# Project Manual
**Project Number: 24-002**

# Village of Hoffman Estates
# Village Green Concessions
## 5510 Prairie Stone Parkway, Hoffman Estates, Illinois 60192

**For**

## The Village Board of Trustees
## Village of Hoffman Estates
**1900 Hassell Road**
**Hoffman Estates, Illinois 60169**

**Issued for Bid: September 5, 2024**

TRIA ARCHITECTURE

**Illinois Office | Corporate Headquarters:** 901 McClintock Drive, Suite 100, Burr Ridge, Illinois 60527
**Indiana Office:** 436 Sand Creek Drive N, Suite 105, Chesterton, Indiana 46304
Company Main: 630.455.4500 Fax: 630.455.4040
www.TriaArchitecture.com

VILLAGE OF HOFFMAN ESTATES

**NOTICE TO BID**

The Village of Hoffman Estates is soliciting bids for:

**VILLAGE GREEN CONCESSIONS PROJECT**

Sealed bids will be received at the Office of the Village Clerk of the Village of Hoffman Estates (1900 Hassell Road) Cook County, Illinois, until September 26, 2024, at 2:00 p.m. All bids will be publicly opened immediately thereafter.

It is the responsibility of the bidder to meet the specified opening time; and any bid not so received will be returned unopened. Bids must be identified as such on the outside of the sealed envelope. This can be done by marking the envelope "SEALED BID" and with the following information:

Company's Name
Company Address
Name of Bid ("VILLAGE GREEN CONCESSIONS PROJECT")
Date and Time of Bid Opening

Specifications and complete bid documents may be obtained, at no cost, from the Village of Hoffman Estates web site, www.hoffmanestates.org/business/rfps-rfqs-bids. Any costs associated with printing hard copies of the electronic files are the responsibility of the bidding contractor.

There will be a pre-bid meeting on September 12, 2024, at 2:00 pm at the Hoffman Estates Village Hall located at 1900 Hassell Road, Hoffman Estates, IL 60169. This pre-bid is **non-mandatory** for contractors bidding on the project.

Bids shall be awarded to the lowest responsible bidder, considering conformity with specifications, terms of delivery, and quality and serviceability, as determined by the project architect and the Village. The Village reserves the right to reject any or all bids in whole or in part and to waive any formalities and technicalities according to the best interest of the Village.

The successful bidder shall comply with the provisions of the Illinois Prevailing Wage Act, specifically including the payment of the applicable prevailing wages to all laborers, workers, and mechanics performing work under the contract. The Village of Hoffman Estates strongly encourages minority firms and women's business enterprises to apply. If subcontracts are to be let, the primary contractor should take these same affirmative steps to solicit bids from minority and women's firms.

All proposals submitted shall remain firm for a period of sixty (60) days after official opening of bids.

By the Order of the Mayor and Board of Trustees of the Village of Hoffman Estates.

_____ DATE _____ Patty Richter, Village Clerk

TO BE PUBLISHED ON _____ PADDOCK PUBLICATIONS
(DATE)

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**SECTION 002113**

**INSTRUCTIONS TO BIDDERS**

## PART 1 – GENERAL

### 1.1 PROPOSAL

A. The Village of Hoffman Estates, will receive sealed bids for the Village Green Concessions project.

B. To receive full consideration bids must contain the following documents properly completed and signed:
   1. Bid Form.
   2. Bid Bond.
   3. Certificate of Compliance with Illinois Drug-Free Workplace Act.
   4. Substance Abuse Prevention Policy
   5. Certificate of Compliance with Illinois Human Rights Act.
   6. Bidder Eligibility Certification and Non-Collusion Affidavit.
   7. Fair Employment Practices Affidavit of Compliance.
   8. Indemnity Hold Harmless Agreement.
   9. Fully completed AIA document A305 providing the Contractor's qualifications and references.

### 1.2 PREPARATION FOR BIDS

A. Proposals to be entitled for consideration must be made in accordance with the following instructions.
   1. Submit one copy of bid on forms provided by the Architect with all blank spaces for bid prices filled in, in ink, or typewritten.
   2. Submit one reproduction of bid forms and associated documents.
   3. Submit bid in an opaque, sealed envelope, addressed to: Ms. Patty Richter, Village Clerk.
      a. Mark the envelope SEALED BID FOR:
         1) Project Name.
         2) Bidder.
   4. Bids will be received until 2:00 p.m. prevailing time on September 26, 2024, for all specified work, at the Village of Hoffman Estates Village Hall, 1900 Hassell Road, Hoffman Estates, Illinois 60169.
   5. Bids received after this time will not be accepted.
   6. Erasures or written memorandum on the Bid Form are prohibited. Include additional explanations, statements, or qualifications in a separate sheet attached to the Bid Form.
   7. The Base Bid shall appear only where called for in the Bid Form and shall not appear elsewhere in the proposal. Any Alternate prices (other than those set forth in the Bid Form) shall be listed on the Substitution Sheet.
   8. Fill in all blank spaces for the bid items with prices, or if not applicable, the words "No Bid."

