal.

## **2.03 STABILIZATION GEOTEXTILE**

- A. Stabilization Geotextile: Non-biodegradable, high modulus woven polypropylene fabric that is inert to naturally encountered chemicals, alkalies and acids. Fabric shall be Mirafi 500X, or approved equal.

## **2.04 SOURCE QUALITY CONTROL**

- A. Perform testing and analysis of aggregate materials in accordance with ASTM C136.
- B. If tests indicate materials do not meet specified requirements, change material or material source and retest.
- C. Provide materials of each type from same source throughout the work.

# **PART 3 EXECUTION**

## **3.01 STOCKPILING**

- A. Stockpile materials on site as needed at locations designated by the Director's Representative.
- B. Stockpile in sufficient quantities to meet Project schedule and requirements.
- C. Separate differing materials with dividers or stockpile apart to prevent mixing.
- D. Direct surface water away from stockpile site so as to prevent erosion or deterioration of materials.

## **3.02 STOCKPILE CLEANUP**

- A. Prevent free standing surface water.

**END OF SECTION**

**SECTION 312000  
EARTH MOVING - STRUCTURES**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section Includes:

1. Preparing subgrades for interior slabs.
2. Excavating and backfilling for buildings and structures.

- B. Related Sections:

1. Section 311000 "Site Clearing" for site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
2. Section 329200 "Turf and Grasses" for finish grading in turf and grass areas, including preparing and placing planting soil for turf areas.

**1.3 DEFINITIONS**

- A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

- B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

- C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

- D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

- E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

- F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation 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 Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
- G. Fill: Soil materials used to raise existing grades.
- H. 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.
- I. 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.
- J. 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.
- K. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

#### **1.4 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.
- B. Qualification Data: For qualified testing agency.
- C. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:
  1. Classification according to ASTM D 2487.
  2. Laboratory compaction curve according to ASTM D 1557.

#### **1.5 QUALITY ASSURANCE**

- A. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E 329 and ASTM D 3740 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 Owner and authorities having jurisdiction.
  2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

- B. Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.
  - 1. Do not proceed with work on adjoining property until directed by Architect.
- C. Utility Locator Service: Notify "Dig Safely New York" for area where Project is located before beginning earth moving operations.
- D. Do not commence earth moving operations until temporary erosion- and sedimentation-control measures, specified in Drawings, Section 015000 "Temporary Facilities and Controls," and Section 311000 "Site Clearing," are in place.
- E. Do not commence earth moving operations until plant-protection measures specified in Section 311000 "Site Clearing" 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 D 2487, 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 D 2487, or a combination of these groups.
  - 1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel and crushed stone meeting the requirements of NYSDOT Standard Specification for Construction Materials, Item 304.12, Subbase Course Type 2.

- E. Select Granular Fill: Naturally or artificially graded mixture of natural or crushed gravel and crushed stone meeting the requirements of NYSDOT Standard Specification for Construction Materials, Item 203.07, Select Granular Fill.
- F. Engineered Fill: Well graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel and crushed stone meeting the requirements of NYSDOT Standard Specification for Construction Materials, Item 623.12, Crushed Stone of Material Size Designation No. 1 as specified in Section 703-02.
- H. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand meeting the requirements of NYSDOT Standard Specification for Construction Materials, Item 605.1001, Underdrain Filter Type II.
- I. Sand: ASTM C 33; fine aggregate.
- J. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

## **2.2 GEOTEXTILES**

- A. Nonwoven Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; of minimum strength class indicated in plans and conforming to NYSDOT Standard Specification for Construction Materials, Item 207.12; and listed in the NYSDOT Approved Materials List.
- B. Woven Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; of minimum strength class indicated in plans and conforming to NYSDOT Standard Specification for Construction Materials, Item 207.11; and listed in the NYSDOT Approved Materials List.

## **2.3 CONTROLLED LOW-STRENGTH MATERIAL**

- A. Controlled Low-Strength Material: Self-compacting, low-density, flowable concrete material produced from the following:
  - 1. Portland Cement: ASTM C 150, Type III.
  - 2. Fly Ash: ASTM C 618, Class C or F.
  - 3. Normal-Weight Aggregate: ASTM C 33, 3/8-inch nominal maximum aggregate size.
  - 4. Foaming Agent: ASTM C 869.
  - 5. Water: ASTM C 94/C 94M.
  - 6. Air-Entraining Admixture: ASTM C 260.
- B. Produce conventional-weight, controlled low-strength material with 250-psi compressive strength when tested according to ASTM C 495.

## **2.4 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. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
  1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

### **3.3 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. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
  - e. 6 inches beneath bottom of concrete slabs-on-grade.
  - f. 6 inches beneath pipe in trenches, and the greater of 24 inches wider than pipe or 42 inches wide.
3. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation.
  - a. Intermittent drilling; blasting, if permitted; ram hammering; or ripping of material not classified as rock excavation is earth excavation.

### **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. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
  2. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.
- B. Excavations at Edges of Tree- and Plant-Protection Zones:
  1. Excavate by hand to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.

### **3.6 EXCAVATION FOR INTERIOR SLABS**

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

### **3.7 SUBGRADE INSPECTION**

- A. Notify Owner's Testing Agency when excavations have reached required subgrade.
- B. If Owner's Testing Agency determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

- C. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired and loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
  - 1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
  - 2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Owner's Testing Agency, 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 unit prices.
- E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Owner's Testing Agency, without additional compensation.

### **3.8 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 Owner's Testing Agency.

### **3.9 STORAGE OF SOIL MATERIALS**

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

### **3.10 BACKFILL**

- A. Place and compact backfill in excavations promptly, but not before completing the following:
  - 1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
  - 2. Surveying locations of underground utilities for Record Documents.
  - 3. Inspecting underground utilities.
  - 4. Removing concrete formwork.
  - 5. Removing trash and debris.
  - 6. Removing temporary shoring and bracing, and sheeting.
  - 7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.

### **3.11 SOIL FILL**

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
  1. Under grass and planted areas, use satisfactory soil material.
  2. Under walks and pavements, use satisfactory soil material.
  3. Under steps and ramps, as specified by geotechnical engineer and in structural plans.
  4. Under building slabs, as specified by geotechnical engineer and in structural plans.
  5. Under footings and foundations, as specified by geotechnical engineer and in structural plans.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

### **3.12 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.

### **3.13 COMPACTION OF SOIL BACKFILLS AND FILLS**

- A. Place backfill and fill soil materials in layers not more than 6 inches in loose depth for material compacted by heavy compaction equipment, and not more than 3 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 D 1557:
  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 90 percent.
  4. For utility trenches, compact each layer of initial and final backfill soil material at 90 percent.

### **3.14 GRADING**

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
  2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
1. Turf or Unpaved Areas: Plus or minus 1 inch.
  2. Walks: Plus or minus 1 inch.
  3. Pavements: Plus or minus 1/2 inch.

### **3.15 SUBBASE COURSE UNDER INTERIOR SLABS**

- A. Place subbase course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place subbase course under interior slabs as follows:
  1. Install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
  2. Place base course material under hot-mix asphalt pavement or concrete 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 and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

### **3.16 FIELD QUALITY CONTROL**

- A. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.
- B. 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.
- C. 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.
- D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, 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.

- E. 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.

### **3.17 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.

### **3.18 DISPOSAL OF SURPLUS AND WASTE MATERIALS**

- A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.
- B. Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Architect.
  - 1. Remove waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

**END OF SECTION 312000**

**SECTION 31 2200**  
**EARTHWORK AND SITE GRADING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Strip, store, and spread existing topsoil.
- B. Cutting, filling, grading, and compaction of subgrade soils.

**1.02 RELATED SECTIONS**

- A. Section 32 9218 – Landscape Grading.
- B. Section 32 9219 – Seeding.
- C. Section 31 2501 – Erosion and Sediment Control.

**1.03 REFERENCES**

- A. ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.
- B. ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.
- C. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures (modified proctor).
- D. ASTM D2167 - Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
- E. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- F. ASTM 699 - Laboratory Testing.
- G. NYSDOT Standard Specifications (latest edition) section 203-3.12 compaction.

**1.04 SUBMITTALS**

- A. Test Reports: Submit the following reports directly to the Director's Representative from the testing service, with copy to the Contractor:
  - 1. Test reports on borrow material including gradation and mechanical analysis.
  - 2. Verification of the subgrade suitability material to meet specified requirements.
  - 3. At least one optimum moisture-maximum density curve for each type of soil to be used or encountered.
  - 4. Field reports including in-place density tests.
  - 5. Report of actual unconfined compressive strength and/or results of bearing tests of each strata tested.
- B. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or invert, and slope gradients.

**1.05 QUALITY ASSURANCE**

- A. Perform earthwork and site grading in conformance with applicable requirements of governing authorities having jurisdiction.
- B. Testing and Inspection Service: Contractor shall employ and pay for a qualified independent geotechnical testing and inspection service/laboratory to perform soil testing and inspection service during earthwork operations.
- C. Testing Laboratory Qualifications: To qualify for acceptance, the geotechnical testing and inspection service/ laboratory must demonstrate to Director's Representative satisfaction,

based on evaluation of laboratory-submitted criteria conforming to ASTM E 699, that it has the experience and capability to conduct required field and laboratory geotechnical testing without delaying the progress of the work.

#### **1.06 EXISTING UTILITIES**

- A. Locate existing underground and overhead utilities in the area of work before starting earthwork operations. It is the Contractor's responsibility to utilize a locating service to mark the location of all underground utilities in the project area.
- B. Where utilities are to remain in place, provide adequate means of protection and precaution against damage throughout the contract period. Conform to the requirements of the utility having jurisdiction.
- C. Should uncharted, or incorrectly charted underground or other utilities be encountered during earthwork operations, consult the utility Owner immediately for directions.
- D. Cooperate with the Owner and public and/or private utility companies in keeping their respective services and facilities in operation. Do not interrupt existing utilities serving facilities occupied and used, except when permitted in writing by the Director's Representative, and then only after acceptable temporary utility services have been provided. Provide minimum of 48 hours notice to Director's Representative.
- E. Repair all damaged utilities to the satisfaction of the utility Owner at the Contractor's expense.
- F. Remove, plug or cap inactive or abandoned utilities encountered during construction operations. The location of such utilities shall be noted on the record drawings. Verify "inactivity" of services with involved jurisdiction before start of work.
- G. Use of explosives is not permitted.

### **PART 2 PRODUCTS**

#### **2.01 MATERIALS**

- A. Topsoil: As specified in Section 31 1000.
- B. Subsoil: As specified in Section 31 1000.
- C. Aggregate Materials: As specified in Section 31 1100.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify site conditions prior to commencement of work.
- B. Verify that survey benchmark and intended elevations for the Work are as indicated.

#### **3.02 PREPARATION**

- A. Identify required lines, levels, contours, and datum.
- B. Stake and flag locations of known utilities.
- C. Protect plant life, lawns, and other features remaining as a portion of final landscaping.
- D. Protect all benchmarks, survey control points, existing structures, fences, sidewalks, paving, and curbs against damage.
- E. Strip topsoil to an approximate depth of 4" and stockpile where designated by Director's Representative.

#### **3.03 SUBSOIL EXCAVATION**

- A. Excavation is unclassified, and includes excavation to subgrade elevations indicated, regardless of the character of materials and obstructions encountered.
- B. If unsuitable materials (as determined by geotechnical testing service/laboratory) are encountered at the required subgrade elevations, carry excavations deeper and replace the excavated material as directed by the geotechnical testing service/laboratory. Promptly remove unsuitable material from the site.
- C. Prevent surface and subsurface water from flowing into excavations. Dewater as required. Contractor is responsible for all dewatering operations, and the disposal of the water shall be in accordance with all applicable local, state and federal regulations and as indicated on the plans.
- D. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rainwater and water removed from excavations to runoff areas.
- E. Do not excavate wet subsoil.
- F. Stockpile in area designated on site by the Director's Representative to depth not exceeding 8 feet and protect from erosion.
- G. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.
- H. Conform to elevations and dimensions within a tolerance of +0.01 feet/-0.10 feet.

#### **3.04 FILLING**

- A. Remove vegetation, organic material, debris, unsuitable soils, obstructions and deleterious materials from ground surface prior to placement of fills. Break-up sloped surfaces steeper than 4:1 so that fill material will bond with existing surface.
- B. When existing ground surface has a density less than that specified for the particular area classification, break-up the ground surface, pulverize, moisture-condition to the optimum moisture content, and compact to the required depth and percentage of maximum density.
- C. Fill areas to contours and elevations with unfrozen materials.
- D. Place fill material on continuous layers, not exceeding 8 inches in loose depth for material to be compacted by heavy compaction equipment and not more than 4" in loose depth for material to be compacted by hand-operated equipment, and compact.
- E. Maintain optimum moisture content of fill materials to attain required compaction density.
- F. Make grade changes gradual. Blend slope into level areas.

#### **3.05 GRADING**

- A. Uniformly grade areas within the limits shown on the plans. Smooth finish surfaces within specified tolerances. The degree of finish required will be that ordinarily obtainable from either blade grader or scraper operations.
- B. Shape the surface to line, grade and cross-section as shown on the plans, with the finish surface not more than 0.10 foot above or below required subgrade elevation, compacted as specified, and graded to prevent ponding of water after rains. Include such operations as plowing, discing and any moisture or aerating required to provide the optimum moisture content for compaction. Fill low areas resulting from removal of unsatisfactory soil materials, obstructions, and other deleterious materials using satisfactory soil material.
- C. Before placing fill, proof roll subgrade thoroughly using a 10-ton roller with two passes, the second pass perpendicular to the first.

### **3.06 COMPACTION**

- A. Control soil compaction during construction, providing the minimum percentage of density specified for each area classification indicated below.
- B. Compact soil to not less than the following percentages of maximum density in accordance with ASTM D 1557 Modified Proctor:
  1. Planting and/or Lawn Areas: Compact top 6" of subgrade and each layer of fill material at 90% maximum density.
  2. Pavements and Building Slab Areas: Compact top 12" of subgrade and each layer of fill area at 95% maximum density.
- C. All subgrades shall be compacted with an approved method as specified in NYSDOT Standard Specification section 203-3.12.
- D. Moisture Control:
  1. Where the subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to the surface. Prevent free water appearing on the surface during or subsequent to compaction operations.
  2. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
  3. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread to allow to dry. Assist drying by discing, harrowing, or pulverizing until the moisture content is reduced to a satisfactory value.

### **3.07 FIELD QUALITY CONTROL**

- A. Testing: Geotechnical testing service/laboratory retained by the Contractor shall inspect, test, and approve each in-place subgrade layer before further backfill work is performed. Testing service shall review and test material and determine optimum moisture at which maximum density can be obtained in accordance with ASTM D1557.
- B. Perform field density test in accordance with ASTM D 1556 (sand cone method), ASTM D 2167 (rubber balloon method) or ASTM D 2922 (nuclear method).
- C. If tests indicate work does not meet specified requirements, Contractor shall remove work, replace, and retest.
- D. Frequency of Tests: In each compacted soil fill layer, make one field density test for each lift every 2,000 sq. ft. of fill area. In pipe trenches, make one field density test for each 100 lineal feet of trench.

### **3.08 MAINTENANCE**

- A. Protect newly graded areas from traffic and erosion. Keep free of trash and debris.
- B. Repair and re-establish grades in settled, eroded and rutted areas to the specified tolerances. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify the surface, reshape and compact to the required density prior to further construction.

### **3.09 SETTLING**

Where settling is measurable or observable at graded areas during the general project warranty period, remove surface (pavement, lawn or other surface), 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 31 2501**  
**EROSION AND SEDIMENT CONTROL**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. All erosion and sediment control facilities have been installed under separate contract and remain in place.
- B. Contractor shall maintain all erosion and sediment control facilities throughout the duration of the contract.
- C. Contractor shall remove all erosion and sediment control facilities upon final stabilization of the project site.
- D. Contractor shall furnish and install Geocell GS System.

**1.02 RELATED SECTIONS**

- A. Section 31 2200: Earthwork and Site Grading

**1.03 REFERENCES**

- A New York State Standards and Specifications for Erosion and Sediment Control, latest edition.

**1.04 SUBMITTALS FOR REVIEW**

- A. Designate erosion control and maintenance activities on the submitted Project Schedule.

**1.05 QUALITY ASSURANCE**

All Erosion/Sediment Control activities performed by the contractor shall be in compliance with the following standards of practice:

- A. New York State Standards and Specifications for Erosion and Sediment Control published by NYS Soil and Water Conservation Committee.
- B. Project Storm Water Pollution Prevention Plan (SWPPP).

**PART 2 - PRODUCTS**

**2.01 NOT APPLICABLE EXCEPT THE FOLLOWING**

**2.02 TEMPORARY GRASS**

- A. Temporary grass shall be quick growing species suitable to the area and as a temporary cover which will not compete with the grasses sown later for permanent cover.
- B. Seed Mixtures
  - 1. Temporary Seeding

	Type	Lbs./Acre	Lbs./1000SF
a.	Annual Rye grass	80	1.9
b.	<u>Winter Ryegrass</u>	100	2.5

Use winter rye if seeding in October/November.

**2.03 EROSION CONTROL FABRIC FOR VEGETATED SWALE**

PRODUCT:

Turf Reinforcement Mat (TRM): TMAX3K and anchor with stainless steel twist pins TL-TA1 as manufactured by North American Green, Western Green, 4609 E. Boonville-New Harmony Rd.,

Evansville, IN 47725, Website: [www.nagreen.com](http://www.nagreen.com), Phone: 1-800-772-2040, or approved equal.

## **2.04 TYPAR GEOCELL GS SYSTEM**

### **PRODUCT:**

The TYPAR GEOCELL GS system consists of a geotextile material in a honeycomb structure into which topsoil shall be placed. The complete system includes GEOCELL panels, topsoil infill and some or all of the following components:

1. geotextiles, geogrids, anchoring devices, geomembrane, drainage materials and surface treatments.

Model: TYPAR GEOCELL GS product grade 250/150

## **2.05 TEMPORARY MULCHING MATERIAL**

- A. Mulching Material: Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable.

## **PART 3 - EXECUTION**

### **3.01 EROSION AND SEDIMENT CONTROL**

- A. All erosion and sediment control facilities must be maintained in working order until the site is stabilized. All preventative and remedial maintenance work, including clean out, repair, replacement, re-grading, re-seeding, re-mulching, or re-netting, must be performed immediately.
- B. Any disturbed area on which activity has ceased must be stabilized immediately. During non-germinating periods, mulch must be applied at the recommended rates. Spread uniformly to form a continuous blanket not less than 1" loose measurement over seeded areas. Apply tackifier to securely hold in place the mulch. Apply a minimum ratio of 75 lbs. tackifier/2,000lbs. of mulch.
- C. After final stabilization has been achieved, temporary erosion and sediment controls must be removed. Areas disturbed during removal shall be stabilized immediately.

- 3.02 Sediment shall be removed from sediment fences whenever their capacity has been reduced by fifty (50) percent from the design capacity and/or as required to ensure intent. Prior to fine grading and restoration, the Contractor shall remove and dispose of accumulated sediments and silts as required.

### **3.03 POLLUTION CONTROL**

- A. Provide methods, means and facilities required to prevent contamination of soil, water or atmosphere by the discharge of noxious substances from construction operations. Promptly repair equipment leaks. Provide equipment and personnel to perform emergency measures required to contain any spillages, and to remove contaminated soils or liquids.
- B. Notify Owner's Representative if contaminated soil, groundwater or other forms of pollution are encountered. Excavate and dispose of any contaminated earth immediately in accordance with Federal, State and local regulations off-site, and replace with suitable compacted fill.
- C. Pollutants such as fuels, lubricants, bitumen's, raw sewage and other harmful materials shall not be discharged into or near rivers, streams, and impoundments or into natural or man-made channels leading thereto. Wash water or waste from concrete mixing operations or trucks shall not be allowed to enter live streams.

### **3.04 DEWATERING AND WASHWATERS**

- A. Water from aggregate washing, equipment washing, dewatering or other operations containing sediment, shall be treated by filtration, settling basin, silt bags or other means sufficient to reduce the turbidity, so as not to cause a substantial visible contrast to

natural conditions.

### **3.05 CONSTRUCTION OPERATIONS**

- A. When borrow material is obtained from other than commercially operated sources, erosion of the borrow site shall be so controlled, both during and after completion of the work, so that erosion will be minimized and sediment will not enter streams or other bodies of water. Waste or disposal areas and construction roads shall be located and constructed in a manner that will minimize sediment-entering streams. Install sediment containment devices around stockpiles and waste areas. Stabilize the surface of temporary haul roads to minimize sediment creation.