B. The Owner reserves the right to reject any or all bids or parts thereof at its sole discretion.

C. The Owner reserves the right to waive any or all irregularities or informalities.

D. The Owner reserves the right to terminate this request for bids at any time in the bidding process.

E. All costs associated with developing or submitting a bid in response to this request, or to obtain oral or written clarification of its content shall be borne by the respondent. The Owner and Architect, and their agents, assume no responsibility for these costs. This request for bids does not commit the Owner or Architect, or any of their agents, to pay any costs incurred in the preparation or submission of a bid.

F. Telegraphic bids will not be accepted, but modifications by telegram of bids already submitted will be considered if received prior to the scheduled closing time for receiving bids.

### 1.3 DEFINITIONS

A. All definitions set forth in the General Conditions of the Contract for Construction as printed in AIA Document A201 as modified and included herewith are applicable to these Instructions to Bidders.

B. Bidding Documents include the Advertisement to Bid, Instructions to Bidders, the Bid Proposal Form and required attachments, AIA Document A101 Standard Form of Agreement Between Owner and Contractor where the Basis of Payment is a Stipulated Sum, 2017 edition, including General Conditions as modified for this project, AIA Document A305, and the proposed Contract Documents including any addendum issued prior to receipt of bids.
C. Addenda are written or graphic instruments issued prior to the execution of the Contract which modify or interpret the bidding documents, including Drawings and Specifications, by additions, clarifications, or corrections. Addenda will become part of the Contract Documents when the Construction Contract is executed.
   1. Addenda will be issued by Email, FAX transmittal, direct mail or United Parcel delivery. Bidders are to consider all addenda, regardless of method of transmittal, as a binding modification to the contract documents.
   2. It is the bidder's responsibility to ascertain from the Architect that they have received all addenda issued to the bidding documents prior to submitting their bids.

**1.4 DOCUMENTS**

A. The Bidding Documents are on file and may be obtained at the Village of Hoffman Estates web site at www.hoffmanestates.org/business/rfps-rfqs-bids.

**1.5 EXAMINATION OF DOCUMENTS AND SITE**

A. Bidders are responsible for examining all documents on file at the office of the Printer or Owner and must make a mandatory site visit to examine the site to become familiar with and make allowance for any conditions which may affect the work. Contractors will not be given extra payments for conditions which can be determined by examining the site and documents.
B. A Non-Mandatory Pre-Bid Conference will be held on September 12, 2024, 2:00 p.m. at the Village of Hoffman Estates Village Hall, 1900 Hassell Road, Hoffman Estates, Illinois 60169. It is recommended that all Bidders attend and participate in the conference which will also be attended by the Owner, the Architect, and the Engineer. The Architect will transmit to prospective bidders of record any Addenda the Architect considers necessary in response to questions arising at the conference.

**1.6 POST-BID QUALIFICATION**

A. Any bidder may be required to submit supporting data to substantiate that such bidder is properly qualified to carry out the obligations of the Contract and to complete the Work contemplated therein.

**1.7 BID WITHDRAWAL**

A. Any bidder may withdraw their bid prior to the scheduled closing time for receiving bids. All bidders shall hold their Bids open for a period of sixty calendar days from the date of Bid Opening. The Owner and Bidders may agree to extend the period of irrevocability beyond the sixty-day period.

**1.8 INTERPRETATION OF BIDDING DOCUMENTS**

A. Submit all questions regarding the Bidding Documents to the Architect. Replies will be issued to all bidders of record in the form of an Addendum. Questions received less than five days before the bid opening date cannot be answered.

**1.9 NON-SPECIFIED ITEMS**

A. Approved Equal Items:
   1. To obtain approval to use non-specified items, submit written request at least five days prior to the opening date; requests received after this time will NOT be considered.
   2. Requests shall clearly describe the items for which approval is asked including all data necessary to demonstrate acceptability.
   3. If an item is acceptable, the Architect will approve same in an Addendum issued to all bidders of record.