### **3.06 FINAL STABILIZATION**

- A. Final stabilization is defined as all soil disturbing activities at the site have been completed, and that a uniform perennial vegetative cover with a density of at least 80% has been established or equivalent stabilization measures (such as the use of mulches or geotextiles) have been employed on all unpaved areas and areas not covered by permanent structures.

### **3.07 REMOVAL OF TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES**

- A. Remove erosion control devices when final stabilization has occurred for the respective areas of the site and are no longer needed.

### **3.08 CONTRACTOR'S RESPONSIBILITY**

- A. The actual scheduling and implementation of the erosion and sediment control plan and devices shown are considered to comprise the majority of efforts needed, but not necessarily all that will be required. Weather, Contractor's schedule, extent of disturbance, site and unforeseen conditions can dictate that greater efforts will be necessary.

**END OF SECTION**

**SECTION 32 1100**  
**MAINTANENCE AND PROTECTION OF TRAFFIC**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. This work shall consist of maintaining pedestrian and vehicular traffic and protecting the public from damage to person and property within the limits of and for the duration of the contract.
- B. Traffic shall be maintained over a reasonably smooth travel way which shall be marked by the use of flagman, traffic signs, barricades, lights and other devices and methods to maintain the safety of those persons coming in contact with the construction site, both day and night.
- C. Coordination of trucks, equipment and parking for construction workers.
- D. Removal of equipment and devices upon completion of the related work.

**PART 2 PRODUCTS**

**2.01 SIGNS, LIGHTS AND DEVICES**

- A. Barricades, lights, signs, and fencing as required for the work of this section.
- B. Traffic Cones and Drums, Flares and Lights: as required for the work of this section.
- C. Flagman and flagman equipment as required for work of this section.

**PART 3 EXECUTION**

**3.01 GENERAL**

- A. Maintain the surface condition of traveled ways. Existing pavements shall be kept in repair using materials compatible with the pavement.
- B. Maintain the drainage facilities and other site elements, old or new, including that on detours.
- C. Provide adequate protection for pedestrian traffic during construction.
- D. Provide the necessary traffic control equipment and flagmen for adequate traffic control on the traveled way and in accordance with the plans.
- E. Make all necessary repairs to existing pavements and wearing surfaces as required to provide a reasonably smooth traveled way where vehicle operation is maintained.
- F. Protect the public from damage to person and property which may result directly or indirectly from the construction operations.
- G. Schedule the work to keep to a minimum the amount of pavement and/or facilities that are destroyed or torn up at any one time.

- H. Control dust and keep the traveled way free from materials spilled from hauling equipment. This shall also apply to dust control and spilled material resulting from the Contractor's operations in the areas outside the contract limits.

### **3.02 PROJECT SITE PATROL**

- A. The Contractor shall provide personnel to patrol the contract area as necessary to ensure that conditions on the site are adequate for public safety and convenience at all times.

### **3.03 CONSTRUCTION PARKING CONTROL**

- A. Control construction related vehicular parking to prevent interference with public traffic and access by emergency vehicles. Construction parking will generally occur off the side street.

### **3.04 FLAGPERSONS**

- A. Provide trained and equipped flag persons to regulate and control traffic as required.

### **3.05 HAUL ROUTES**

- A. Consult with authority having jurisdiction, establish public thoroughfares to be used for haul routes and site access.

### **3.06 TEMPORARY TRAFFIC SIGNS**

- A. The Contractor shall furnish, install, move, remove and maintain construction signs, construction barricades, lights, fencing, drums and cones as required to maintain effective traffic control. Relocate as work progresses.

### **3.07 REMOVAL**

- A. Remove equipment and devices when no longer required.

**END OF SECTION**

**SECTION 32 1123**  
**AGGREGATE BASE COURSE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Aggregate base courses for all new pavements and curbs.

**1.02 RELATED SECTIONS**

- A. Section 31 2200 – Earthwork and Site Grading.
- B. Section 31 1100 – Aggregate materials and geotextiles.

**1.03 REFERENCES**

- A. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures.
- B. ASTM D2167 - Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
- C. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- D. ASTM D3017 - Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.
- E. ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.
- F. NYSDOT Standard Specifications (latest edition) section 203-3.12 compaction.

**1.04 SUBMITTALS**

- A. Contractor shall submit gradation and mechanical analysis for each aggregate sub-base material to be used.

**1.05 QUALITY ASSURANCE**

- A. Testing and Inspection Service: Contractor shall employ and pay for a qualified independent geotechnical testing and inspection service/laboratory to perform soil testing and inspection service during earthwork operations.
- B. Testing Laboratory Qualifications: To qualify for acceptance, the geotechnical testing and inspection service/ laboratory must demonstrate to Director's Representative satisfaction, based on evaluation of laboratory-submitted criteria conforming to ASTM E 699, that it has the experience and capability to conduct required field and laboratory geotechnical testing without delaying the progress of the work.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. See Section 31 1100 – Aggregate materials, for Aggregate Subbase Course materials and geotextiles.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify substrate has been inspected, gradients and elevations are correct, including crowns and cross sections, and is dry.

**3.02 PREPARATION**

- A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.
- B. Do not place fill on soft, muddy, or frozen surfaces.

- C. Proof-roll subgrade with a smooth drum roller (with vibratory capability with a minimum static drum weight of 10 tons. A minimum of 3 passes shall be made in one direction, followed by 3 overlapping passes in a direction perpendicular to the first.
- D. Install filtration and stabilization geotextiles in accordance with the plans and manufacturer's recommendation.

### **3.03 AGGREGATE PLACEMENT**

- A. Place aggregate sub-base on the prepared sub-grade in layers of uniform thickness, conforming to the cross-section and thickness indicated on the plans. Maintain the optimum moisture content for compacting the aggregate sub-base during placement operations.
- B. When a compacted aggregate sub-base course is shown to be 6" thick or more, place the material in equal layers, except no single layer more than 8" or less than 3" in thickness when compacted.
- C. Level and contour surfaces to elevations and gradients indicated. Place in such a manner to minimize segregation. No aggregate sub-base shall be placed under adverse weather conditions.
- D. Compact and roll each layer of aggregate sub-base course to 95% maximum density.
- E. All compaction requirements shall be in accordance with NYSDOT Standard Specification section 203-3.12. The depth of each sub-base course shall not exceed the compactor's capability. Each compactor lacking the original manufacturer identification plates, or with altered or illegible plates, will not be recognized as acceptable compaction equipment and shall be removed from the site.
- F. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.
- G. Use mechanical tamping equipment in areas inaccessible to compaction equipment.
- H. When the pavement sub-base becomes mixed with the sub-grade or any other material, it shall be removed and replaced with the appropriate material. The movement of any traffic over the fine graded aggregate sub-base is not recommended. When damage or contamination occurs, it must be repaired before paving begins.

### **3.04 TOLERANCES**

- A. Fine grading of the pavement sub-base finish course shall not vary more than 1/2 inch above or below true grade at any point.
- B. Scheduled Compacted Thickness: Within 1/4 inch.
- C. Flatness: Maximum variation of 1/2 inch measured with a 10 foot straight edge.

### **3.05 FIELD QUALITY CONTROL**

- A. Quality Control Testing during construction: Allow testing service to inspect, test and approve each aggregate sub-base layer before further backfill or construction work is performed. Testing service shall review and test material and determine optimum moisture at which maximum density can be obtained in accordance with ASTM D 1557, modified proctor.
- B. Field Compaction testing will be performed in accordance with ASTM D1556 (sand cone method), ASTM D2167 (rubber balloon method), or ASTM D2922 (nuclear method). If tests indicate work does not meet specified requirements, remove work, replace and re-test.
- C. Frequency of Tests: Make at least one field density test for each layer of aggregate sub-base every 2,000 sq. ft.

### **3.06 MAINTENANCE AND CLEAN-UP**

- A. Protection of graded areas: Protect newly graded and compacted aggregate sub-base courses from traffic and erosion. Repair and re-establish grades in settled, eroded and rutted areas.
- B. Remove all excess materials and debris from the Owner's property.

**END OF SECTION**

**SECTION 32 1219**  
**CONCRETE PAVEMENT**

**PART 1 – GENERAL**

**1.01 SECTION INCLUDES**

- A. Furnish and install concrete pavement.

**1.02 REFERENCES**

- A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; American Concrete Institute International; 1991 (Reapproved 2002).
- B. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; American Concrete Institute International; 2000.
- C. ACI 306R - Cold Weather Concreting; American Concrete Institute International; 1988 (Reapproved 2002).
- D. ASTM A 185/A 185M - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete; 2006.
- E. ASTM A 497/A 497M - Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete; 2006.
- F. ASTM C 33 - Standard Specification for Concrete Aggregates; 2003.
- G. ASTM C 39/C 39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2005.
- H. ASTM C 94/C 94M - Standard Specification for Ready-Mixed Concrete; 2007.
- I. ASTM C 150 - Standard Specification for Portland Cement; 2005.
- J. ASTM C 173/C 173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2001.
- K. ASTM C 260 - Standard Specification for Air-Entraining Admixtures for Concrete; 2006.
- L. ASTM C 309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2006.
- M. ASTM C 494/C 494M - Standard Specification for Chemical Admixtures for Concrete; 2005a.
- N. ASTM C 618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2005.
- O. ASTM C 685/C 685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing; 2001.
- P. ASTM D 1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (non-extruding and Resilient Bituminous Types); 2004.

**1.03 SUBMITTALS**

- A. Product Data: Provide data on concrete mix, joint filler, joint sealant, steel reinforcing, admixtures, and curing compound.
- B. Design Data: Indicate pavement thickness, designed concrete strength, reinforcement, and typical details.

**1.04 QUALITY ASSURANCE**

- A. Perform work in accordance with ACI 301.
- B. Obtain cementitious materials from same source throughout.

- C. Follow recommendations of ACI 306R when concreting during cold weather.

## **1.05 ENVIRONMENTAL REQUIREMENTS**

- A. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

## **PART 2 - PRODUCTS**

### **2.01 FORM MATERIALS**

- A. Form Materials: Conform to ACI 301.
- B. Wood form material, profiled to suit conditions.

### **2.02 JOINT FILLER**

- A. Preformed; non-extruding bituminous type (ASTM D 1751). Thickness: 3/8 inch, unless specified otherwise on the plans.
- B. Joint sealant: Two component polyurethane sealant: Polyurethane-based, two part elastomeric sealant, complying with FS TT-S-00227, Class A, type 1 (self leveling) unless type 2 (non-sag) is recommended by the manufacturer for application shown.

### **2.03 REINFORCEMENT**

- A. Steel Welded Wire Reinforcement: Plain type, ASTM A 185/A 185M; in flat sheets; unfinished.
- B. Dowels: ASTM A 615/A 615M Grade 40 (280); deformed billet steel bars; unfinished finish.

### **2.04 CONCRETE MATERIALS**

- A. Cement: ASTM C 150 Normal - Type I Portland type, grey color.
- B. Fine and Coarse Mix Aggregates: ASTM C 33.
- C. Fly Ash: ASTM C 618, Class C or F.
- D. Water: Clean, and not detrimental to concrete.
- E. Air Entrainment Admixture: ASTM C 260.
- F. Chemical Admixtures: ASTM C 494/C 494M, Type A - Water Reducing, Type C - Accelerating, and Type G - Water Reducing, High Range and Retarding.

### **2.05 ACCESSORIES**

- A. Curing Compound: ASTM C 309, Type 1, Class A.

### **2.06 CONCRETE MIX DESIGN**

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
- B. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.
- C. Concrete Properties:
  1. Compressive Strength, when tested in accordance with ASTM C 39/C 39M at 28 days: 4000 psi.
  2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
  3. Cement Content: Minimum 606 lbs. per cubic yard of concrete.
  4. Water-Cement Ratio: Maximum 40 percent by weight.
  5. Total Air Content: 4 percent, determined in accordance with ASTM C 173/C 173M.

6. Maximum Slump: 3 inches.
7. Maximum Aggregate Size: 1 inch.

## **2.07 MIXING**

- A. On Project Site: Mix in drum type batch mixer, complying with ASTM C 685. Mix each batch not less than 1-1/2 minutes and not more than 5 minutes.
- B. Transit Mixers: Comply with ASTM C 94/C 94M.

## **2.08 ADA DETECTABLE WARNING TILE SYSTEM**

- A. Replaceable Cast in Place Warning Tile made of high-density Nylon Composite material. Slip resistant diamond grip.

### Manufacturing Tolerances

<b>ASTM Reference</b>	<b>Test Description</b>	<b>Requirements</b>
ASTM D 695	Compressive Strength	Not less than 25,000 psi
ASTM D 790	Flexural Strength	Not less than 30,000
ASTM D 570	Water Absorption	0.05%
ASTM C 1028	Slip Resistance	0.8 wet/dry
ASTM E 84	Flame Spread Index	$\leq 25$
ASTM B 117	Salt Spray	No Change (300 hours)
ASTM 1308	Chemical Stain	No Effect
ASTM C 501	Abrasion Resistance	Lw>500
ASTM G 155	Accelerated Weathering	Delta E<5 (2,000 hours)
ASTM D 638	Tensile Strength	12,500 psi
AASHTO-H20	Load Bearing at 10,410 lbs.	No Cracking, Delamination or Deformation
ASTM C 1026	Freeze/Thaw/Heat	No Chipping, Cracking or Peeling
ASTM D 1037	Accelerated Aging [Freeze/Thaw]	No Change in Color, Gloss or Delamination
ASTM D 696-03	Linear Thermal Expansion	$9.45 \times 10^{-7}$ per °Fahrenheit

### Specifications

- a) Size: 2' x 4'
- b) Direct cast in place
- c) Dome Spacing: 2.35"
- d) Color: Brick Red (22144)
- e) 5 Year Warranty
- f) Manufacturer: Access Tile Tactile Systems

241 Main Street, Suite 100 • Buffalo, NY 14203 [www.accesstile.com](http://www.accesstile.com)

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Verify compacted sub-grade is acceptable and ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct.

### **3.02 AGGREGATE SUB-BASE COURSE**

- A. See Section 32 1123 for construction of aggregate sub-base course for work of this Section.

### **3.03 PREPARATION**

- A. Moisten sub-base to minimize absorption of water from fresh concrete.
- B. Notify Director's Representative minimum 24 hours prior to commencement of concreting operations.

### **3.04 FORMING**

- A. Place and secure forms to correct location, dimension, profile, and gradient.
- B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

### **3.05 REINFORCEMENT**

- A. Place reinforcement as indicated.
- B. Interrupt reinforcement at expansion joints.
- C. Place dowels to achieve pavement and curb alignment as detailed.

### **3.06 PLACING CONCRETE**

- A. Place concrete in accordance with ACI 304R.
- B. Ensure reinforcement, inserts, embedded parts, formed joints are not disturbed during concrete placement.
- C. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.
- D. Place concrete to joint pattern.

### **3.07 JOINTS**

- A. Align curb and sidewalk joints.
- B. Place 3/8 inch wide expansion joints where shown on the plans and to separate paving from fixed vertical surfaces and other components and in pattern indicated.
  1. Form joints with joint filler extending from bottom of pavement to within 1/2 inch off finished surface.
  2. Secure to resist movement by wet concrete.
  3. Install joint sealant in accordance with manufacturer's recommendation.
- C. Provide scored joints:
  1. As shown on the plans and details.

### **3.08 FINISHING**

- A. Light broom, texture perpendicular to direction of travel with troweled and radius edge 1/4 inch radius, and as shown on the plans.

- B. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

### **3.09 TOLERANCES**

- A. Maximum Variation of Surface Flatness: 1/4 inch in 10 ft.
- B. Maximum Variation From True Position: 1/4 inch.

### **3.10 FIELD QUALITY CONTROL**

- A. The Contractor shall employ an independent testing agency to perform field quality control tests and to submit test reports.
  - 1. Provide free access to concrete operations at project site and cooperate with appointed firm.
  - 2. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.
  - 3. Tests of concrete and concrete materials may be performed at any time to ensure conformance with specified requirements.
- B. Compressive Strength Tests: ASTM C 39/C 39M. For each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cu yd or less of each class of concrete placed.
  - 1. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
  - 2. Perform one slump test for each set of test cylinders taken.
- C. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

### **3.11 PROTECTION**

- A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.
- B. Do not permit pedestrian traffic over pavement for 7 days minimum after finishing.

## **END OF SECTION**

**SECTION 32 1220**  
**COLORED CONCRETE PAVEMENT**

**PART 1 – GENERAL**

**1.01 SECTION INCLUDES**

- A. Furnish and install colored and imprinted concrete pavement.
- B. Comply with requirements of NYSDOT Colored and Imprinted Portland Cement Concrete Pavement Item 608.01020005 standard specification.

**1.02 REFERENCES**

- A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; American Concrete Institute International; 1991 (Reapproved 2002).
- B. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; American Concrete Institute International; 2000.
- C. ACI 306R - Cold Weather Concreting; American Concrete Institute International; 1988 (Reapproved 2002).
- D. ASTM A 185/A 185M - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete; 2006.
- E. ASTM A 497/A 497M - Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete; 2006.
- F. ASTM C 33 - Standard Specification for Concrete Aggregates; 2003.
- G. ASTM C 39/C 39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2005.
- H. ASTM C 94/C 94M - Standard Specification for Ready-Mixed Concrete; 2007.
- I. ASTM C 150 - Standard Specification for Portland Cement; 2005.
- J. ASTM C 173/C 173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2001.
- K. ASTM C 260 - Standard Specification for Air-Entraining Admixtures for Concrete; 2006.
- L. ASTM C 309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2006.
- M. ASTM C 494/C 494M - Standard Specification for Chemical Admixtures for Concrete; 2005a.
- N. ASTM C 618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2005.
- O. ASTM C 685/C 685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing; 2001.
- P. ASTM D 1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (nonextruding and Resilient Bituminous Types); 2004.

**1.03 SUBMITTALS**

- A. Product Data: Provide data on concrete mix, joint filler, joint sealant, steel reinforcing, admixtures, and curing compound.
- B. Design Data: Indicate pavement thickness, designed concrete strength, reinforcement, and typical details.
- C. Color admixture: Provide product data on color admixture for colored concrete pavement.

## **1.04 QUALITY ASSURANCE**

- A. Perform work in accordance with ACI 301.
- B. Obtain cementitious materials from same source throughout.
- C. Follow recommendations of ACI 306R when concreting during cold weather.
- D. Mockups: Cast mockups of full-size sections of concrete pavement to demonstrate typical joints, surface finish, texture, color, and standard of workmanship.
  - 1. Build a 4' x 4' mockup on site. If location is not indicated, as directed by Owner's representative.
  - 2. Notify Owner's representative seven days in advance of dates and times when mockups will be constructed.
  - 3. Obtain approval from Owner's representative before starting mockup construction.
  - 4. Maintain approved mockups during construction in an undisturbed condition as a standard for judging the completed pavement.
  - 5. Demolish and remove approved mockups from the site when directed by Owner's representative

## **1.05 ENVIRONMENTAL REQUIREMENTS**

- A. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

## **PART 2 - PRODUCTS**

### **2.01 FORM MATERIALS**

- A. Form Materials: Conform to ACI 301.
- B. Wood form material, profiled to suit conditions.

### **2.02 JOINT FILLER**

- A. Preformed; non-extruding bituminous type (ASTM D 1751). Thickness: 3/8 inch, unless specified otherwise on the plans.
- B. Joint sealant: Two component polyurethane sealant: Polyurethane-based, two part elastomeric sealant, complying with FS TT-S-00227, Class A, type 1 (self leveling) unless type 2 (non-sag) is recommended by the manufacturer for application shown.
- C. Joint sealant color to match adjacent pavement.

### **2.03 REINFORCEMENT**

- A. Steel Welded Wire Reinforcement: Plain type, ASTM A 185/A 185M; in flat sheets; unfinished.
- B. Dowels: ASTM A 615/A 615M Grade 40 (280); deformed billet steel bars; unfinished finish.

### **2.04 CONCRETE MATERIALS**

- A. Cement: ASTM C 150 Normal - Type I Portland type, white color.
- B. Fine and Coarse Mix Aggregates: ASTM C 33.
- C. Fly Ash: ASTM C 618, Class C or F.
- D. Water: Clean, and not detrimental to concrete.
- E. Air Entrainment Admixture: ASTM C 260.
- F. Chemical Admixtures: ASTM C 494/C 494M, Type A - Water Reducing, Type C - Accelerating, and Type G - Water Reducing, High Range and Retarding.

## **2.05 ACCESSORIES**

- A. Curing Compound: ASTM C 309, Type 1, Class A.

## **2.06 CONCRETE MIX DESIGN**

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
- B. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.
- C. Concrete Properties:
  1. Compressive Strength, when tested in accordance with ASTM C 39/C 39M at 28 days: 4000 psi.
  2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
  3. Cement Content: Minimum 606 lbs. per cubic yard of concrete.
  4. Water-Cement Ratio: Maximum 40 percent by weight.
  5. Total Air Content: 4 percent, determined in accordance with ASTM C 173/C 173M.
  6. Maximum Slump: 3 inches.
  7. Maximum Aggregate Size: 1 inch.

## **2.07 MIXING**

- A. On Project Site: Mix in drum type batch mixer, complying with ASTM C 685. Mix each batch not less than 1-1/2 minutes and not more than 5 minutes.
- B. Transit Mixers: Comply with ASTM C 94/C 94M.

## **2.08 COLOR**

- A. Construct Portland cement concrete using colored concrete, including color matching joint material, when specified.

### Colored Concrete

All coloring agents shall produce a color conforming to the Federal Standard 595B. The color shall be Blue and Tan as approved in submittal.

Color admixtures for integrally colored concrete will be certified by the manufacturer as meeting the requirements of ASTM C979 Standard Specifications for Pigments for Integrally Colored Concrete and be packaged such that one dose is the proper dosage for one cubic yard of concrete.

### Color Matching Joint Material

When specified for any location, use a color matched caulking compound designed for joint sealing.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Verify compacted sub-grade is acceptable and ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct.

### **3.02 AGGREGATE SUB-BASE COURSE**

- A. See Section 32 1123 for construction of aggregate sub-base course for work of this Section.

### **3.03 PREPARATION**

- A. Moisten sub-base to minimize absorption of water from fresh concrete.
- B. Notify Director's Representative minimum 24 hours prior to commencement of concreting operations.

### **3.04 FORMING**

- A. Place and secure forms to correct location, dimension, profile, and gradient.
- B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

### **3.05 REINFORCEMENT**

- A. Place reinforcement as indicated.
- B. Interrupt reinforcement at expansion joints.
- C. Place dowels to achieve pavement and curb alignment as detailed.

### **3.06 PLACING CONCRETE**

- A. Place concrete in accordance with ACI 304R.
- B. Ensure reinforcement, inserts, embedded parts, formed joints are not disturbed during concrete placement.
- C. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.
- D. Place concrete to joint pattern.

### **3.07 JOINTS**

- A. Place 3/8 inch wide expansion joints where shown on the plans and to separate paving from fixed vertical surfaces and other components and in pattern indicated.
  1. Form joints with joint filler extending from bottom of pavement to within 1/2 inch off finished surface.
  2. Secure to resist movement by wet concrete.
  3. Install joint sealant in accordance with manufacturer's recommendation.
- B. Provide scored joints:
  1. As shown on the plans and details.

### **3.08 COLOR**

- A. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

#### Colored Concrete

Apply color admixtures and dry shake additives at the manufacturers recommended dosage rate. This rate is to remain constant for all batches of concrete produced. Prior to placing concrete, protect adjacent surfaces and structures from spatters. Once a portion of the batch has been placed, no additional water shall be added to the remaining batch.

To integrally color the concrete, introduce the color additive into the mixer drum in a manner recommended by the manufacturer. The quantity of concrete being delivered shall be no less than one-third the capacity of the mixer drum. Batch the concrete in full cubic yard increments.

After the concrete is placed, apply a color matching hardener evenly to the plastic surface by the "dry shake" method as recommended by the manufacturer.

### **3.09 TOLERANCES**

- A. Maximum Variation of Surface Flatness: 1/4 inch in 10 ft.
- B. Maximum Variation from True Position: 1/4 inch.

### **3.10 FIELD QUALITY CONTROL**

- A. The Contractor shall employ an independent testing agency to perform field quality control tests and to submit test reports.
  - 1. Provide free access to concrete operations at project site and cooperate with appointed firm.
  - 2. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.
  - 3. Tests of concrete and concrete materials may be performed at any time to ensure conformance with specified requirements.
- B. Compressive Strength Tests: ASTM C 39/C 39M. For each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cu yd or less of each class of concrete placed.
  - 1. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
  - 2. Perform one slump test for each set of test cylinders taken.
- C. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

### **3.11 PROTECTION**

- A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.
- B. Do not permit pedestrian traffic over pavement for 7 days minimum after finishing.

### **END OF SECTION**

**SECTION 32 1318**  
**ASPHALT PAVEMENT**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Provide all labor, materials, tools, equipment, supervision and services necessary and incidental to install asphalt pavement as shown on the plans.

**1.02 RELATED SECTIONS**

- A. Section 31 1100 - Aggregate Materials
- B. Section 32 1323 – Painted Pavement Markings.

**1.03 REFERENCES**

- A. NYSDOT Standard Specifications (latest edition), Section 400 - Bituminous Pavements.
- B. ASTM D2950 - Density of Bituminous Concrete in Place by Nuclear Methods.
- C. ASTM D2041 - Specific Gravity and Density of Bituminous Paving Mixture, Theoretical Maximum.
- D. TAI - (The Asphalt Institute) - MS-2 Mix Design Methods for Asphalt Concrete and Other Hot Mix Types.
- E. TAI - MS-8 Asphalt Paving Manual.

**1.04 SUBMITTALS**

- A. Test Reports: Submit the following reports to the Director's Representative from the testing service, with a copy to the Contractor.
  - 1. One theoretical maximum density determination for each asphalt type.
  - 2. Field Reports; in-place density tests of asphalt pavement.
- B. Material Certificates: Provide copies of materials certificates signed by material producer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.
- C. Provide copies of NYSDOT certification of asphalt plant.

**1.05 QUALITY ASSURANCE**

- A. Perform Work in accordance with NYSDOT Standard Specifications (latest edition), Section 400 - Bituminous Pavements, and with local governing regulations if more stringent than herein specified.
- B. Existing survey markers, if disturbed, shall be reset by a licensed land surveyor at Contractor's expense. Grade stakes shall be placed to indicate edge of pavement grade. All stakes should be clearly marked and located at points of tangency, breaks in grade, low and high points and as directed by the Director's Representative.
- C. Obtain materials from same source throughout.

**1.06 ENVIRONMENTAL REQUIREMENTS**

- A. Weather Limitations: Do not place asphalt pavement top course when ambient air or base surface temperature is less than 40 degrees F, or surface is wet. Asphalt binder course may be placed when ambient air or base surface temperature is above 30 degrees and rising and base is dry.
- B. Apply tack coat when ambient air or base surface temperature is above 50 degrees F for 12 hours immediately prior to application. Do not apply when base is wet.

## **PART 2 - PRODUCTS**

### **2.01 MATERIALS**

- A. Asphalt Top Course: NYSDOT Standard Specifications section 400, Type 7, Item 402-096202.
- B. Asphalt Binder Course: NYSDOT Standard Specifications section 400, Type 3, Item 402.196202.
- C. Tack Coat: Homogeneous Asphalt Emulsion Tack Coat conforming to NYSDOT Material Designation 702-90.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Verify sub-base conditions under provisions of Section 31 2200 Earthwork and Site Grading.
- B. Verify that compacted sub-grade is dry and ready to support paving and imposed loads.
- C. Verify gradients and elevations of base are correct, including cross slope.

### **3.02 PLACING ASPHALT PAVEMENT**

- A. Place asphalt binder course on prepared surface, spread and strike-off. Spread mixture at a minimum temperature of 225 degrees F (107 degrees C). Place inaccessible and small areas by hand. Place each course to required grade, cross section and required compacted thickness. Place within 24 hours of applying a tack coat.
- B. Any irregularities in the surface of the pavement shall be corrected immediately. Excess materials forming high spots shall be removed. Indented areas shall be filled with hot mix and smoothed. Casting of mix over such areas will not be permitted.
- C. Make joints between old and new pavements and between successive days work, to ensure continuous bond between adjoining work. Construct joints to have same texture, density and smoothness as other sections of asphalt pavement. Clean contact surfaces and apply tack coat.
- D. Prior to installing the top course, the binder course shall be cleaned, conditioned and leveled as specified in NYSDOT Standard Specification section 401-3.07. The Director's Representative may require that a tack coat be applied to the binder course before the placement of the top course.
- E. Both courses shall be applied as specified in NYSDOT Standard Specification Section 401-3.05.

### **3.03 COMPACTION**

- A. Compact each course of asphalt placed in accordance with NYSDOT Standard Specification Section 401-3.12.
- B. Remove and replace paving areas mixed with foreign materials and defective areas. Cut out such areas and fill with fresh, hot asphalt mix.
- C. Do not permit vehicular traffic on pavement until it has cooled and hardened. Erect barricades to protect paving from traffic.
- D. Any adjustment to existing driveways, shoulders and lawns required to meet the top course surface shall be done while, or immediately after the top course is placed.

### **3.04 TOLERANCES**

- A. Flatness: Maximum variation of  $\frac{1}{4}$  inch measured with 10 foot straight edge.

- B. Scheduled Compacted Thickness: Within  $\frac{1}{4}$  inch.
- C. Variation from True Elevation: Within  $\frac{1}{2}$  inch.

### **3.05 FIELD QUALITY CONTROL**

- A. Test in-place asphalt pavement for compliance with requirements for thickness and surface smoothness.
- B. Thickness Control: The Contractor shall furnish and pay the cost of 4" diameter diamond or shot drill cores of pavement taken at locations designated by the Director's Representative. If the average thickness of any core so taken is  $\frac{1}{4}$ " or more under the required thickness of the typical pavement section, the pavement is considered defective and additional cores shall be taken to determine the limit of defective pavement. The full extent of defective pavement so delineated shall be considered of no value to the Director's Representative, and shall be carefully sawcut to a depth of 1" and fully removed and replaced to the specified thickness by the Contractor at no additional cost to the Director's Representative. Repair and filling of cores with bituminous material as specified is to be performed by the Contractor and is considered incidental to the work.
- C. Surface Smoothness: Test finished surface of asphalt pavement for smoothness, using a 10' straightedge. Surfaces will not be acceptable if exceeding the specified tolerances for smoothness.
- D. All finished paved surfaces are to have sufficient pitch to convey water across the surface to a designated collection area.

### **3.06 CLEAN-UP**

- A. Clean-up and dispose of all surplus or waste material as a result of work of this section. Asphalt Pavement shall be broom cleaned and the surrounding area shall be cleaned of any loose asphalt mix.

### **3.07 PROTECTION**

- A. Immediately after placement, protect pavement from mechanical injury for 2 days, or until surface temperature is less than 140 degrees F.

## **END OF SECTION**

**SECTION 32 1319**  
**PAVEMENT STRIPING**

**PART 1 – GENERAL**

**1.01 SECTION INCLUDES**

- A. Furnish and install painted handicapped parking symbols and parking lot striping.
- B. Furnish and install pavement arrow symbols.

**1.02 REFERENCES**

- A. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; current edition, [www.paintinfo.com](http://www.paintinfo.com).
- B. FHWA MUTCD - Manual on Uniform Traffic Control Devices for Streets and Highways; U.S. Department of Transportation, Federal Highway Administration; current edition at <http://mutcd.fhwa.dot.gov>.

**1.03 SUBMITTALS**

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
  1. Preparation instructions and recommendations.
  2. Storage and handling requirements and recommendations.
  3. Installation methods.
- B. Certificates: Submit for each batch of paint, stating compliance with specified requirements.

**1.04 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver paint in containers of at least 5 gallons accompanied by batch certificate.
- B. Store products in manufacturer's unopened packaging until ready for installation.
- C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

**1.05 PROJECT CONDITIONS**

- A. Do not install products under environmental conditions outside manufacturer's absolute limits.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A. Pavement Marking Paint: MPI No. 97 Latex Traffic Marking Paint, color: white for parking lot stripes, pavement symbol arrows and blue for handicap symbols and aisles.

**PART 3 - EXECUTION**

**3.01 EXAMINATION**

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

**3.02 PREPARATION**

- A. Allow new pavement surfaces to cure for a period of not less than 14 days before application of marking materials.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving

- the best result for the substrate under the project conditions.
- C. Clean surfaces thoroughly prior to installation.
    - 1. Remove dust, dirt, and other granular surface deposits by sweeping, blowing with compressed air, rinsing with water, or a combination of these methods.
  - D. Where oil or grease are present, scrub affected areas with several applications of trisodium phosphate solution or other approved detergent or degreaser, and rinse thoroughly after each application; after cleaning, seal oil-soaked areas with cut shellac to prevent bleeding through the new paint.
  - E. Establish survey control points to determine locations and dimensions of markings; provide templates to control paint application by type and color at necessary intervals.

### **3.03 INSTALLATION**

- A. Begin pavement marking as soon as practicable after surface has been cleaned and dried.
- B. Do not apply paint if temperature of surface to be painted or the atmosphere is less than 50 degrees F or more than 95 degrees F.
- C. Apply in accordance with manufacturer's instructions using an experienced technician that is thoroughly familiar with equipment, materials, and marking layouts.
- D. Comply with FHWA MUTCD manual (<http://mutcd.fhwa.dot.gov>) for details not shown.
- E. Apply markings in locations determined by measurement from survey control points; preserve control points until after markings have been accepted.
- F. Apply uniformly painted markings of color(s), lengths, and widths as indicated on the drawings true, sharp edges and ends.
  - 1. Apply paint in one coat only.
  - 2. Wet Film Thickness: 0.015 inch, minimum.
  - 3. Length Tolerance: Plus or minus 3 inches.
  - 4. Width Tolerance: Plus or minus 1/8 inch.

### **3.04 DRYING, PROTECTION, AND REPLACEMENT**

- A. Protect newly painted markings so that paint is not picked up by tires, smeared, or tracked.
- B. Provide barricades, warning signs, and flags as necessary to prevent traffic crossing newly painted markings.
- C. Allow paint to dry at least the minimum time specified by the applicable paint standard and not less than that recommended by the manufacturer.
- D. Remove and replace markings that are applied at less than minimum material rates; deviate from true alignment; exceed length and width tolerances; or show light spots, smears, or other deficiencies or irregularities.
- E. Remove markings in manner to avoid damage to the surface to which the marking was applied, using carefully controlled sand blasting, approved grinding equipment, or other approved method.

**END OF SECTION**

## SECTION 32 1325

### ARTIFICIAL TURF

#### **PART 1 - GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Provide all labor, materials, tools, equipment, supervision and services necessary and incidental to install artificial turf as shown on the plans.

##### **1.02 RELATED SECTIONS**

- A. Section 31 1100 - Aggregate Materials

##### **1.03 SUBMITTALS**

- A. Material Certificates: Provide copies of materials certificates signed by material producer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.

##### **1.04 QUALITY ASSURANCE**

- A. Existing survey markers, if disturbed, shall be reset by a licensed land surveyor at Contractor's expense. Grade stakes shall be placed to indicate edge of pavement grade. All stakes should be clearly marked and located at points of tangency, breaks in grade, low and high points.

##### **1.05 ENVIRONMENTAL REQUIREMENTS**

- A. Weather Limitations: Do not place polyurethane base when ambient air or base surface temperature is less than 40 degrees F, or surface is wet.

#### **PART 2 - PRODUCTS**

##### **2.01 MANUFACTURERS**

- A. Basis of Design Manufacturer: Subject to requirements of this Section, provide listed products of SYNLawn, Dalton GA 30721; (866) 796-5296; [info@synlawn.com](mailto:info@synlawn.com); [www.synlawn.com](http://www.synlawn.com).

##### **2.02 SYNTHETIC TURF SURFACING**

- A. Synthetic Turf Surfacing: Complete surfacing system, consisting of delustered UV-stabilized antimicrobial synthetic yarns bound to water-permeable bio-based primary and secondary backing. IPEMA-certified. Non-abrasive blades with low surface temperature. Anti-Static and Ultra Violet reflective pigment-enhanced.

1. Basis of Design Product: **SYNLawn SYNTipede 243**.
2. Artificial Turf Fiber and Construction Characteristics:

- a. Yarn, Turf Zone: Tufted Polyethylene; high-emissivity omega shape.

- 1) Color: Field green + Apple.
- 2) Denier, ASTM D1577: 10,800/6.
- 3) Antimicrobial Protection: Sanitized®
- 4) Antistatic Protection: StatBlock™
- 5) IR Reflective: DualChill™

- b. Yarn, Thatch Zone: Polyethylene.

- 1) Color: Field green

- 2) Denier: 5,000/8.
  - c. Finished Pile Height, ASTM D5823: 1 inch.
  - d. Finished Pile Weight, ASTM D5848: 60 oz/sq. yd.
  - e. Tuft Machine Gauge: 3/8 inch.
  - f. Backing, Primary: 6 oz/sq. yd. 15/18 polypropylene, 2 layers with fiber-reinforcing core.
  - g. Backing, Secondary: 22 oz./sq. yd. bio-based urethane.
    - 1) Enviroloc+™
      - a) Anti Fungi and Anti Algae blended into secondary backing.
    - 2)
  - h. Total Weight: 88 oz./sq. yd.
  - i. Infill: Silica sand ballast.
  - j. Temperature-Reducing Infill: Silica sand and moisture-retaining coated sand ballast.
3. Performance Characteristics:
- a. Tuft Bind, ASTM D1335: Not less than 8 lb.
  - b. Grab tear strength, ASTM D5034: Not less than 200lbf.
  - c. Elongation to break, ASTM D2256: Not less than 30 percent
  - d. Yarn breaking strength, ASTM D5793: Not less than 20lb
  - e. Foot Traffic Rating: 4.
  - f. Softness Rating: 2.
  - a. Flammability ASTM D2859: Pass.
  - b. Fire Test Exposure, ASTM E108: Class A

## 2.03 FALL PAD

- B. Fall Pad: Rubber, heavy metal-free, non-degradable porous elastic pad, with permeability of not less than that of specified artificial turf surfacing, composed of 100 percent recycled non-contaminated post-industrial closed cell polyethylene foam, geotextile weed barrier faced on one side.
  - 1. Product: **SYNLawn, Fall Pad.**
  - 2. Pad Thickness: 1-1/8 inch.
  - 3. IPEMA Fall Height, ASTM F1292: 9.0 feet.
  - 4. Accessibility, ASTM F1951: Passes.
  - 5. Rainfall Capacity, ASTM F1551: Not less than 30 inches per hour.
- C. Turf Spikes: Manufacturer's approved fasteners.
- D. Nailer Board: Manufacturer's approved nailer/edger board.

## 2.04 MATERIALS

- A. Infill Material: Silica sand in manufacturer's recommended formula for application to synthetic turf surfacing.
 

Product: **SYNLawn, Envirofill.**

Color: Green.
- B. Glue, Seaming Fabric, and Thread: As recommended by manufacturer for application.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Verify sub-base conditions under provisions of Section 31 2200 Earthwork and Site Grading.
- B. Verify that compacted sub-grade is dry and ready to support of imposed loads.
- C. Verify gradients and elevations of base are correct, including cross slope.
- D. Examine synthetic turf surfacing base and perimeter conditions, with Installer present, for compliance with requirements for installation tolerances, and other conditions affecting performance of the Work.
  - 1. Verify substrate meets profile required.
  - 2. Confirm base material, compaction of substrate, permeability, and drainage system installation meets requirements.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.02 SYNTHETIC TURF INSTALLATION**

- A. General: Comply with synthetic turf surfacing manufacturer's written installation instructions. Install synthetic turf surfacing over area and in thickness indicated.
- B. Fall Pad: Place fall pads tightly abutted over area to receive synthetic turf surfacing. Tape seams with pad seam tape to secure pads in position prior to installing synthetic turf.
- C. Artificial Turf: Loose-lay artificial turf and allow fabric to relax for period recommended by manufacturer. Stretch turf sheet and attach at perimeter and in field of turf in accordance with approved submittals.
- D. Seaming: Form seams flat and snug, with no gaps or fraying. Remove yarns that are trapped within seams. Form seams as recommended in synthetic turf manufacturer's written instructions using manufacturer's provided or recommended materials.

### **3.03 INSTALLATION, INFILL**

- A. Mix and install infill material components in accordance with manufacturer's requirements for approved system. Groom material and leave surface ready for use.