B. Substitutions:
   1. Substitutions for the items specified may be made by the Contractor only by submitting proposed substitutions on the Substitution Sheet provided.
   2. Requests received after bid opening will not be considered except for the following conditions:
      a. Product discontinued.
      b. Insufficient quantity. Except the following will not establish cause for substitution:
         1) Failure to award subcontract in sufficient time, or failure to place orders for products so as to ensure delivery without delaying work.
      c. Delays beyond control, such as strikes, lockouts, storms, fires, or acts of God, which may preclude the procurement and delivery of products for purposes of the Project.
C. No consideration will be given to substitutions after the Contractor submits the Schedule of Values.

**1.10 METHOD OF AWARD**

A. If the Owner should award a Contract, the Owner will award it to the lowest responsible bonafide Bidder with full consideration given to Contractor's Completion Schedule.
B. In determining the lowest responsible bona fide Bidder and in awarding a contract, the Owner may take into consideration skill, facilities, capacity, experience, ability, responsibility, previous work, financial standing of bidder, amount of work being carried on by bidder, quality and efficiency of construction equipment proposed to be furnished, period of time within which proposed equipment is furnished and delivered, and necessity of prompt and efficient completion of work herein described.

**1.11 PROPOSAL REQUIREMENTS**

A. Bidder's proposals shall be expressly based on the following items:
   1. Instructions to Bidders.
   2. Bid Proposal Form.
   3. General Conditions.
   4. Plans and Specifications.
   5. Addenda
B. Any Contract resulting from the Bidding Documents will incorporate the terms and provisions of said documents. It is intended that these Bidding Documents shall prevail over conflicting terms and conditions of Contractor's proposal. Bidder's printed terms and conditions are NOT considered as exceptions to the Contract.

**1.12 BID SECURITY**

A. Accompany bids with a Bid Bond, Certified Check or Bank Draft for an amount of Five Percent of the Base Bid as a guarantee that, if award is made, the bidder will sign the agreement and furnish the required bonds within five days or forfeit his bid security as liquidated damages, but not as a penalty. Execute Bid Bond on A.I.A. Form A-310, current edition or on form furnished by the Architect.
   1. Make Bid Security payable to: Village of Hoffman Estates.
B. Where a bid bond is given as the bid security, the bid bond must comply with the rating level required for the performance and payment bond as stated in the AIA document A101-Exhibit A included in specification section 007213.
C. The bid security of all except the three lowest bidders will be returned within five days after the award of the Contract.
D. The bid security of the successful bidder and the two other bidders will be returned promptly after the Owner and the accepted bidder have executed the agreement, and the appropriate bonds and certificates of insurance have been provided by the successful bidder. Bid security of the other Contractor's will be returned promptly after agreement is finalized.

## 1.13 PERFORMANCE ASSURANCE

A. Accepted Bidder: Provide a Performance and Labor and Material/Payment bond.
   1. Provide a 100 percent Performance Bond on Owner's Performance Bond.
      a. Refer to Section 012901 for Owner's Performance Bond to be completed by Contractor's surety.
   2. Provide a 100 percent Payment Bond on AIA 312.
   3. Deliver bonds within 3 days after execution of the Contract.

## 1.14 OTHER CERTIFICATIONS AND SUBMITTALS

A. All bidders must complete and sign the following certifications and submit them with their bid proposals. FAILURE TO DO SO MAY RESULT IN DISQUALIFICATION OF BIDDER.
   1. Certificate of Compliance with Illinois Drug-Free Workplace Act.
   2. Substance Abuse Prevention Policy
   3. Certificate of Compliance with Illinois Human Rights Act.
   4. Bidder Eligibility Certification and Non-Collusion Affidavit.
   5. Fair Employment Practices Affidavit of Compliance.
   6. Indemnity Hold Harmless Agreement.
   7. Fully completed AIA Document A305.

## 1.15 POWER OF ATTORNEY

A. Attorneys-in-Fact who sign bonds, Agreements or bids must file with each such document a certified and effectively-dated copy of their Power of Attorney.

## 1.16 EMPLOYMENT AND LABOR PROVISIONS

A. In the employment and use of labor, the Contractor and his subcontractors shall conform to the Illinois Statutory requirements regarding labor and wages. See Document 004343 - Prevailing Wage Requirements.
B. Vendors/Contractors must conform to all federal, state, local and OSHA Regulations now in effect.
C. The Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex or national origin.