### **3.04 PROTECTION**

- A. Protect completed installation from damage. Prevent traffic over system prior to acceptance by Owner.

### **3.05 DEMONSTRATION**

- A. Instruct Owner's personnel in proper inspection and maintenance of synthetic turf surfacing. Review manufacturer's recommended maintenance procedures and warranty terms and conditions.

### **3.06 CLEAN-UP**

- A. Clean-up and dispose of all surplus or waste material as a result of work of this section. Asphalt Pavement shall be broom cleaned and the surrounding area shall be cleaned of any loose asphalt mix.

### **3.07 PROTECTION**

- A. Immediately after placement, protect pavement from mechanical injury for 2 days, or until surface temperature is less than 140 degrees F.

**END OF SECTION**

**SECTION 32 1335**  
**GRANITE CURBING**

**PART 1 – GENERAL**

**1.01 SECTION INCLUDES**

- A. Installation of Granite curbing, including flush granite curbs, transition granite curbs and 6" reveal granite curbs.
- B. Cast in place continuous concrete backing is specified in section 03 3000.

**1.02 RELATED SECTIONS**

- A. Section 03 3000 - Cast-In-Place Concrete.

**1.03 REFERENCES**

- A. The National Building Granite Quarries Association

**1.04 SUBMITTALS**

- A. Provide shop drawings showing sizes, shapes, dimensions and all pertinent information for granite curbing.

**1.05 ENVIRONMENTAL REQUIREMENTS**

- A. Do not place concrete backing when temperature is less than 40 degrees F, or surface is wet or frozen.

**PART 2 - PRODUCTS**

**2.01 STONE MATERIALS**

- A. Vertical Curbs: granite, length varies with a minimum overall length of 5' x 16" x 5", radii as required and as shown on the plans. Finish: thermal finish top and quarry split face front. Color: natural gray. At the terminus of all vertical face curb runs provide a sloped transition curb that transitions from a 6 inch exposed face to 1/4" reveal.
- B. Reference plans for transition and flush curbs size and dimensioning.

**PART 3 – EXECUTION**

**3.01 EXAMINATION**

- A. Verify that substrate is level, smooth, capable of supporting curb and imposed loads, and ready to receive work of this section.
- B. Verify gradients and elevations of substrate are correct.

**3.02 INSTALLATION**

- A. Set curb sections level and to the grades shown on the plans in a continuous concrete footing. Mortar all joints. Maximum vertical mortar joint between curb sections is to be 1/2 inch.

**3.03 TOLERANCES**

- A. Maximum variation from true position and elevation: 1/2 inch:10'

**3.04 REPAIRS AND PROTECTION**

- A. Repair or replace broken or defective curb, as directed by Director's Representative.
- B. Protect curb from damage until final acceptance of work.

**3.05 CLEAN-UP**

- A. Remove all excess materials and debris from Owners property.

**END OF SECTION**

**SECTION 32 3100**  
**ORNAMENTAL SECURITY FENCING AND GATES**

**PART 1 GENERAL**

**2.01 SECTION INCLUDES**

- A. Ornamental Steel Security Fencing and Gates Including the Following:
  - 1. Omega II Secur Fences.

**2.02 REFERENCES**

- A. ASTM International (ASTM):
  - 1. ASTM A82: Cold Drawn Steel Wire, Plain, for Concrete Reinforcement.
  - 2. ASTM A121: Standard Specification for Metallic-Coated Carbon Steel Barbed Wire.
  - 3. ASTM A185: Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
  - 4. ASTM A446: Standard Specification for Steel Sheet, Zinc Coated (Galvanized) by the Hot-Dip Process, Structural (physical) Quality.
  - 5. ASTM A500: Standard Specification for Cold formed welded and seamless carbon steel structural tubing in round shapes.
  - 6. ASTM A513: Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing.
  - 7. ASTM A641: Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
  - 8. ASTM A653: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  - 9. ASTM A787: Standard Specification for Electric-Resistance-Welded Metallic-Coated Carbon Steel Mechanical Tubing.
  - 10. ASTM A1008: Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy (HSLA) and HSLA with Improved Formability.
  - 11. ASTM B6: Standard Specification for Zinc.
  - 12. ASTM B117: Standard Test Method of Salt Spray (Fog) Testing.
  - 13. ASTM B221: Standard Specification for Aluminum and Aluminum-alloy extruded bars, rods, wire, shapes and tubes.
  - 14. ASTM D2247: Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.
  - 15. ASTM D2794: Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
  - 16. ASTM D3359: Standard Test Methods for Measuring Adhesion by Tape.
  - 17. ASTM F626: Standard Specification for Fence Fittings.
  - 18. ASTM F900: Standard Specification for industrial and commercial swing gates.
  - 19. ASTM F934: Standard Specification for Standard Colors for Polymer-Coated Chain Link Fence Materials.
  - 20. ASTM F1043: Standard Specification for Strength and Protective Coatings on Steel Industrial Chain Link Fence Framework
  - 21. ASTM F1184: Standard Specification for industrial and commercial horizontal slide gates.
  - 22. ASTM F1234: Standard Specification for protection coatings on steel framework for fences.
  - 23. ASTM F2919: Standard Specification for Welded Wire Mesh Fence Fabric (Metallic-Coated or Polymer Coated) with Variable Mesh Patterns or Meshes Greater than 6 square inch (3871 mm<sup>2</sup>) in Panels.
    - a. Canadian Standards Association (CSA):
  - 24. CAN/CSA-A23.1, Concrete - Constituants et Execution des Travaux.
  - 25. CAN/CSA-G164, Hot Galvanization of Irregular Objects.
    - a. Canadian General Standards Board (CGSB):
  - 26. CAN/CGSB-138.1, Steel Meshes for fence.
  - 27. CAN/CGSB-138.2, Steel mounting galvanized for fence.

28. CAN/CGSB-138.3, Installation of the latticed fences.
29. CAN/CGSB-138.4, Gates for fences.
30. CAN/CGSB-1.181, Rich zinc coating, organic, prepared.

## **2.03 SUBMITTALS**

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- B. Product Data: Material descriptions, construction details, dimensions of individual components and profiles, and finishes for the following:
  1. Fence and gate posts, rails, and fittings.
- C. Shop Drawings:
  1. Show locations of fence, each gate, posts, rails, and details of gate swing, or other operation, hardware, and accessories.
  2. Indicate materials, dimensions, sizes, weights, and finishes of components.
  3. Include plans, elevations, sections, gate swing and other required installation and operational clearances, and details of post anchorage, attachment and bracing.
  4. Installation procedures and instructions describing details for a typical fence and gates.
- D. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square or long, representing actual color.
- E. Qualification Data: For firms and persons specified in "Quality Assurance" article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- F. Maintenance Data: Provide a maintenance guide and parts list.

## **2.04 QUALITY ASSURANCE**

- A. Installer Qualifications: Minimum 2 years experience installing fences and gates similar in material, design, and extent to those indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Mock-Up: Provide a mock-up for evaluation of overall appearance and application workmanship.
  1. Construct areas designated by Owner's Representative.
  2. Do not proceed with remaining work until workmanship and material are approved by Owner's Representative.
  3. Correct mock-up installation as required to produce acceptable work.

## **2.05 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver and store products in manufacturer's tagged and unopened packaging until ready for installation.
- B. Handle products in accordance with manufacturer's instructions.

## **2.06 PROJECT CONDITIONS**

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions:
  1. Notify local utility marking services before beginning work.
  2. Unless otherwise indicated in the general provisions of the contract, notify Architect no less than two days in advance of proposed utility interruptions.
  3. Do not proceed with utility interruptions without Architect's written permission.
- B. Field Measurements: Verify layout information for fences and gates shown on drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

## **2.07 WARRANTY**

- A. Manufacturer's Warranty: Provide manufacturer's standard ten year limited warranty for finish.

## PART 2 PRODUCTS

### 3.01 MANUFACTURERS

- A. Acceptable Manufacturer: Omega II Fence Systems, which is located at: 1735 St-Elzear Blvd. W.; Laval, QC, Canada H7L 3N6; Toll Free Tel: 800-836-6342; Tel: 450-686-9600; Fax: 450-681-7905; Email:[request info \(information@omegatwo.com\)](mailto:request_info@omegatwo.com); Web:<http://www.omegatwo.com>|<https://www.metaltech.co>
- B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.
  - 1. All substitution approval requests shall be accompanied by manufacturing drawings and specifications, and they shall meet all specifications for design, size, gauge of metal parts, and fabrication.

### 3.02 OMEGA II SECUR FENCES

- A. Height:
  - 1. As shown on the Drawings.
- B. Secur Steel Mesh Fence Panels:
  - 1. Fabricated welded wire mesh panels zinc-coated steel wire conforming to specification ASTM A641, 98-7/8inches (2511mm) wide, formed by one vertical wire of 0.225 inch (5.72 mm) placed between two horizontal wires of 0.303 inch (7.70 mm), as per ASTM A185 and A853.
  - 2. The wires are welded by resistance weld at each crossing to form rectangles 1-15/16 x 7-7/8 inches (50 x 200mm).
  - 3. The cold rolled wire shall have a tensile strength of at least 75,000 psi (515 Mpa) and a 3150 lbs (1430 Kg) break strength for the 0.225 inch (5.72 mm) wires and of 5600 lbs (2545 Kg) for the 0.303 inch (7.70 mm) wires.
  - 4. One end of the vertical wires of the panel shall exceed 1 inch (25 mm) from the last or first horizontal wire creating a spiked top or bottom depending on the position when installed. The other end is cut flush.
  - 5. Panel camber may not exceed 0.094inch (2.5 mm).
- C. Square Posts: Cold rolled 1008 grade steel to meet ASTM 500 and ASTM A787 and the following maximum horizontal loads, length as required for installation type:
  - 1. Installation: Surface mounted, flanged.
  - 2. Post Size: 2 x 2 inch (50 x 50 mm):
    - a. 16 gauge (1.6 mm), 329 pound (149 kg) maximum horizontal load.
    - b. 11 gauge (3.0 mm), 578 pound (262 kg) maximum horizontal load.
  - 3. Post Size: 3 x 3 inch (75 x 75 mm):
    - a. 11 gauge (3.0 mm), 1383 pound (627 kg) maximum horizontal load.
  - 4. Post Size: 2 x 2 inch (50 x 50 mm):
    - a. 16 gauge (1.6 mm), 263 pound (119 kg) maximum horizontal load.
    - b. 11 gauge (3.0 mm), 463 pound (210 kg) maximum horizontal load.
  - 5. Post Size: 3 x 3 inch (75 x 75 mm):
    - a. 11 gauge (3.0 mm), 1106 pound (501 kg) maximum horizontal load.
  - 6. Post Size: 2 x 2 inch (50 x 50 mm):
    - a. 11 gauge (3.0 mm), 385 pound (175 kg) maximum horizontal load.
  - 7. Post Size: 3 x 3 inch (75 x 75 mm):
    - a. 11 gauge (3.0 mm), 922 pound (418 kg) maximum horizontal load.
  - 8. Post Size: 2 x 2 inch (50 x 50 mm):
    - a. 11 gauge (3.0 mm), 289 pound (131 kg) maximum horizontal load.
  - 9. Post Size: 3 x 3 inch (75 x 75 mm):
    - a. 11 gauge (3.0 mm), 691 pound (313 kg) maximum horizontal load.
- D. Post Brackets:

1. Universal Post Bracket Kit, Includes the following: 13 gauge (2.4mm) steel collar, nut, washer and carriage bolt 1/4 x 1-1/4 inch (6.4 x 32 mm), all galvanized steel.
  - a. For 90 degrees turns, use the same bracket.
  - b. For different angles, used universal angle brackets.
  - c. For 4 foot (1230 mm) high panels: Provide 4 brackets per panel.
  - d. For 5 foot (1449 mm) high panels: Provide 6 brackets per panel.
  - e. For 6 foot (1830 mm) high panels: Provide 6 brackets per panel.
  - f. For 8 foot (2430 mm) high panels: Provide 8 brackets per panel.
2. U-Shaped Bracket Kit, Includes the following: Stainless steel U rod 5/16 inch (8 mm) diameter, rear flange in PVC 3-1/2' x 1-1/2' x 1-1/8 inches (88.7 x 37.8 x 28.4 mm), forehead support in PVC 2-3/8' x 5/8' x 1-1/16 (60.4 x 15.2 x 27.5 mm) cosmetic plastic caps and nuts (M8).
  - a. For 4 foot (1230 mm) high panels: Provide 4 brackets per panel.
  - b. For 4 foot (1230 mm) high panels: Provide 6 brackets per panel.
  - c. For 5 foot (1449 mm) high panels: Provide 6 brackets per panel.
  - d. For 6 foot (1830 mm) high panels: Provide 6 brackets per panel.
  - e. For 8 foot (2430 mm) high panels: Provide 8 brackets per panel.
- E. Special Panel Fittings (SPF): Hot dipped galvanized steel enable panels to be fastened to any vertical or horizontal surface, such as steel or concrete beams or wood posts. Provide the following model:
  1. SPF-W Kit: For mounting on a vertical surface, consisting of an L-shaped slotted plate, which accommodates a 1-3/4" (45 mm) vertical adjustment and a retaining plate that hold two vertical wires when bolted together.
  2. SPF-C Kit: for horizontal surfaces, uses the same "L" shaped slotted plate and 2 wire retaining plates.
  3. SPF-P Kit: connects two panels together.
- F. Post Caps:
  1. Aluminum alloy.
  2. Galvanized steel.
- G. Overhang Extension:
  1. Same dimensions as the post, minimum 18 in. (460 mm) long, welded to the end square posts to form a 45 degrees angle to receive a panel of 16 in. (420 mm).
  2. Provide with two fastener kits.
- H. Secur mesh panels and posts shall be zinc-coated steel wire conforming to specification ASTM A641 (1989) Class 1, and with 4 mils polyester powder coating as specified below.

### **3.03 ACCESSORIES**

- A. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107. Provide grout, recommended in writing by manufacturer, for exterior applications.
- B. Erosion-Resistant Anchoring Cement: Factory-packaged, non-shrink, non-staining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and recommended in writing by manufacturer for exterior applications.
- C. Mounting kit including pedestal.
- D. Instructional, Safety, and Warning Labels and Signs:
  1. Manufacturer's standard for components and features specified.

### **3.04 FENCING**

- A. Zinc Coating:
  1. Wire Mesh Coating: 0.5 oz./sq.ft. (150 g/m<sup>2</sup>) zinc in conformity with ASTM A 641 (1989) Class 1.

- 2. Fence Posts and Gate Frames Coating: Zinc coated (galvalume process) with a minimum of 0.9 oz/sq.ft. (275 g/m<sup>2</sup>) as per ASTM A653 G90.
- B. Polyester Coating: Polyester coating to be minimum 4 mils applied by an electrostatic method to cover all surfaces of the wire mesh and post sections. Coating shall be capable of withstanding requirements of the following tests:
  - 1. Mechanical Adhesion: ASTMD 3359 - Method B.
  - 2. Shock Resistance: ASTM D 2794.
  - 3. Salt Spray Testing: Minimum of 1,000 hours without red rust appearance, per ASTM B 117 (1990).
  - 4. Humidity Resistance: ASTM D 2247, weather meter chamber.
  - 5. Exposure to Ultraviolet Light: ASTM D1499, exposure of 1000 hours using apparatus Type E and 63 degreesC.
- C. Polyester Surface Coating Colors:
  - 1. Standard Coating: Black, RAL 9004.

## **PART 3 EXECUTION**

### **4.01 EXAMINATION**

- A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, and other conditions affecting performance.
  - 1. Do not begin installation before final grading is completed, unless otherwise permitted by Architect.
  - 2. Provide a verified survey of property lines and legal boundaries.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### **4.02 PREPARATION**

- A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet (152.5 m) or line of sight between stakes.
- B. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments marked by registered surveyor and utility companies.

### **4.03 FENCE POST LAYOUT**

- A. Layout fencing on established boundaries inside property line.
- B. Terminal Posts Layout: Locate terminal end, corner, and gate posts at changes in horizontal or vertical alignment of:
  - 1. 15 degrees or more.
  - 2. 30 degrees or more.
  - 3. As indicated on Drawings.
  - 4. \_\_\_\_\_
- C. Post spacing for 2 inch (50 mm) posts:
  - 1. Elite & Secur panel 103-7/8 inch (2638 mm) center to center with an adjustment of plus or minus 1-1/2 in. (38 mm).
- D. Post spacing for 3 inch (75 mm) posts:
  - 1. Elite & Secur panel 104-7/8 inch (2664 mm) center to center with an adjustment of plus or minus 1-1/2 in. (38 mm).
- E. Sloped Fences:
  - 1. Step fence sections in accordance with the manufacturer's instructions.
  - 2. Unless otherwise shown on the drawings, align a new post at each step for a clean line.
  - 3. Slide universal brackets on posts to desired height, always installing flush with horizontal wire (no gap).
  - 4. For steep slopes, provide longer posts and panels cut in half or panels in special shapes to keep gaps under panels to a minimum.

#### **4.04 IN-GROUND CONCRETE INSTALLATION**

- A. Drill or hand-excavate holes for posts to spacing indicated, in firm, undisturbed or compacted soil.
- B. Dig holes with a diameter 4 times the diameter of the post and 6 inches (150 mm) deeper than the bottom of the post.
  - 1. Minimum 8 inch (200 mm) in diameter and 42 inch (1070 mm) in depth.
- C. Concrete forms are not necessary or recommended. Crown concrete at top to shed water.
- D. Measure, batch, and mix project-site-mixed concrete according to ASTM C 94. Pour concrete and let cure in accordance with ACI 301 and Division 03 Section "Cast-in-Place Concrete".
- E. Exposed Concrete Footings: Extend concrete 2 inches (50 mm) above grade, or as indicated on Drawings, smooth, and shape to shed water.
- F. Concealed Concrete Footings: Stop footings 2 inches (50 mm) below grade or as indicated on Drawings to allow covering with surface material.
- G. Post Setting: Set posts in concrete footing. Protect portion of posts above ground from concrete splatter. Place concrete around posts and consolidation. Using mechanical devices to set posts is not permitted. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during placement and finishing operations until concrete is sufficiently cured.
- H. Posts Set into Concrete in Sleeves: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with non-shrink, non-metallic grout, or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions, and finished sloped to drain water away from post.
- I. Posts Set into Concrete in Voids: Form or core drill holes not less than 5 inches (125 mm) deep and 3/4 inch (20 mm) larger than outside diameter of post. Clean holes of loose material, insert posts, and fill granular space between post and concrete with non-shrink, non-metallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions, and finished sloped to drain water away from post.

#### **4.05 SURFACE MOUNTED FLANGE INSTALLATION**

- A. Flange Post Installation: Bolt mounting plates attached to each post to slab or structure as indicated, using expansion bolts in accordance with the manufacturer's instructions.

#### **4.06 PANEL INSTALLATION**

- A. Once the post installation is complete, install the mesh sections with the Universal Bracket kits, flush with horizontal wire of the panel (no gap).
- B. Attach the panels to the posts with eye-U-bracket and tie wire or twist tie. Where two panels meet and no post is set, join them with end-to-end connectors used for panel to panel linkage. Do not exceed manufacturers recommended spacing. Attach panel to corner posts with bands spaced maximum of 24 inches (2610 mm) on center.
- C. Panel Installation: Installed a minimum of 1-1/4 inch (30 mm) and maximum of 2 inches (50 mm) above the ground surface.
  - 1. Install vertical wire extensions pointing up for security.
  - 2. Install vertical wire extensions pointing down for safety.
- D. Upon cutting or trimming, a post or a wire mesh section, apply a zinc rich primer to the exposed ends and finish with matching touch-up paint supplied by the manufacturer.
- E. Barbed wire: Uniformly space parallel rows of barbed wire on security side of fence. Pull wire taut and attach to each extension arm. The extension armed is fastened to the post.

#### **4.07 GROUNDING AND BONDING**

- A. Unless otherwise indicated in Division 26 Electrical, or grounding resistance is unusually high, provide the following.
- B. Fence Grounding: Maximum intervals of 1500 feet (450 m).
- C. Fences within 100 feet (30 m) of Buildings, Structures, Walkways, and Roadways: Ground at maximum intervals of 750 feet (225 m).
- D. Conductors: Bare, solid wire for No. 6 AWG and smaller; stranded wire for No. 4 AWG and larger.
- E. Material Above Finished Grade: Copper.
- F. Material Above Finished Grade: Aluminum.
- G. Material On or Below Finished Grade: Copper.
- H. 3 Bonding Jumpers: Braided copper tape, 1 inch (25 mm) wide, woven of No. 30 AWG bare copper wire, terminated with copper ferrules.
- I. Connectors and Ground Rods: Listed in UL 467.
- J. Connectors for Below-Grade Use: Exothermic welded type.
- K. Ground Rods: Copper-clad steel, sized 5/8 x 96 inches (16 by 2400 mm).
- L. Protection at Crossings of Overhead Electrical Power Lines: Ground fence at location of crossing and at a maximum distance of 150 feet (45 m) on each side of crossing.
- M. Fences Enclosing Electrical Power Distribution Equipment: Ground as required by IEEE C2, unless otherwise indicated.
- N. Grounding Method: At each grounding location, drive a ground rod vertically until the top is 6 in. (150 mm) below finished grade. Connect rod to fence with No. 6 AWG conductor. Connect conductor to each fence component at the grounding location.
- O. Bonding Method for Gates: Connect bonding jumper between gate post and gate frame.
- P. 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 will be galvanically compatible.
  - 1. Use electroplated or hot-tin-coated materials to ensure high conductivity 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.
- Q. Bonding to Lightning Protection System: If fence terminates at lightning-protected building or structure, ground the fence and bond the fence grounding conductor to lightning protection down conductor or lightning protection grounding conductor complying with NFPA 780

#### **4.08 FIELD QUALITY CONTROL- GROUNDING**

- A. Ground-Resistance Testing Agency: Contractor shall engage a qualified independent testing agency to perform field quality-control testing.
- B. Ground-Resistance Testing Agency: Owner will engage a qualified independent testing agency to perform field quality-control testing.
- C. Ground-Resistance Tests: Subject completed grounding system to a megger test at each grounding location. Measure ground resistance not less than two full days after last trace of precipitation, without soil having been moistened by any means other than natural drainage or

seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests by two-point method according to IEEE 81.

- D. Desired Maximum Grounding Resistance Value: 25 ohms.
- E. Excessive Ground Resistance: If resistance to ground exceeds desired value, notify Architect promptly. Include recommendations to reduce ground resistance and proposal to accomplish recommended work.
- F. Report: Prepare test reports, certified by testing agency, of ground resistance at each test location. Include observations of weather and other phenomena that may affect test results.

#### **4.09 PROTECTION**

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

**END OF SECTION**

**SECTION 32 3120**  
**SITE FURNISHINGS**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES:** Furnish and provide all labor, material equipment and services necessary to complete the installation of site furnishings as indicated on the drawings and as specified herein. Provide materials, labor, equipment and services necessary to furnish, adapt and install all work of this section as shown on the Construction Documents and/or as required by job conditions, including, but not limited to the following:

- A. Benches
- B. Picnic Tables
- C. Trash Receptacles
- D. Bike Racks
- E. Drinking Fountain
- F. Pool Shower
- G. Removable Bollard
- H. Safety Bollard
- I. Skateboard Deterrent

**1.02 RELATED SECTIONS:**

- A. Section 03 3000 – Cast In Place Concrete

**1.03 SUBMITTALS**

- A. Provide shop drawings, manufacturer's product data and installation requirements for each type of site furnishing.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of site furnishing types and sizes required, whose products have been in satisfactory use in similar service for not less than five years.
- B. Installer's Qualifications: Firm with at least three years of successful installation experience on projects with furnishing work similar to that specified for project.

**PART 2 - PRODUCTS**

**2.01 BENCHES**

- A. Model 2 from the Homestead Collection

Specifications:

- a. Size: 6 ft length
- b. Armrests with matching trim in Black
- c. Surface mount
- d. Slats: Reinforced recycled plastic in Cherry
- e. Supports: Black
- f. All fabricated metal components are steel shotblasted, etch, phosphatized, preheated and electrostatically powder-coated with TGIC polyester powder coatings. Products are fully cleaned and pretreated, preheated and coated while hot to fill crevices and build coating film. Coated parts are fully cured to coating manufacturer's specifications. The thickness of the resulting finish averages 8-10 mils.
- g. Manufacturer: Victor Stanley, Inc. PO Drawer 330, Dunkirk, MD 20754,

B. WT – Custom (Wood Top System)

Specifications:

- a. (2) 8' Length and (2) 9'6" Length
- b. Surface bracket mounting
- c. Stainless steel hardware
- d. Stainless steel frame
- e. Timber: 100% FSC Hardwood, Class 1 (Cumaru) Seats
- f. Manufacturer: Street Life Herengracht 36, 2312 LD Leiden, The Netherlands  
[www.streetlife.nl](http://www.streetlife.nl)

**2.02 PICNIC TABLES**

A. Rectangular Picnic Table Model 238-P6 by Ultra Site

Specifications:

- a. 6' length
- b. Surface mounting
- c. Stainless steel hardware
- d. Black powder coated frame
- e. Blue thermoplastic top and seats
- f. Manufacturer: Ultra Site 1675 Locust Street, Red Bud, IL 62278 [www.ultra-site.com](http://www.ultra-site.com)

B. Rectangular ADA Accessible Picnic Table Model 238HS-V8 by Ultra Site

Specifications:

- a. 8' length
- b. Surface mounting
- c. Stainless steel hardware
- d. Black powder coated frame
- e. Blue thermoplastic top and seats
- f. Manufacturer: Ultra Site 1675 Locust Street, Red Bud, IL 62278 [www.ultra-site.com](http://www.ultra-site.com)

**2.03 TRASH RECEPTACLES**

A. Sage Trash Receptacle Model SGE-36SA-P from the Perenne Collection

Specifications:

- a. 3/8"x1" solid steel bars, 1" square tubular steel rings, 1"x1-1/2" tubular steel uprights, 11 gauge perforated steel panels, 16 gauge steel dome, leveling feet with a 3/8" diameter threaded steel shaft. Oil impregnated bronze bushings and stainless steel pivot pins for door movement.
- b. 36 gallon capacity high density plastic liner
- c. Lid: solid convex lid
- d. Color: Black
- e. Mounting plate: standard (1) anchor bolt hole with bottom plate cover
- f. All fabricated metal components are steel shotblasted, etch, phosphatized, preheated and electrostatically powder-coated with TGIC polyester powder coatings. Products are fully cleaned and pretreated, preheated and coated while hot to fill crevices and build coating film. Coated parts are fully cured to coating manufacturer's specifications. The thickness of the resulting finish averages 8-10 mils.
- g. Manufacturer: Victor Stanley, Inc. PO Drawer 330, Dunkirk, MD 20754,  
[www.victorstanley.com](http://www.victorstanley.com)

## **2.04 BIKE RACKS**

- A. Freesia Bike Rack from the Perenne Collection

Specifications:

- a. Frame constructed of 1"x1" solid steel
- b. Model: BFRE-101 Single arch
- c. Color: Black
- d. Mounting: surface mount
- e. All fabricated metal components are steel shotblasted, etch, phosphatized, preheated and electrostatically powder-coated with TGIC polyester powder coatings. Products are fully cleaned and pretreated, preheated and coated while hot to fill crevices and build coating film. Coated parts are fully cured to coating manufacturer's specifications. The thickness of the resulting finish averages 8-10 mils.
- f. Manufacturer: Victor Stanley, Inc. PO Drawer 330, Dunkirk, MD 20754,  
[www.victorstanley.com](http://www.victorstanley.com)

## **2.05 DRINKING FOUNTAIN**

- A. Pedestal mounted bottle filler with bi-level drinking fountain. Model: # 10145 SMSSFA (Front Approach) as manufactured by Most Dependable Fountains, Inc. or approved equal.
- B. Accessible drinking fountain shall meet ADA regulations with dual receptor bowls and bottle filler. One piece welded construction with standard 304 schedule 10 stainless steel.
- C. Finish: Stainless steel

## **2.06 POOL SHOWER**

- A. Column dual station shower with foot shower at two stations. Model: # 564 SMSS as manufactured by Most Dependable Fountains, Inc. or approved equal
- B. Finish: Stainless steel

## **2.07 REMOVABLE BOLLARDS**

- A. MODEL:  
Subject to compliance with provisions of this sections, Removable - anchor casting in new concrete shall be model # R-7539 Steel Bollard, 'Black' color, as manufactured by Reliance Foundry Co Ltd, 6450 148 St #207, Surrey, BC V3S 7G7, Canada 1-877-789-3245,  
[www.reliance-foundry.com](http://www.reliance-foundry.com), or an approved equal.
- B. DESCRIPTION:  
Bollard shall be fabricated from ASTM A53 steel, schedule 80 pipe, 6-inch actual diameter, and be powder coated. Bollard shall have internal locking mechanism, with tamper-resistant lock. Bollard shall be supplied with a grade 304 stainless steel embedment sleeve, with hinged cover (Hinge shall be flush with finish grade when the cover is in closed position).

## **2.08 SAFETY BOLLARDS**

MODEL:

Subject to compliance with provisions of this sections, fixed embedded bollard shall be model # R-7901 Steel Bollard, 'Black' color, as manufactured by Reliance Foundry Co Ltd, 6450 148 St #207, Surrey, BC V3S 7G7, Canada 1-877-789-3245,  
[www.reliance-foundry.com](http://www.reliance-foundry.com), or an approved equal.

- C. DESCRIPTION:  
Fixed bollard embedded into concrete.  
Height: 36 inches  
Diameter: 4-1/3 inches body; 4-1/3 inches base  
Weight: 38 lbs.  
Material: Steel: ASTM A36; 25 percent recycled-material content.  
Color: Black  
Reflective Stripe: White

**2.08 SKATEBOARD DETERENTS**

- A. Gorilla 012 (Gorilla Line – Surface Mount Aluminum)

Specifications:

- a. Dimensions: 1 1/8" Wide x 8" Deep x 1 1/8" Tall
- b. Surface mount, with concealed pins
- c. Materials: 6000 Series Aluminum (6061-T6 Aluminum)  
Description: Spacing @ 36" O.C., Starting 18-24" from End of wall or bench.
- d. Manufacturer: Skatestoppers 1547 N. Cuyamaca, El Cajon, CA 92020,  
[www.skatestoppers.com](http://www.skatestoppers.com), or an approved equal.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify that surfaces on which site furnishings are to be installed are level, smooth, clean, and otherwise ready to receive the work of this section. Do not proceed until unsatisfactory conditions are corrected.

**3.02 INSTALLATION**

- A. Install site furnishings where indicated on plans and as per manufacturer's instructions.

**3.03 PROTECTION**

- A. Protect all site furnishings from damage during construction. Repair or replace damaged items at no additional cost to the Owner.

**3.04 CLEAN-UP**

- A. Remove excess materials, leave area in a clean and neat condition.

**END OF SECTION**

**SECTION 32 3122**  
**EXTERIOR SIGNAGE**

**PART 1 - GENERAL**

- 1.01 SECTION INCLUDES:** Furnish and provide all labor, material, equipment, and services necessary to complete the installation of exterior signage as indicated on the drawings and as specified herein. Provide materials, labor, equipment and services necessary to furnish, adapt and install all work of this section as shown on the Construction Documents and/or as required by job conditions, including, but not limited to the following:
- A. ADA Signage
  - B. Crosswalk Signage
  - C. Fire Lane/No Parking Signage
  - D. Stop Signage
  - E. Entrance Monument Sign

**1.02 RELATED SECTIONS:**

- A. Section 03 3000 – Cast In Place Concrete

**1.03 SUBMITTALS**

- A. Provide shop drawings, manufacturer's product data and installation requirements for each type of sign.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of signage types and sizes required, whose products have been in satisfactory use in similar service for not less than five years.
- B. Installer's Qualifications: Firm with at least three years of successful installation experience on projects with signage work similar to that specified for project.

**PART 2 - PRODUCTS**

**2.01 SIGNAGE**

- A. Panels: 0.80 mm thick aluminum sign panel. Sign face to be high density grade decals adhered with heat activated adhesive. Size, graphics and color as indicated on the plans and conforming to FHA Manual of Traffic Control Devices.
- B. Post: Steel U-Channel sign posts, painted black finish.

**2.02 ENTRANCE MONUMENT SIGN**

- A. Panels: 6MM double-sided aluminum composite sign panel with polyethylene core. Sign panel mounted to posts with aluminum angle irons (front and back).
- B. Post: 4" Square Aluminum Sign Post, powder coated black finish.
- C. Base: Brick veneer over concrete structure with limestone cap. Design of base structure reflects the materials and construction styles used on Bath House and Pump House.

**PART 3 - EXECUTION**

**3.01 EXAMINATION**

- A. Verify that surfaces on which exterior signage is to be installed are level, smooth, clean, and otherwise ready to receive the work of this section. Do not proceed until

unsatisfactory conditions are corrected.

**3.02 INSTALLATION**

- A. Install signage where indicated on plans and as per manufacturer's instructions.

**3.03 PROTECTION**

- A. Protect all signage from damage during construction. Repair or replace damaged items at no additional cost to the Owner.

**3.04 CLEAN-UP**

- A. Remove excess materials; leave area in a clean and neat condition.

**END OF SECTION**

**SECTION 32 3125**  
**ALUMINUM PICKET FENCING AND GATES**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Furnish and install 4'-0" ht. aluminum picket fence, fittings and accessories.
- B. Furnish and install 8'-0" ht. aluminum picket fence, gates, fittings and accessories.
- C. Concrete for footings is specified in section 03-3000.

**1.2 SUBMITTALS**

- A. Product Data: Provide data on fencing, posts, accessories, fittings and hardware for all fences and gate systems.
- B. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, and schedule of components for all fences and gate systems.
- C. Project Record Documents: Accurately record actual locations of property perimeter posts relative to property lines and easements.

**1.3 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

**PART 2 PRODUCTS**

**2.1 MATERIALS**

- A. Aluminum picket fence around pool and 12' wide double swing gate at the Pump House shall be 8' tall Echelon II Majestic, 4 rail with rings fence panel and gate panels, as manufactured by Ameristar Fence, 1555 N. Mingo Rd., Tulsa, OK 74116, (888) 333-3422, or an approved equal. The entire system shall be a product of one manufacturer and shall include all components (i.e., pickets, rails, posts, gates and hardware) required.
- B. Aluminum picket fence between parking lot and splash pad shall be 4' tall Echelon II Majestic, 3 rail with rings fence I, as manufactured by Ameristar Fence, 1555 N. Mingo Rd., Tulsa, OK 74116, (888) 333-3422, or an approved equal. The entire system shall be a product of one manufacturer and shall include all components (i.e., pickets, rails, posts, gates and hardware) required.
- C. Aluminum material for fence framework (i.e. tubular pickets, rails and posts), shall be galvanized prior to forming in accordance with the requirements of ASTM B221. The aluminum extrusions for posts and rails shall be Alloy and Temper Designation 6005-T52. The aluminum extrusions for pickets shall be Alloy and Temper Designation 6063-T52.
- D. Material for fence pickets shall be 1" square x 0.062" thick (.125" wall for Invincible) extruded tubing. The cross-sectional shape of the rails shall conform to the manufacturer's double-walled U-channel rail design with outside cross-section dimensions of 1.75" square. The top wall and internal web of the rail shall be 0.070" thick; the sidewalls shall be 0.070" thick for superior vertical load strength. Picket holes in the double-walled U-channel rail shall be spaced 4.715"

o.c., except for Invincible style 6' long, which shall be, spaced 4.98" o.c. Picket retaining rods shall be 0.125" diameter galvanized steel. High quality PVC grommets shall be supplied to seal all picket-to-rail intersections. Fence posts and gate posts shall meet the minimum size requirements as designated by the manufacturer for a given fence height and gate sizes.

- D. Bracket to rail attachments shall be made using specially designed one-way tamperproof security nuts with carriage bolt. Bracket to post connections shall be made using self-drilling hex-head screws.
- E. Aluminum castings shall be used for all rings, post caps, finials, and miscellaneous adornments.

## **2.2 FABRICATION**

- A. Pickets, rails and posts shall be precut to specified lengths. Double-walled U-channel rails shall be prepunched to accept pickets. Pickets shall be predrilled to accept retaining rods.
- B. Grommets shall be inserted into the prepunched holes in the rails and pickets shall be inserted through the grommets so that predrilled picket holes align with the internal upper raceway of the Double-walled U-channel rails (Note: This can best be accomplished by making an alignment jig). Retaining rods shall be inserted into each Double-walled U-channel rail so that they pass through the predrilled holes in each picket.
- C. The manufactured framework shall be subjected to the thermal stratification coating process (high-temperature, in-line, multi-stage, multi-layer) including, as a minimum, a six-stage pretreatment/wash and an electrostatic spray application of a polyester finish. The topcoat shall be a "no-mar" TGIC polyester powder coat finish with a minimum thickness of 2 mils. The color shall be Black.
- D. Completed sections (i.e., panels) shall be capable of supporting a 300 lb. load applied at midspan without permanent deformation. Panels shall be biasable to a 25% change in grade.
- E. Swing gates shall be fabricated using 1.75" sq. Double-walled U-channel rails, 2" sq. x .250". gate ends, and 1" sq. x .125" pickets. All rail and upright intersections shall be joined by welding. All picket and rail intersections shall also be joined by welding.

## **2.3 PADLOCKS**

- A. Furnish padlocks for new gates where indicated. Locks to be set up alike: Furnish five (5) keys for all.
- B. Padlock case shall be of 13/4" extruded brass, cornered elliptical shape. The width of the case shall be 13/4", the depth 119/32" and the thickness 13/16". The shackle shall be of hardened steel cadmium plated with a diameter of 11/32". The width of the opening of shackle from the top of the case to the inside of the shackle shall be 29/32". The shackle shall lock at both the toe and the heel.
- C. Cylinder shall be capable of being keyed individually, keyed alike, masterkeyed and sets and grandmaster keyed as will be directed.
- D. Padlocks shall have 14 gage steel wire chains 9" long attached to lock and riveting pins with rivets and clevis. Chains, rivets, clevis and riveting pins shall be hot dipped galvanized or cadmium plated. Chains shall be galvanized after fabrication.
- E. Stamp or cast the words, "Property of City of Schenectady" on padlocks. Padlocks shall bear the manufacturer's name, stamped or cast.

## **PART 3 EXECUTION**

### **3.1 INSTALLATION**

- A. Fence post shall be spaced as shown on plans, and not exceeding the spacing recommended by the manufacturer. Fence panels shall be attached to posts with brackets supplied by the manufacturer. When cutting/drilling rails or posts adhere to the following steps to seal the exposed steel surfaces; 1) Remove all metal shavings from cut area. 2) Apply zinc-rich primer to thoroughly cover cut edge and/or drilled hole; let dry. 3) Apply 2 coats of custom finish paint matching fence color. Failure to seal exposed surfaces per steps 1-3 above will negate warranty. Manufacturer's spray cans or paint pens shall be used to prime and finish exposed surfaces; it is recommended that paint pens be used to prevent overspray.

### **3.2 GATE INSTALLATION**

- A. Gate posts shall be spaced as indicated on drawings, and not exceeding the spacing recommended by the manufacturer, dependent on standard out-to-out gate leaf dimensions and gate hardware selected. Type and quantity of gate hinges shall be based on the application; weight, height, and number of gate cycles. The manufacturers' gate drawings shall identify the necessary gate hardware required for the application. Gate hardware shall be provided by the manufacture of the gate and shall be installed per manufacturer's recommendations.

### **3.3 CLEANING**

- A. The contractor shall clean the jobsite of excess materials; post-hole excavations shall be scattered uniformly away from posts.

**END OF SECTION**

**SECTION 32 9218**  
**LANDSCAPE GRADING**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. This Section includes spreading topsoil and providing finish grade for final landscaping and seeding. Existing topsoil shall be stripped and stockpiled for reuse, import topsoil as required to meet project requirements.

**PART 2 – PRODUCTS**

**2.01 TOPSOIL**

- A. In accordance with Section 31 1000 – Soil Materials.

**2.02 SOURCE QUALITY CONTROL**

- A. Topsoil material shall consist of material complying with the specifications contained herein. Existing and re-used topsoil shall be tested and amended as necessary to comply with specifications.
- B. If testing and analysis indicate topsoil materials do not meet specified requirements, amend material and retest.
- C. Provide materials of each type from same source throughout the Work.

**PART 3 – EXECUTION**

- A. Verify earthwork and site grading has been completed and inspected.
- B. Verify sub-grade has been contoured and compacted.

**3.01 SUBGRADE PREPARATION**

- A. Eliminate uneven areas and low spots.
- B. Remove debris, roots, branches, stones, in excess of  $\frac{1}{2}$  inch in size. Remove subsoil contaminated with petroleum products.
- C. Scarify surface to depth of 3 inches where topsoil is scheduled. Scarify in areas where equipment used for hauling and spreading topsoil has compacted subsoil.

**3.02 PLACING TOPSOIL**

- A. Place topsoil in areas where seeding and landscaping is required to a thickness of 4 inches or as indicated on the plans. Place topsoil during dry weather.
- B. Fine grade topsoil to eliminate rough or low areas. Maintain profiles and contour of sub-grade.
- C. Remove roots, weeds, rocks, and foreign material while spreading.
- D. Manually spread topsoil close to existing vegetation to prevent plant damage.
- E. Leave stockpile area and site clean and raked, ready to receive seeding.

**3.05 TOLERANCES**

- A. Top of Topsoil: Plus or minus  $\frac{1}{2}$  inch.

**3.06 PROTECTION**

- A. Protect landscaping and other features remaining as final work.

**3.07 CLEAN-UP**

- A. Remove all excess materials and debris from Owner's property.

**END OF SECTION**

## **SECTION 32 9219**

### **SEEDING**

#### **PART 1 - GENERAL**

##### **1.01 SUMMARY**

- A. This Section includes the following:
  1. Soil preparation.
  2. Seed mixtures for permanent seeding, mulching, fertilizing and maintenance until final acceptance.
  3. Temporary seeding is specified in Section 31 2501 – Erosion and Sediment Control.

##### **1.02 DEFINITIONS**

- A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

##### **1.03 SUBMITTALS**

- A. Seed vendor's certified statement for each seed mixture required, stating botanical and common name, percentage by weight, percentages of purity, germination, weed seed for each grass seed species, and bagging date.
- B. Fertilizer and herbicide manufacturer's product and application data.

##### **1.04 QUALITY ASSURANCE**

- A. Provide seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.
- B. Time of seeding: Sow lawn seed between April 1 and May 31 or September 1 and October 31, or as otherwise approved in writing by the Director's Representative.

##### **1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver seed mixture in sealed containers showing seed vendor's name and seed analysis by weight. Seed in damaged packaging is not acceptable.
- B. Deliver fertilizer and herbicide in waterproof bags showing weight, chemical analysis, and name of manufacturer.
- C. Store all products in a cool, dry and secure location.

#### **PART 2 – PRODUCTS**

##### **2.01 SEED MIXTURE**

- A. Provide fresh, clean, new-crop seed mixed in the proportions specified for species and variety, and conforming to state and federal standards.
- B. Acceptable material in a seed mixture other than pure live seed consists of nonviable seed, chaff, hulls, live seed of crop plants and inert matter. The percentage of weed seed shall not exceed 0.1% by weight.
- C. Lawn Seed Mix: Apply at a rate of 6 lbs. per 1000sf:
  1. Kentucky Bluegrass: 35 percent.
  2. Perennial Ryegrass: 25 percent.
  3. Chewings Fescue: 40 percent.

- D. Rain Garden / Bio-retention Seed Mix:

**ERNMX-180-1 (Rain Garden Grass Mix)**

- E. Vegetated Swale Seed Mix:

**ERNMX-114 (5311 Conservation Mix)**

- F. Cover Crop: Overseed all Rain Garden / Bio-retention, and Vegetated Swale Seed Mix with 100% Annual Rye Grass at a rate of 6 lbs. per 1000 sf.

- G. Seed Mixes by Ernst Conservation Seeds, Inc., 8884 Mercer Pike, Meadville, PA, 16335, (800) 873-3321, or approved equal.

## **2.02 SOIL MATERIALS**

- A. Topsoil: As specified in Section 31 1000 and in accordance with planting plans.

## **2.03 ACCESSORIES**

- A. Mulching Material: Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable.
- B. Fertilizer: Complete fertilizer of neutral character, with some elements derived from organic sources and containing the following percentages of available plant nutrients: 1:2:1 ratio, 5% total nitrogen, 10% phosphoric acid, and 5% soluble potash.
- C. Herbicide: Apply a pre-emergent herbicide to the installed topsoil. Apply a post-emergent herbicide when weed infestation exceeds 5% of any planted lawn area. Reapply post-emergent herbicide application until weeds are eradicated.
- D. Water: Clean, fresh and free of substances or matter which could inhibit vigorous growth of lawn or wildflowers.
- E. Tackifier: Natural Organic Bio-Degradable Tackifier. Tackifier shall consist of one primary hydrocolloid organic active ingredient which makes up at least 65% of the total formulation or a proven/approved inorganic equal. Tackifier shall be nontoxic and contain no germination or growth inhibiting factors. "Ecotak" as manufactured by Eastern Products, Inc. 1162 Sycamore Lane, Mahwah, NJ 07430, (201) 934-5050, or approved organic equal.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that prepared topsoil is true to grade, has been rolled and is ready to receive the work of this section. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.

### **3.02 PRE-TREATMENT**

- A. After the areas required to be seeded have been brought to the required subgrade, apply pre-emergent herbicide per manufacturer's instructions. Remove debris and stones larger than 1/2 inch.

### **3.03 FERTILIZING**

- A. Apply fertilizer to lawn seed areas in accordance with manufacturer's instructions and according to soil test recommendations. More frequent applications at a lower rate are more desirable. Water all fertilizers after application.
- B. Apply after smooth raking of topsoil and prior to roller compaction.
- C. Do not apply fertilizer at same time or with same machine as will be used to apply seed.
- D. Mix thoroughly into upper 2 inches of topsoil.
- E. Lightly water to aid the dissipation of fertilizer.

#### **3.04 SEEDING**

- A. Apply seed at a rate of 6 lbs. per 1000 SF evenly in two intersecting directions in areas as indicated on the plans. Rake seed lightly into top 1/8 inch of soil.
- B. Do not seed areas in excess of that which can be mulched on same day.
- C. Do not sow immediately following rain, when ground is too dry, or during windy periods.
- D. Roll seeded area with roller not exceeding 112 lbs.
- E. Immediately following seeding and compacting, apply mulch to a thickness of not less than 1" loose measurement. Maintain clear of shrubs and trees.
- F. Apply water with a fine spray immediately after each area has been mulched. Saturate the top 4 inches of soil. Apply tackifier in accordance with manufacturer's recommendations.

#### **3.05 SEED PROTECTION**

- A. Identify seeded areas and take necessary precautions to minimize traffic in seeded areas.
- B. Protect seeded areas against erosion by spreading specified mulch after completion of seeding operations. Spread uniformly to form a continuous blanket not less than 1" loose measurement over seeded areas. Apply tackifier to securely hold in place the mulch. Apply a minimum ratio of 75 lbs. tackifier/2,000lbs. of mulch.

#### **3.06 MAINTENANCE**

- A. Water to prevent seed and soil from drying out.
- B. Topdress surface to remove minor topsoil depressions or irregularities.
- C. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.
- D. Immediately re-seed areas which show bare spots.
- E. Protect seeded areas with warning signs during maintenance period.

#### **3.07 CLEAN-UP**

- A. Remove all excess materials and debris from the owner's property.

#### **3.08 INSPECTION AND ACCEPTANCE**

- A. The Contractor is responsible for the establishment and proper care of a stand of grass over the entire seeded areas. Final acceptance of seeded areas will be granted when a uniform stand of grass is obtained. An acceptable stand of grass is one in which 98% coverage is obtained.
- B. A minimum maintenance period is required. The maintenance period shall extend until 98% coverage is obtained.

#### **END OF SECTION**

**SECTION 32 9222**  
**LANDSCAPE PLANTING**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. This Section includes the following:
  - 1. Furnish and install new Landscape Plantings and Accessories.
  - 2. Furnish and install double ground hardwood bark mulch.
  - 3. Maintenance until final acceptance.
  - 4. See planting plans for additional notes and specifications for landscape planting.

**1.02 DEFINITIONS**

- A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.
- B. Backfill: The earth used to replace or the act of replacing earth in an excavation.
- C. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with a ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.
- D. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.
- E. Finish Grade: Elevation of finished surface of planting soil.
- F. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant. Some sources classify herbicides separately from pesticides.
- G. 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.
- H. Planting Area: Areas to be planted.
- I. Planting Soil Mix: 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. See Section 31 1000 "Soil Materials".
- J. Plant; Plants; Plant Material: Living trees, plants, and ground cover specified in this Section. These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.
- K. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.
- L. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.
- M. 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.

### **1.03 SUBMITTALS**

- A. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
  - a. Include in plant list the botanical and common names, size, quantity, form, root ball, limb height (if applicable), other requested data, and source locations for all plant materials.
  - b. Include names, addresses and phone numbers of each nursery source associated with each plant item.
  - c. Plant lists shall clearly identify deviations from specified plants and any approved substitutions. Where deviations or other changes occur in plant list, identify both the original specified plant item and the new plant item.
  - d. Plants listed with submittal shall be available at the nursery for inspection and selection. Contractor shall evaluate and verify at proposed nursery source that plant material conforms to the requirements of the Contract Documents.
- B. Maintain and re-submit updated Plant List and Source Identification as deviations or other changes occur until Substantial Completion. Submit as a Record Document at completion of Contract work.
- C. Submit technical descriptive data for each manufactured or packaged product of this Section including fertilizers, mulch, soil amendments, tree staking materials and plant treatment material as applicable. Include manufacturer's product testing and certified analysis and installation instructions for manufactured or processed items and materials. Include guaranteed analysis and weight of pre-packaged material as specified for certification of material not pre-packaged.
- D. Operation and Maintenance Data: include pruning objective, types and methods; types, application, frequency and recommended coverage of fertilizer. Include recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before expiration of required maintenance periods.

### **1.04 QUALITY ASSURANCE**

- A. Nursery Qualifications: Nursery/Plant Supplier Qualification: Plant Nursery(ies) shall have a nursery facility as an integral part of operation where majority of plants can be grown and reviewed, shall be reputable, and shall have been in continual operation with a minimum of 7 years' experience as a plant grower. Nursery shall be capable of the following as a minimum:
  - a. Supplying plant material conforming to the quality standards, visual characteristics, sizes, species cultivars, and quantities indicated by the Contract Documents.
  - b. Conformance to cultural practices and maintenance procedures suitable for healthy plant material.
- B. Installer Qualifications: Engage an experienced installer who has completed plant installation work similar in material, design, and extent to that indicated for this project with a record of successful landscape establishment. Company specializing in installing and planting the plants with five years' documented experience and approved by nursery.
  - a. Installer's Field Supervisor(s) for Installation and Maintenance shall be an English speaking supervisor(s) experienced in tree, shrub, groundcover and plant installation and maintenance.
  - b. Supervisor(s) shall be maintained full-time on Project site when installation or maintenance is in progress.
  - c. Perform installation work with personnel totally familiar with preparations and exterior plant installation under supervision of an experienced landscape Foreman.
  - d. Provide adequate numbers and types of accessible personnel to meet the scheduling requirements of the exterior plant installation.
  - e. Certified Project Arborist, if required: Must be currently certified by International Society of Arboriculture and must have a minimum of five (5) years' experience. The certified project arborist must be on site when all installation, maintenance of plants

including pruning and root pruning, and while all earth moving is taking place to enforce tree protection requirements.

C. Maintenance Services: Performed by Installer.

**1.05 REGULATORY REQUIREMENTS**

- A. Comply with regulatory agencies for fertilizer and herbicide composition.
- B. Plant Materials: Certified by state department of agriculture described by ASTM Z60.1; free of disease or hazardous insects.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Notify Director's Representative seven days in advance of delivery of plant materials to site.
- B. 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 if applicable.
- C. Bulk Materials:
  - a. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing or proposed turf areas or plants.
  - b. 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.
  - c. Accompany each delivery of bulk materials with appropriate certificates.
- D. Plant material which has been damaged by delivery, storage or handling will be rejected.
- E. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.
- F. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling. Handle planting stock by root ball.
- G. Protect and maintain plant life until planted. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F until planting.
- H. Deliver plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.
  - a. Do not remove container-grown stock from containers before time of planting.

**1.07 ENVIRONMENTAL REQUIREMENTS**

- A. 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 and warranty requirements.
- B. Do not install plant life when ambient temperatures may drop below 35 degrees F or rise above 90 degrees F.

- C. Do not install plant life when wind velocity exceeds 30 mph.
- D. The following species are fall planting hazards and shall be dug and planted in the Spring only. Digging or planting at times other than spring season shall be done at Contractor's risk, and shall not relieve Contractor of the obligation of Warranty/Guarantee obligations. If the Contractor elects to plant trees on this list in the fall without having arranged for a spring-dug tree, the Warranty Period shall be extended by an additional year with the same replacement warranty as spring planted trees.
  - a. Betula
  - b. Carpinus
  - c. Celtis
  - d. Cercis
  - e. Cercidiphyllum
  - f. Crataegus
  - g. Fagus
  - h. Halesia
  - i. Koelreuteria
  - j. Liquidambar
  - k. Liriodendron
  - l. Malus
  - m. Nyssa
  - n. Ostrya
  - o. Prunus
  - p. Pyrus
  - q. Quercus –except Q. palustris
  - r. Salix
  - s. Sorbus
  - t. Styrax
  - u. Tilia tomentosa
  - v. Ulmus parviflora
  - w. Zelkova

#### **1.08 WARRANTY**

- A. Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period. Failures include, but are not limited to, the following:
  - a. Death and unsatisfactory growth, except for defects resulting from Owner abuse, lack of adequate maintenance by Owner or neglect by Owner.
  - b. Structural failures including plantings falling or blowing over.
  - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
- B. Include coverage for one year beginning at Date of Substantial Completion.
- C. Include the following remedial actions as a minimum:
  - a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
  - b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
  - c. A limit of one replacement of each plant is required except for losses or replacements due to failure to comply with requirements.

- d. Replacements: Plants of same size and species as specified, planted in the next growing season, with a new warranty commencing on date of replacement for period equal to original warranty period.

## PART 2 – PRODUCTS

### 2.01 TREES, SHRUBS AND GROUNDCOVERS

#### A. Planting Stock:

- a. Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant List, Plant Schedule, or Plant Legend indicated on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
  - b. All plants shall be true to type and name in accordance with the latest edition of Standardized Plant Names, official code of the American Joint Committee on Horticulture Nomenclature, and each bundle or each plant, when not tied in bundles, shall be labeled properly.
    - i. Label each tree and shrub with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant.
  - c. All plants shall have a well-branched, vigorous, and balanced root and top growth and, unless otherwise specified, shall be No. 1 Grade conforming to "American Standard for Nursery Stock" of the American Association of Nurserymen (AAN). They shall be free from disease, injurious insects, mechanical wounds, broken branches, decay, or any other defect.
    - i. Trees shall have reasonably straight trunks with well-balanced tops and a single leader.
    - ii. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots are unacceptable.
    - iii. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.
    - iv. Deciduous plants, other than those specified as container grown, shall be dormant.
- B. Trees, Shrubs and Groundcovers: Species, size and variety identifiable in plant schedule shown on the plans, grown in climatic conditions similar to those in locality of the Work.
- C. Measurements:
- a. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container-grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches above the root flare for trees up to 4-inch caliper size, and 12 inches above the root flare for larger sizes.
  - b. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which begins at root flare according to ANSI Z60.1. Root flare shall be visible before planting.
  - c. Other Plants: Measure with stems, petioles, and foliage in their normal position.

- D. Supply trees which have been transplanted or root pruned in a uniform circle of 360 degrees about the root system at least once in interval of from one to three years prior to date of this contract.
- E. Provide balled and burlapped plants from soil that will hold a firm natural ball. Do not prune plants before delivery.

## **2.02 PLANTING SOIL MATERIALS**

- A. Planting Soil: The same material as Topsoil, as specified in Section 31 1000, with amendments as called for based upon soil testing reports from a qualified soil-testing agency.

## **2.03 SOIL AMENDMENT MATERIALS**

- A. If soil tests indicate soil amendment, apply soil conditioners/fertilizers to amend soil to specified conditions.
- B. Commercial Fertilizer: Commercial – grade complete fertilizer of neutral character, consisting of fast and slow release nitrogen, 50 percent derived from natural organic sources of urea, formaldehyde, phosphorus, and potassium in the following composition:
  - a. Composition: Nitrogen, phosphorus, and potassium and other supplemental nutrients in amounts recommended in soil testing reports from a qualified soil-testing agency.
- C. Compost: Shall be type A or type D in accordance with NYSDOT specification section 713-15. Minimum organic matter content of compost shall be 35% dry weight.
- D. Mycorrhizal Fungi: Dry, granular inoculant containing at least 5300 spores per lb of vesicular-arbuscular mycorrhizal fungi and 95 million spores per lb of ectomycorrhizal fungi, 33 percent hydrogel, and a maximum of 5.5 percent inert material.
- E. Water: Clean, fresh, and free of substances or matter which could inhibit vigorous growth of plants.

## **2.04 MULCH MATERIALS**

- A. Mulching Material: Double ground hardwood bark mulch, free of growth or germination inhibiting ingredients and deleterious materials. Suitable for top dressing of trees and plant beds. In accordance with NYSDOT specification section 713.05, type D. Dyed and raw wood chips are not acceptable.

## **2.05 SOURCE QUALITY CONTROL AND TESTS**

- A. Provide testing and analysis of imported topsoil. The contractor shall pay for all testing under this Section.
- B. Analyze to ascertain percentage of nitrogen, phosphorus, potash, soluble salt, organic matter and pH value.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Verify actual grade elevations, service and utility locations, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.
  - a. 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.
  - b. Verify that plants and vehicles loaded with plants can travel to planting locations with adequate overhead clearance.
  - c. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.

- d. Uniformly moisten excessively dry soil that is not workable or which is dusty.
- B. Verify that finish grades have been prepared and are ready to receive work.
- C. Percolation Test: Prior to planting, saturate plant pits with water to test drainage. Notify Director's Representative of any drainage problems/concerns.

### **3.02 PREPARATION**

- A. Site Preparation
  - a. Protect structures, utilities, sidewalks, pavements, and other facilities, turf areas and existing plants from damage caused by planting operations.
  - 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.
- B. Subsoil Preparation
  - a. Prepare subsoil to eliminate uneven areas. Maintain profiles and contours. Make changes in grade gradual. Blend slopes into level areas.
  - b. Remove foreign materials, weeds and undesirable plants and their roots. Remove contaminated subsoil.
  - c. Scarify subsoil to a depth of 3 inches (75 mm) where plants are to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted subsoil.
  - d. Dig pits and beds 12 inches (300 mm) larger than plant root system.
- C. EXCAVATION FOR TREES AND SHRUBS
  - a. Planting Pits and Trenches: Excavate circular planting pits.
    - i. Excavate planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are unacceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.
    - ii. Excavate to the depth and width as shown on the drawings.
    - iii. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
    - iv. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
    - v. Maintain angles of repose of adjacent materials to ensure stability. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
    - vi. Maintain supervision of excavations during working hours.
    - vii. Keep excavations covered or otherwise protected when unattended by Installer's personnel.

- b. Backfill Soil: Use planting soil, as specified in Section 31 1000 "Soil Materials" for backfill. Subsoil and soil removed from excavations may not be used as backfill soil unless analysis verifies that materials meet specifications.
- c. Obstructions: Notify Director's Representative if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.
- d. Drainage: Notify Director's Representative if subsoil conditions show evidence of unexpected water seepage or retention in tree or shrub planting pits.
  - i. Upon completion of planting pit or trench excavation and prior to planting, fill excavations with 12" minimum depth water and allow water to naturally drain out. When water has drained out, fill excavation again with 12" minimum depth water and measure rate of drainage. Drainage rate should be a minimum of 1" per hour (1 inch drop in water elevation per hour within pit or excavation).
  - ii. Frequency of Drainage Testing:
    - 1. Tree Pits: test each tree pit
    - 2. Planting Bed Areas: one drainage test for every 1,000 sq. ft. of planting bed, or one drainage test per planting bed less than 1,000 sq. ft.
- e. If pits or planting beds do not drain freely, notify Director's Representative for direction prior to installation of trees.

### **3.03 PLACING TOPSOIL**

- A. Mix the following soil amendments with topsoil at the rates specified. Delay mixing of fertilizer if planting will not follow the placing of topsoil within a few days.
  - 3.5 bushels of peat moss per cubic yard of topsoil
  - 1.25 lbs. of fertilizer per cubic yard of topsoil.
- B. Install amended topsoil to depth required to accommodate plant root balls, as specified on the plans. Amended soil shall be installed throughout the extent of planting beds.
- C. Before planting, obtain Director's Representative's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.
- D. Application of Mycorrhizal Fungi: If required for project, at time directed by Director's Representative, broadcast dry product uniformly over prepared soil at application rate according to manufacturer's written recommendations.

### **3.04 FERTILIZING**

- A. Apply fertilizer in accordance with manufacturer's instructions.
- B. Lightly water to aid the dissipation of fertilizer.

### **3.05 PLANTING**

- A. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.
  - a. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations. Place plants for best appearance for review and final orientation by Saratoga Associates.

**B. Tree and Shrub Planting**

- a. Roots: Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.
- b. Balled and Burlapped Stock: Set each plant plumb and in center of planting pit or trench with root flare 1 inch above adjacent finish grades.
  - i. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
  - ii. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
  - iii. Continue backfilling process. Water again after placing and tamping final layer of soil.
- c. Container-Grown Stock: Set each plant plumb and in center of planting pit or trench with root flare 1 inch above adjacent finish grades.
  - i. Carefully remove root ball from container without damaging root ball or plant.
  - ii. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
  - iii. Continue backfilling process. Water again after placing and tamping final layer of soil.

**C. Groundcover and perennial Planting**

- a. Set out and space groundcover and plants other than trees and shrubs, as indicated on Drawings, in even rows with triangular spacing or as shown in drawings.
- b. Amend soil throughout planting bed. Dig holes large enough to allow spreading of roots.
- c. For rooted cutting plants supplied in flats, plant each in a manner that minimally disturbs the root system but to a depth not less than two nodes.
- d. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.
- e. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.
- f. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

**D. Remove non-biodegradable root containers.**

**E. Set plants in pits or beds, partly filled with prepared plant mix, at a minimum depth of 6 inches under each plant.**

**F. Place bare root plant materials so roots lie in a natural position. Backfill soil mixture in 6-inch layers. Maintain plant life in vertical position.**

**G. Saturate soil with water when the pit or bed is half full of topsoil and again when full.**

**H. Mulch backfilled surfaces of planting areas and other areas indicated.**

- a. Organic Mulch in Planting Areas: Apply 4-inch average thickness of organic mulch over entire surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 6 inches of tree trunks or shrub stems.

### **3.06 TREE AND SHRUB PRUNING**

- A. Perform pruning of trees as recommended in ANSI A300.
- B. Prune newly planted trees as required to remove dead, broken, and split branches. Do not prune for shape. Prune, thin, and shape trees and shrubs according to standard professional horticultural and arboricultural practices, to retain natural character of plant materials.

### **3.07 FIELD QUALITY CONTROL**

- A. When landscape work is completed, including maintenance, Owner's representative will make an inspection to determine acceptability. When inspected work does not comply with requirements, replace rejected work and continue specified maintenance until reinspected by Owner's representative and found to be acceptable. Remove rejected plants and materials promptly from the site.
- B. Plants will be rejected if a ball of earth surrounding roots has been disturbed or damaged prior to or during planting.
- C. End of Warranty Inspection: Remove and replace all dead, unhealthy or badly impaired plants according to original specification, if so directed by the Owner's representative. Replace planting during the next planting season if conclusion of warranty period is not within planting season.

### **3.08 MAINTENANCE**

- A. Furnish maintenance until end of one year warranty period.
- B. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings.
- C. Irrigate sufficiently to saturate root system and prevent soil from drying out.
- D. Remove dead or broken branches and treat pruned areas or other wounds.
- E. Neatly trim plants where necessary. Immediately remove clippings after trimming.
- F. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions.
- G. Control insect damage and disease.
  - a. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease.
  - b. Use integrated pest management practices. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.
  - c. If applying pesticides, follow manufacturer's instructions. Remedy any damage to other vegetation from use of herbicides and pesticides.
- H. Fill in, as necessary, soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence. Replace mulch when deteriorated.
- I. Maintain wrappings, guys, turnbuckles, and stakes. Adjust turnbuckles to keep guy wires tight. Repair or replace accessories when required.

### **3.09 REPAIR AND REPLACEMENT**

- A. General: Repair or replace existing or new trees and other plants that are damaged by construction operations, in a manner approved by Director's Representative.
  - 1) Submit details of proposed pruning and repairs.
  - 2) Perform repairs of damaged trunks, branches, and roots within 24 hours, if approved, under the supervision of a Certified Project Arborist.

- 3) Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Director's Representative.
- B. Remove and replace trees that are more than 25 percent dead or in an unhealthy condition or are damaged during construction operations that Director's Representative determines are incapable of restoring to normal growth pattern.
- C. Repair and replace, in kind, any existing vegetation disturbed by construction practices that is shown to remain.
- D. Air Spade Procedures
- 1) Reinvigorate trees affected by compaction or significant loss of canopy through use of Air Spade as directed by the Director's Representative.
    - i. Acceptable Uses of an Air Spade
      1. Expose root flares and root structure 6" to 18" below grade for base investigation.
      2. Expose root flare for Micro Injections.
      3. Expose roots that were impacted by additional soil during site operations.
      4. Create Tunnels under existing roots without impacting tree health.
    - ii. Prepare Site
      1. Remove existing grass with sod cutter
      2. Adjust depths of cutter to lowest measurement.
      3. Special Note Within the Critical Root Zone (CRZ): Hand tools should be used where possible. However, use of a sod cutter should be gauged downward to 5/8th of an inch cutting if used within this sensitive area of the tree.
      - iii. Certified Project Arborist shall mark surface roots within the Critical Protection Zone. This area should utilize finer care with the use of hand tools only when removing grass or sod for reinvigoration.
      - iv. Grasses/Debris to be removed manually in beds and not put by a tractor pulled through beds.
      - v. Machinery shall have wooden boards or padding underneath at all times to reduce further compaction and stress to trees.
    1. Types of Acceptable Aeration Techniques:
      - a. Radial Method: Trenching with an air excavator, excavate a soil trench 3 to 6-inches wide and a minimum of 12-inches deep from (approximately) 3-feet from the trunk out to the dripline area. The trenches shall radiate out from one foot apart at the closest point.
      2. Technique will be effective for root invigoration at moderate depths due to the existing compaction.
    - vi. Root Collar Excavation Method: Air excavator should be used to remove excess soil at a depth between 6-18 inches. This technique can be used when grade changes have occurred in excess of one inch to avoid quick decline through suffocation of absorbing roots and decay.
  - 2) Procedure for air spade

- i. Use air spade to remove soil from around the roots and base of the tree trunk to expose root system.
  - ii. Fill trenches with new topsoil and soil amendments.
  - iii. Never add fertilizer to the heritage trees at time of invigoration as it will have a deleterious effect.
- 3) Procedure After Radial Air Spade
- i. Apply new soil to the trenches to cover exposed roots and level area for mulch application.
  - ii. Application of mulch within CRZ 3-inch average thickness of organic mulch. See section 2.3 for materials.
    - 1. Do not place mulch within 6 inches of trunks or stems.
  - iii. Water Tree immediately after Invigoration. 10 gallons of water per 1 DBH of Tree.
    - 1. Watering should be gradual and break between every 10-20 gallons to allow for tree to absorb the water without overflowing into other areas.
  - iv. Plant Protection Fencing shall be installed immediately after watering occurs.

### **3.12 CLEANING AND PROTECTION**

- A. During planting, keep adjacent paving and construction clean and work area in an orderly condition. 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 Owner's property.
- C. Protect plants from damage due to landscape operations and operations of other contractors and trades.
  - a. Install protection fencing in accordance with drawings.
  - b. Maintain protection fencing during installation and maintenance periods. Replace if damaged. Remove protection fencing at end of maintenance period outlined herein.
- D. Treat, repair, or replace damaged plantings.
- E. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

### **END OF SECTION**

## **SECTION 33 0507**

### **HORIZONTAL DIRECTIONAL DRILLING**

#### **PART 1 GENERAL**

##### **1.01 RELATED WORK SPECIFIED ELSEWHERE**

- A. Geotechnical Data: Section 003132.
- B. Earthwork: Section 312000.
- C. Dewatering: Section 312319.
- D. Site Water Distribution Piping: Section 331415.
- E. Facility Sanitary Sewers: Section 221313.

##### **1.02 DESCRIPTION**

- A. The Work of this Section consists of operations, equipment, methods and materials necessary to install horizontal directional drilling (HDD) of High-Density Polyethylene (HDPE-PE) Pressure pipe.

##### **1.03 SUBMITTALS**

- A. Submittals Package: Submit the following items specified below the same time as a package:
  - 1. Written Drilling Procedure.
  - 2. Quality Control Submittal.
- B. Written Drilling Procedure: Describes in detail proposed method and entire operation but not limited to the following:
  - 1. Size, capacity and arrangement of equipment, drawn to scale.
  - 2. Location and size of drilling and receiving pits.
  - 3. Dewatering and methods of removing spoils material.
  - 4. Method of installing detection wire and pipe.
  - 5. Type, location and method of installing locator station.
  - 6. Method of fusion pipe segment and type of equipment.
  - 7. Type of cutting head.
  - 8. Method of monitoring and controlling line and grade.
  - 9. Detection of surface movement.
  - 10. Bentonite drilling mud for information only.
  - 11. Products information, material specifications, and handling procedures.
  - 12. Material safety data sheet and special precautions required.
  - 13. Method of mixing and application.
- C. Quality Control Submittals:
  - 1. Contractor's Qualifications Data:
    - a. Firm name, address, and phone number.
    - b. Period of time that the firm has been in the business of performing horizontal directional drilling.
    - c. Names and addresses of 5 similar projects completed by the firm. Include the name and phone number of contact person.

2. Field Supervisor Qualifications Data:
  - a. Name of the person supervising the horizontal directional drilling.
  - b. Period of time that the person has performed/supervised horizontal directional drilling.
  - b. Names and addresses of three similar projects that the person has worked on during the past three years.
- D. Contract Closeout Submittals
  1. Reproducible as-built drawings showing dimensions, accurate locations, and depth of burial at 100 ft intervals. Marked-up contract drawings will not be acceptable.
  2. Issue a written report at the conclusion of the installation phase, stating whether or not specifications and approved manufacturer's installation recommendations.
  3. Furnish a signed report to the Director's Representative.
- E. The submittal will not relieve the Contractor of complete responsibility to the successful performance of the intended installation procedure.

#### **1.04 QUALITY ASSURANCE**

- A. Qualifications:
  1. Contractor: The firm performing the Work of this Section shall have been regularly engaged in performing horizontal directional drilling for a minimum of 10 years, and shall have completed 5 similar projects of size and complexity over the last 5 years.
  2. Field Supervisor: The person supervising the Work of this Section shall have been regularly engaged in performing horizontal directional drilling for a minimum of 5 years and shall have supervised 3 similar projects of size and complexity over the last 3 years.
- B. Pre-Installation Conference: Before the work is scheduled to commence, a conference will be called by the Director's Representative at the Site for the purpose of reviewing the Contract Documents and discussing requirements for the Work. The conference shall be attended by related trade Contractors (if any), their qualified installers and Field Supervision.

#### **1.05 PROJECT CONDITIONS**

- A. Complete HDD so as not to interfere with, interrupt, or endanger surface and activity thereon.
- B. Do not use HDD in rock stratum or subsoil consisting of boulders and underground obstructions that impede the process.
- C. Follow applicable ordinances, codes, statutes, rules, and regulations of State of New York, and applicable regulations of Federal Government, OSHA 29CFR 1926, and applicable criteria of ANSI A10.16-1995 (R2001), "Safety Requirements for Tunnels, Shafts, and Caissons."

### **PART 2 PRODUCTS**

#### **2.01 MATERIALS**

- A. Pipe and Fittings:

1. Water Pipe: Refer to Section 331415.
  2. Sanitary Sewer Pipe: Refer to Section 221313.
- B. Joining Method:
  1. Water Pipe: Refer to Section 331415.
  2. Sanitary Sewer Pipe: Refer to Section 221313.
  3. When joining HDPE pipe at ends of directional drilling runs fusion bond to adjacent pipe section using butt fusion.
  4. Mechanical couplings are not permitted for joining of directional drilled pipe sections.
- C. Drilling Fluid:
  1. Bentonite drilling mud compatible with environment.
  2. Waste oil or environmentally non-compatible polymers cannot be part of composition.
- D. Detection Wire: TW, THW, THWN, or HMWPE insulated copper, 10 gage or thicker wire.
- E. Locator Station.
  1. Underground, Flush Mounted:
    - a. Tube minimum 15 inches long with minimum inside diameter of 2-1/2-inches made of non-corrosive material, schedule 40 PVC, HDPE, or equal.
    - b. Factory attached cast iron or high-impact plastic collar with ribs to prevent rotation when removing locking lid after locator station is set in concrete.
    - c. Light blue cast iron or high-impact plastic locking lid that will withstand AASHTO H-20 traffic loads and ultra-violet rays.
    - d. Mark locking lid to identify pipeline with permanent identification such as P.S. Locator.
    - e. Terminal block made of high dielectric material which is made of phenolic resin, plastic, micarta, Lexan or Bakelite for each locator station. Terminal block furnished with two 3/16-inch threaded studs, nuts, and washers made of nickel-plated brass.
    - f. Manufacturers: C.P. Test Services, Inc., Model Mini; Handly, Industries, Model T2IS2.
  2. Manhole Mounted:
    - a. Waterproof enclosure made from cast aluminum, galvanized steel, high-impact plastic, Lexan, Gyrlyn, or equal.
    - b. Light blue schedule 40 PVC pipe or schedule 40 galvanized steel with outside diameter of at least 3/4-inch to mount enclosure.
    - c. Use similar materials for pipe and enclosure to fasten enclosure onto pipe following manufacturer's instructions.
    - d. Manufacturers: Cott Manufacturing Company, Model Finklet or Finkplate, 2 leads; Gerome Manufacturing Company, Inc., Model Testox Series 300, 2 leads.

## PART 3 EXECUTION

### 3.01 PREPARATION

- A. Underground Utilities: Refer to Section 023313.
  1. Locate and mark-out existing, underground utilities along directional drill path. Perform Level A locator service in all project areas.

2. Determine vertical orientation and depths of utility lines along directional drill path.
- B. Pit Preparation:
1. Excavate pits following contract documents as specified by the Director's Representative.
  2. Dewater pits as required and as directed.

### **3.02 OPERATION**

- A. General.
1. Determine drilling length and equipment pull strength for type of soil encountered.
  2. Provide method to control line and grade.
    - a. Provide and maintain instrumentation that accurately locates pilot hole.
    - b. Drill pilot hole along path following Drawings to these tolerances:
      - 1) Vertical alignment plus or minus 0.5 foot. Vertical path of pilot hole must not establish new high points not shown on Drawings.
      - 2) Horizontal alignment plus or minus 1.0 foot.
    - c. Include electronic monitoring of horizontal and vertical drilling head location. Obtain accuracy range within 1 inch of actual position of pipeline. Record position readings at maximum of 10-foot intervals.
    - d. At completion of pilot hole drilling, furnish tabulations of horizontal and vertical alignment to Engineer.
  3. When water is encountered.:
    - a. Provide and maintain dewatering system of sufficient capacity to remove water. Refer to Section 312319.
    - b. Keep excavation free of water until backfill operation is in progress.
    - c. Perform dewatering in manner that removal of soils particles are held to minimum.
    - d. Dewater into sediment trap.
  4. Maintain close observation to detect settlement or displacement of surface and adjacent facilities.
    - a. Notify Director's Representative immediately if settlement or displacement is detected.
    - b. Maintain safe conditions and prevent damage.
- B. Drilling Operation.
1. Drilling Fluids.
    - a. Maintain drilling fluid in bore hole to increase stability of surrounding soil and reduce drag on pulled pipe.
    - b. Dispose of drilling fluid and other spoils at location following laws, ordinances, rules, and regulations of local jurisdiction.
    - c. Transport excess fluids and other spoils to disposal site, at no additional cost to the contract.
    - d. Minimize drilling fluid at locations other than entry and exit points. Immediately clean up any drilling fluids that inadvertently surface.
    - e. Provide clean water for drilling, at no cost to the contract, and as directed by the Director's Representative.
  2. Pilot Hole Drilling.

- a. Angle entry hole so that the curvature of pilot hole does not exceed allowable radius of HDPE pipe.
- b. Be able to make turns of up to 90 degrees and maintain curvature not to exceed allowable bending radius of HDPE pipe.
- c. Alignment adjustment and restarts:
  - 1) Follow pipeline alignment on Drawings within tolerances specified herein. Before adjustments, notify Director's Representative for approval.
  - 2) Notify Director's Representative when forward motion of operation is stopped by an obstruction.
    - a) Abandon in place with drilling fluid, unless Directors' Representative directs otherwise.
    - b) Upon the Director's Representative's approval, attempt second installation at approved location or excavate at point of difficulty and install HDPE pipe by trench methods specified in Section 310000.
- 3. Withdrawals, abandonments, and restarts are at no additional costs to the Contract when HDD is provided as an option of installation of pipe.
- 4. Exercise caution including, but not limited to, locating utilities, drilling downholes (test pits) to observe drill stems or reamer assembly to clear other existing utilities at locations following drawings.
- 5. Keep the number of boring pits to a minimum.

### **3.03 INSTALLATION**

- A. Installing HDPE Pipe
  - 1. Provide a swivel to reaming assembly and pull section of pipe to minimize torsional stress on pull section after drilling pilot hole.
  - 2. Hold reaming diameter to 1.5 times outside diameter of HDPE pipe being installed.
  - 3. Protect pull section as it proceeds during pull back so it moves freely and is not damaged.
  - 4. Pull detection wire along with HDPE pipe. Extend wire into locator station at each end of the HDPE pipe.
  - 5. When connecting to adjacent pulled or non-pulled section of HDPE pipe, allow pull section of pipe to extend past termination point. Make tie-ins the next day after pull back of HDPE pipe.
  - 6. Test pit pipe installation to verify horizontal and vertical alignment at Director's Representative's direction.
    - a. One test pit every 500 feet along length of pipeline, if not within environmentally sensitive and/or protected area.
    - b. Director's Representative may order additional test pits for each test pit that reveals pipeline installation is not in compliance with the Contract Documents at no additional cost to the Contract.
  - 7. Replace portions of pipeline not in compliance with the Contract Documents at Director's Representative's direction and at no cost to the Contract.
- B. Installing Locator Station
  - 1. Location Stations:
    - a. When HDPE pipe is connected to another type of pipe material, continue detector wire over connecting pipe, so locator station is installed out of paved area.
    - b. In areas scheduled to be improved identify and protect station locations immediately after installation.

- 1) Space 3 stakes equally around the station.
  - 2) Extend at least 4 feet above existing grade.
2. Detection Wire.
  - a. Install detection wire without splices unless specified on the plans.
  - b. Terminate detection wire inside locator box using proper sized crimp type connection on wire ends.
  - c. Neatly coil slack wire in test station below terminal board.
  - d. Locate wires on top and along HDPE pipe.
  - e. Allow adequate slack and support to protect wires from damage during backfilling operations.
  - f. Test each detection wire for continuity after backfill is completed.
    - 1) If test for continuity is negative, repair or replace at Director's Representative's direction.
    - 2) After continuity is verified, connect each detection wire to terminal block in locator station.

#### **3.04 FIELD QUALITY CONTROL**

- A. Perform field testing of HDPE pipe following Section 331415 for water and 221313 for sanitary sewer.

#### **3.05 MAINTENANCE AND RESTORATION**

- A. Restore grades to original levels where settlement or damage due to performance of the Work has occurred. Correct conditions contributing to settlement. Remove and replace improperly placed or poorly compacted fill materials.
- B. Restore pavements, walks, curbs, lawns, and other surface features damaged during performance of the Work to match the appearance and performance of existing corresponding features as closely as practicable.
- C. Topsoil and seed or sod damaged lawn areas.

**END OF SECTION**

**SECTION 33 1300**  
**STORMWATER MANAGEMENT**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Furnish and install storm drainage piping, fittings, and accessories.
- B. Furnish and install area drains and overflow basins.
- C. Furnish and install flared end sections and rip rap.
- D. Furnish and install bio-retention Areas, vegetated swales and rain garden.
- E. Furnish and Install cleanouts.
- F. Furnish and install downspout connections to storm line.

**1.02 REFERENCES**

- A. AASHTO M294 – Specification for Corrugated Polyethylene Drainage Tubing, 12" Through 48" Diameters.
- B. ASTM A48 - Cast iron frames and grates.
- C. ASTM A615 - Steel bar reinforcement for pre-cast concrete catch basins.
- D. ASTM D1056 – Specification for Flexible Cellular Materials – Sponge or Expanded Rubber.
- E. ASTM D3350 - Standard Specifications for polyethylene plastic pipe and fittings.
- F. ASTM D2321 - Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.
- G. ASTM C150 - G-mat specification for pre-cast concrete catch basins and manholes.
- H. NYSDOT Standard Specifications (latest edition), Section 706-13 – Perforated Corrugated Polyethylene Underdrain Tubing.
- I. NYSDOT Standard Specifications (latest edition), Section 706-14 – Corrugated Polyethylene Storm Drain Pipe.

**1.03 SUBMITTALS FOR REVIEW**

- A. Product Data: Submit manufacturer's technical product data for all storm sewer pipe materials and fittings.
- B. Shop Drawings: Submit shop drawings for all area drains, underground stormwater cistern and dry well, showing all materials, structure sizes, pipe sizes, all rim and invert elevations, and any other pertinent information.
- C. Record Drawings: At project closeout, submit as-built drawings of installed storm sewer system.

**1.04 REGULATORY REQUIREMENTS**

- A. Plumbing Code Compliance: Conform to applicable portions of the National Standard Plumbing Code pertaining to selection and installation of storm sewer system's materials and products.
- B. The Contractor and all subcontractors must comply with the terms of the SWPPP.

## **1.05 COORDINATION**

- A. Coordinate work of this section with any and all other underground utility work.

## **1.06 QUALITY ASSURANCE**

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of storm sewer system's products of types, materials and sizes required, whose products have been in satisfactory use in similar service for not less than five years.
- B. Installer's Qualifications: Firm with at least three years of successful installation experience on projects with storm sewer work similar to that required for project.

# **PART 2 PRODUCTS**

## **2.01 PIPING AND ACCESSORIES**

- A. The prescribed sizes of pipe are nominal inside diameters. Pipes shall be of the size and lengths indicated on the plans.
- B. Storm Sewer Pipe (solid wall): Double wall, smooth interior, corrugated exterior High Density Polyethylene Pipe and fittings (HDPE): Shall be high density, corrugated exterior, smooth interior polyethylene pipe in accordance with AASHTO M294 and section 706-14 of the NYSDOT Standard Specifications. Coupling bends shall cover at least one full corrugation on each section of pipe. Where watertight fittings are required, use pipes with molded couplings and "O" ring gaskets.
- C. Underdrain Pipe (4" perforated wall): Double wall, smooth interior, corrugated exterior, High Density Polyethylene Pipe and fittings (HDPE): Shall be high density, corrugated exterior, smooth interior polyethylene pipe in accordance with AASHTO M294 and section 706-14 of the NYSDOT Standard Specifications. Coupling bends shall cover at least one full corrugation on each section of pipe. Where watertight fittings are required, use pipes with molded couplings and "O" ring gaskets.

## **2.02 AREA DRAINS**

- A. Area Drains: Nyloplast (size varies) drain basins with PVC body and cast iron frame and grates as indicated. Manufactured by Advanced Drainage Systems (ADS), or approved equal.

## **2.03 FLARED END SECTION**

- A. Of the same material and size of the pipe.

## **2.04 CLEANOUTS**

- A. As shown on the drawings.

## **2.05 TRENCH DRAINS**

- A. Pre-engineered polymer concrete Trench Drain with Heel Proof/ ADA Perforated Extra Reinforced Stainless Steel Grates.

- B. Model and Manufacturer: Trench drain shall be standard polydrain channel with built in 0.6% slope. Model 2454.19/2455.10; manufactured by Advanced Building Technologies, Inc. (ABT), 259 Murdock Road, Troutman, NC - (800) 438-6057. [www.abtdrains.com](http://www.abtdrains.com) or approved equal.
- C. Precast Trench: The precast trench shall be manufactured using polyester polymer concrete with the following material properties when tested:

<b>Property</b>	<b>Test Method</b>	<b>Value</b>
Compressive Strength	ASTM C579	14,000 psi Minimum
Bending Strength	ASTM C580	4,000 psi Minimum
Tensile Strength	ASTM C307	2,000 psi Minimum
Moisture Absorption	ASTM D570	0.1% Maximum
Chemical Resistance	ASTM C267	Pass
Freeze/Thaw w/o weight loss	ASTM C666	1,600 Number of Cycles Min.
Resistance to Fungi	ASTM G21	Zero (0) Rating Mold Growth
UL/ULC Listed- Flame Spread	UL-723	Class A

The trench consisting of 39.19" (1 meter) or 19.56" (1/2 meter) channels with nominal 6" (155mm) outside width, 4 " (100mm) inside width. Pre-sloped channels shall have a standard slope of 0.6% with radius bottom. Non-sloping channels must have written approval by engineer prior to installation. Channels shall have tongue and groove joints. Grate lock down slots shall have polyethylene vibration dampening inserts. All channels must have full length anchoring ribs for a positive mechanical lock with the surrounding concrete.

- D. Sidewall Extensions: Sidewall extensions for channels may be used for hydraulic performance or to maintain the standard slope of 0.6% in greater trench run lengths. Sidewall extensions shall be composed of similar material and thickness as the channels and shall have tongue and groove joints.
- E. Grating: PolyDrain part number 2454.19/2455.10 or approved equal. Grates are 39.19" (1 meter) and 19.6" (1/2 meter) respectively. Grates shall be a minimum of 14ga stamped extra reinforced 18-8 stainless steel and shall be Heel Proof with maximum openings of .25" (6.35mm) and shall be ADA compliant to all directions of travel. Grating shall meet a minimum 494 psi proof load per AASHTO M-306 test modified by utilizing a 9" x 3" load plate. Grates shall seat into channels without rocking and shall be locked to the channel using a stainless steel 5/16 – 18 UNC bolt and stainless steel toggle bar system with a bolt torque of 10in/lb.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify that substrate is ready to receive work and that the excavations, dimensions, and elevations are as indicated on the drawings.

#### 3.02 PREPARATION

- A. Hand trim excavations to required elevations. Correct over excavation with fine aggregate.
- B. Remove large stones or other hard matter that could damage piping or impede consistent backfilling or compaction.

### **3.03 INSTALLATION OF PIPE AND PIPE FITTINGS**

- A. Install pipe, fittings, and accessories in accordance with governing authorities having jurisdiction, and manufacturer's instructions. Seal joints silt tight.
- B. Inspect piping before installation to detect apparent defects. Extreme care shall be taken in the handling of pipe and appurtenances. Under no circumstances shall such material be dropped, rolled or skidded against another pipe. All slings, hooks, and pipe tongs shall be padded and used in such a manner to prevent damage to the pipe. Handling pipe from the interior pipe wall is prohibited. Mark defective materials with white paint and promptly remove from site.
- C. All pipe bedding, haunching and initial backfill materials shall have optimum moisture content suitable for proper compaction. Pipe haunch material shall be manually compacted and the initial backfill shall be mechanically compacted.
- D. Lay pipe beginning at low point of system, true to grades and alignment indicated, with unbroken continuity of invert. Contractor shall use a low intensity mobile laser for pipe alignment and grade. The laser must be set up to emit a beam of light through the pipe being installed. The use of a mechanical blower (designed for pipe lines) is required on all runs over 100' long. Using a level to check the elevation of the pipe at various locations is highly recommended. Maximum variation from true slope of 1/8 inch in 10 feet.
- E. Place bell ends or groove ends of piping facing upstream.
- F. Install initial backfill at sides and over top of pipe and compact. Provide final backfill in 6" lifts compacted to 95 percent maximum density.
- G. When required, install gaskets in accordance with manufacturer's recommendations including the use of lubricants, cements and other special installation requirements.
- H. Cleaning Pipe: Clear interior of piping of dirt and other superfluous material as work progresses. Maintain swab or drag line and pull past each joint as it is completed. In large, accessible piping, brushes and brooms may be used for cleaning.
- I. Place plugs in ends of uncompleted conduit at end of day or whenever work stops.
- J. Flush lines between drainage structures, if required, to remove collected debris.
- K. Interior Inspection: Inspect piping to determine whether line displacement or other damage has occurred.
  - 1. Make inspections after lines between drainage structures have been installed and approximately 2' of backfill is in place, and again at completion of project.
  - 2. If inspection indicates poor alignment, debris, displaced pipe, infiltration or other defects, correct such defects, and re-inspect.

### **3.04 INSTALLATION OF AREA DRAINS AND OVERFLOW BASINS**

- A. Form bottom of excavation clean and smooth to correct elevation. Install base aggregate to the depths and elevations indicated on the plans. Set drainage structures level and plumb and secure unto base aggregate.
- B. Establish rim and invert elevations for inlets and outlets as indicated.
- C. Mount lid and frame level onto pvc body to finish grade elevation.

### **3.05 INSTALLATION OF TRENCH DRAINS**

- A. Form bottom of excavation clean and smooth to correct elevation. Install trench drain section to the elevations indicated on the plans. Encase trench drain in concrete as shown on the plans.

### **3.07 TOLERANCES**

- A. Lay pipe to alignment and slope gradients noted on drawings; with maximum variation from true slope of 1/8 inch in 10 feet.

### **3.08 BACKFILLING**

- A. Conduct backfill operations of open-cut trenches closely following laying, jointing and bedding of pipe, and after initial inspection and testing are completed.
- B. All piping and drainage structures shall be backfilled as per Section 31 2200.

### **3.09 FIELD QUALITY CONTROL**

- A. Notify the Owner's Representative 48 hours in advance of testing procedures. Provide all necessary testing apparatus. Prevent separation and displacement of piping during testing operation and take necessary safety precautions.
- B. Conduct all tests in the presence of the Director's Representative or the authority/agency having jurisdiction, as may be required. All sections of piping that fail to pass the specified tests shall have the defects located and repaired or replaced and re-tested until passable, at the contractor's expense.
- C. Thoroughly clean and flush all sewers prior to testing. The following visual test is to be performed prior to final Acceptance: When shining a light at one end of a length of pipe, the full diameter must be visible from the other end, with no intermediate obstructions.
- D. The tests shall be performed prior to placement of pavement or other construction, which may, in the opinion of the Owner's Representative, be detrimentally affected by excavation required for repairs.
- E. The tests shall be performed only after the backfill has been in place and compacted to its full depth. Prior to testing, the contractor shall submit details of his testing procedures with a description of methods and equipment he proposes to use to the Owner's Representative for approval.
- F. If tests indicate Work does not meet specified requirements, remove Work, replace and re-test.

### **3.10 PROTECTION**

- A. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

### **3.11 CLEAN-UP**

- A. Remove all excess materials and debris from work of this section.

**END OF SECTION**

**SECTION 33 14 15**  
**SITE WATER DISTRIBUTION PIPING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Water-distribution piping and related components outside the building for domestic water service.
- B. Related Requirements:
  - 1. Section 031000 "Concrete Forming and Accessories."
  - 2. Section 032000 "Concrete Reinforcing."

**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.

**1.4 CLOSEOUT SUBMITTALS**

- A. Operation and Maintenance Data: For each type of product indicated.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Preparation for Transport: Prepare piping, valves, meters, backflow prevention devices, and fire hydrants according to the following:
  - 1. Ensure that piping, valves, meters, backflow prevention devices, and fire hydrants are dry and internally protected against rust and corrosion.
  - 2. Protect threaded ends and flange faces against damage.
  - 3. Set piping, valves, meters, backflow prevention devices, and fire hydrants in best position for handling and to prevent rattling.
- B. During Storage: Use precautions for piping, valves, meters, backflow prevention devices, and fire hydrants 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 COORDINATION**

- A. Coordinate connection to water main with utility company.

# **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. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.
- C. Piping materials to bear label, stamp, or other markings of specified testing agency.
- 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.

## **2.3 COPPER TUBE AND FITTINGS**

- A. Drawn-Temper Copper Tube: ASTM B88, Type K.
- B. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings.

- C. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, pressure fittings.
- D. Copper Tube, Pressure-Seal-Joint Fittings:
  - 1. Source Limitations: Obtain copper tube, pressure-seal-joint fittings from single manufacturer.
- E. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.
- F. Cast-Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock-body, ball-and-socket, metal-to-metal seating surfaces; and solder-joint or threaded ends.
- G. Wrought-Copper Unions: ASME B16.22.

## **2.4 PE PIPE AND FITTINGS**

- A. PE, ASTM Pipe: ASTM D2239, SDR No. 11; with PE compound number required to give pressure rating not less than 200 psig.
  - 1. Insert Fittings for PE Pipe: ASTM D2609, made of PA, PP, or PVC with serrated male insert ends matching inside of pipe. Include bands or crimp rings.
  - 2. Molded PE Fittings: ASTM D3350, PE resin, socket- or butt-fusion type, made to match PE pipe dimensions and class.
- B. PE, AWWA Pipe: AWWA C906, DR No. 11; with PE compound number required to give pressure rating not less than 200 psig.
  - 1. PE, AWWA Fittings: AWWA C906, socket- or butt-fusion type, with DR number matching pipe and PE compound number required to give pressure rating not less than 200 psig.
- C. PE, Fire-Service Pipe: ASTM F714, AWWA C906, or equivalent for PE water pipe; FM Global approved, with minimum thickness equivalent to FM Global Class 200.
  - 1. Molded PE Fittings: ASTM D3350, PE resin, socket- or butt-fusion type, and made to match PE pipe dimensions and class

## **2.5 PIPING JOINING MATERIALS**

- A. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series.
- B. Bonding Adhesive for Fiberglass Piping: As recommended by fiberglass piping manufacturer.
- C. Gaskets for Ferrous Piping and Copper-Alloy Tubing: ASME B16.21, asbestos free.
- D. Plastic Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

## **2.6 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. Flexible Connectors:

1. Nonferrous-Metal Piping: Bronze hose covered with bronze wire braid; with copper-tube, pressure-type, solder-joint ends or bronze flanged ends brazed to hose.
2. Ferrous-Metal Piping: Stainless steel hose covered with stainless steel wire braid; with ASME B1.20.1, threaded steel pipe nipples or ASME B16.5, steel pipe flanges welded to hose.

## **2.7 GATE VALVES**

- A. Gate Valves - AWWA, Cast Iron:
1. Source Limitations: Obtain gate valves - AWWA, cast iron, from single manufacturer.
  2. Gate Valves - Nonrising Stem, Resilient Seated: Cast- or ductile-iron body and bonnet, with bronze or cast- or ductile-iron gate, resilient seats, bronze stem, and stem nut.
    - a. Standards: AWWA C509 or AWWA C515.
    - b. Minimum Pressure Rating: 200 psig.
    - c. End Connections: Mechanical joint, flanged, threaded, or push on.
    - d. Interior Coating: Complying with AWWA C550.

## **2.8 GATE VALVE ACCESSORIES AND SPECIALTIES**

- A. Tapping-Sleeve Assemblies: Sleeve and valve compatible with drilling machine.
1. Source Limitations: Obtain tapping-sleeve assemblies from single manufacturer.
  2. Standard: MSS SP-60.
  3. Tapping Sleeve: Cast- or ductile-iron or stainless steel, two-piece bolted sleeve with flanged outlet for new branch connection. Include sleeve matching size and type of pipe material being tapped and with recessed flange for branch valve.
  4. Valve: AWWA, cast-iron, nonrising-stem, [metal] [resilient]-seated gate valve with one raised face flange mating tapping-sleeve flange.
- B. Valve Boxes: Comply with AWWA M44 for cast-iron valve boxes. Include top section, adjustable extension of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over valve and with a barrel approximately 5 inches in diameter.
1. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.
- C. Indicator Posts: UL 789, FM Global approved, vertical-type, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of burial of valve.

## **2.9 WATER METERS**

- A. Water Meter - Utility Company Furnished:
1. Utility Company: City of Schenectady Department of Water

## **PART 3 - EXECUTION**

### **3.1 EARTHWORK**

- A. Comply with excavating, trenching, and backfilling requirements in Section 312000 "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. Flanges, unions, grooved-end-pipe couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.
- D. Underground water-service piping to be the following:
  1. Soft copper tube, ASTM B88, Type K
- E. Water Meter Box Water-Service Piping: to be same as underground water-service piping.

### **3.3 VALVE APPLICATIONS**

- A. General Application: Use mechanical-joint-end valves for NPS 3 and larger underground installation. Use threaded- or flanged-end valves for installation in vaults. Use UL/FM Global, nonrising-stem gate valves for installation with indicator posts. Use corporation valves and curb valves with ends compatible with piping, for NPS 2 and smaller installation.
- B. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
  1. Underground Valves, NPS 3 and Larger: AWWA, cast-iron, nonrising-stem, metal resilient-seated gate valves with valve box.
  - 2.
  3. Use the following for valves in vaults and aboveground:
    - a. Gate Valves, NPS 2 and Smaller: Bronze, nonrising stem.
    - b. Check Valves: AWWA C508 swing type.
  4. Pressure-Reducing Valves: Use for water-service piping in vaults and aboveground to control water pressure.
  5. Relief Valves: Use for water-service piping in vaults and aboveground.
    - a. Air-Release Valves: To release accumulated air.
    - b. Air/Vacuum Valves: To release or admit large volume of air during filling of piping.
    - c. Combination Air Valves: To release or admit air.
  6. Detector Check Valves: Use for water-service piping in vaults and aboveground to detect unauthorized use of water.

### **3.4 INSTALLATION OF PIPING**

- A. Water-Main Connection:
  1. Arrange with utility company for tap of size and in location indicated in water main.
  2. Tap water main in accordance with requirements of water utility company and of size and in location indicated.
- B. Install ductile-iron, water-service piping in accordance with AWWA C600 and AWWA M41.
- C. Install PE pipe in accordance with ASTM D2774 and ASTM F645.
- D. Install PVC, AWWA pipe in accordance with ASTM F645 and AWWA M23.
- E. Install fiberglass AWWA pipe in accordance with AWWA M45.
- F. Bury piping with depth of cover over top at least 60 inches below ground surface.
- G. Install piping by tunneling or jacking, or combination of both, under streets and other obstructions that cannot be disturbed.
- H. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.
- I. Comply with Section 221116 "Domestic Water Piping" for potable-water piping inside the building.

### **3.5 JOINT CONSTRUCTION**

- A. Comply with Section 330500 "Common Work Results for Utilities" for basic piping joint construction.
- B. Make pipe joints according to the following:
  1. Copper-Tubing, Pressure-Sealed Joints: Join copper tube and pressure-seal fittings with tools and procedures recommended by pressure-seal-fitting manufacturer. Leave insertion marks on pipe after assembly.
  2. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.
  3. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.
  4. Ductile-Iron Piping, Grooved Joints: Cut-groove pipe. Assemble joints with grooved-end, ductile-iron-piping couplings, gaskets, lubricant, and bolts in accordance with coupling manufacturer's written instructions.
  5. PE Piping Insert-Fitting Joints: Use plastic insert fittings and fasteners in accordance with fitting manufacturer's written instructions.
  6. PVC Piping Gasketed Joints: Use joining materials in accordance with AWWA C900. Construct joints with elastomeric seals and lubricant in accordance with ASTM D2774 or ASTM D3139 and pipe manufacturer's written instructions.
  7. Fiberglass Piping Bonded Joints: Use adhesive and procedure recommended by piping manufacturer.

### **3.6 INSTALLATION OF VALVES**

- A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.
- B. AWWA Valves Other Than Gate Valves: Comply with AWWA C600 and AWWA M44.
- C. Relief Valves: Comply with AWWA C512. Install aboveground with shutoff valve on inlet.
- D. Comply with requirements for concrete piers in Section 033000 "Cast-in-Place Concrete" for support of valves and piping not direct buried.

### **3.7 INSTALLATION OF WATER METERS**

- A. Install water meters, piping, and specialties in accordance with utility company's written instructions.

### **3.8 CONNECTIONS**

- A. See Section 330500 "Common Work Results for Utilities" for piping connections to valves and equipment.
- B. Connect water-distribution piping to existing water main. Use tapping sleeve and tapping valve.

### **3.9 FIELD QUALITY CONTROL**

- A. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. 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.

### **3.10 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 312000 "Earth Moving."

### **3.11 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. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.
    - b. 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.
    - c. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
    - d. 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**