**END OF SECTION**

**SECTION 004113**

**BID FORM**

**THE PROJECT AND THE PARTIES**

**1.1 NAME OF BIDDER: _____**

**1.2 TO: MS. PATTY RICHTER, VILLAGE CLERK**
**VILLAGE OF HOFFMAN ESTATES**
**1900 HASSELL ROAD**
**HOFFMAN ESTATES, ILLINOIS 60169**

A. We as contractor having familiarized ourselves with local conditions affecting the work and with the proposed Contract Documents on file at the office of the Owner, hereby propose to perform everything required to be performed and to provide all of the labor, materials, necessary equipment and all utilities and transportation and services necessary to perform and complete in a workmanlike manner all work required to complete the proposed work indicated in the bidding documents for the construction of the Village Green Concessions, all in accordance with the Drawings and Specifications prepared by the office of TRIA Architecture, Inc. including Addenda No. _____, _____ and _____ issued thereto for the sum of:

1. Base Bid for all Work:

   _____

   _____

   ($ ___ ___ ___ , ___ ___ ___ , ___ ___ ___ . ___ ___ )

2. The base bid consists of all Work specified and required by the proposed Contract Documents.

B. Alternate Bids: The undersigned hereby states the net amount of increase or decrease to the Lump Sum Base Bid for the following Alternates as described in Section 012300.

ALTERNATE NO. 1: **To change the Date of Substantial Completion**

DEDUCTED from the Lump Sum $_____.

ALTERNATE NO. 2: **To provide 8" diameter HDPE water line piping in lieu of 6" diameter PVC C900 Certa-Lok RJIB water line piping where indicated on the Civil drawings.**

ADD to or DEDUCT from the Lump Sum $_____.

C. Unit Prices: Should additional work of the following categories be required, adjustments will be made to the Contract Sum at the following Unit Prices, which shall include all expenses, including overhead and profit; should less work be required, the Unit Prices will be 15% less the price quoted for additional work.

1. Item: Install 6" Ductile Iron Water Service Piping;

   $_____Per Linear Foot.

2. Item: Install 1-1/2" Copper Water Service Piping;

   $_____Per Linear Foot.

3. Item: Install 6" diameter Water Line PVC C900 Certa-Lok RJIB Piping;

   $_____Per Linear Foot.

4. Item: Install 8" diameter Water Line HDPE Piping;

   $_____Per Linear Foot.

5. Item: Install 6” Sanitary Sewer Service PVC SDR 26;
   $_____Per Linear Foot.
6. Item: Install 4” Sanitary Sewer Service PVC SDR 26;
   $_____Per Linear Foot.
7. Item: Install 4” Sanitary Sewer Service 4” PVC C900;
   $_____Per Linear Foot.
8. Item: Install 18” Storm Sewer RCP pipe;
   $_____Per Linear Foot.
9. Item: Install 6” Storm Sewer PVC SDR 26;
   $_____Per Linear Foot.
10. Item: Install 6” Storm Sewer PVC C900;
    $_____Per Linear Foot.
11. Item: Install 4” Storm Sewer PVC SDR 26;
    $_____Per Linear Foot.
12. Item: Install 4” Storm Sewer PVC C900;
    $_____Per Linear Foot.
13. Item: Install 4” Storm Sewer Underdrain perforated pipe SDR 35;
    $_____Per Linear Foot.
14. Item: Removal and Replacement of Unsuitable Soil, Replaced with compacted CA-6;
    $_____Per Cubic Yard.
15. Item: Installation of the Typical Concrete Sidewalk Section Including Excavation, Stone Base, and Concrete;
    $_____Per Square Yard.
16. Item: Seed Restoration;
    $_____Per Square Yard.
17. Item: Rain Garden Plantings;
    $_____Per Square Yard.
18. Item: Winter Protection Enclosure for Masonry Work;
    $_____Per 20 Linear Feet of Masonry Wall.
19. Item: Continuous Heating of Winter Protection Enclosure for Masonry Work;
    $_____Per Day (24 Hours).

D. Accompanying this proposal is a Bid Security payable to the Village of Hoffman Estates, which is agreed will be forfeited to the aforementioned as liquidated damages if the undersigned fails to execute the standard form of Owner/Contractor Agreement (AIA Document A101, 2017 Edition, as modified), which is included herein, and furnish evidence of their ability to become bonded and to provide insurance coverage as specified, within five days after notification of the Intent to Award Contract to the undersigned.

E. In signing and submitting this Bid, the undersigned certifies that all materials and construction to be provided are as indicated in the proposed Contract Documents.

F. Time of Completion: If awarded the Contract, the bidder agrees to complete all Construction Work and achieve Substantial Completion by May 1, 2026, 5:00 p.m. NOTE: Substantial Completion for this project refers to all work being a minimum of 99% complete. Final Completion for this project refers to all scheduled work, punch-list and closeout items being 100% complete.

G. The space below the Specified Substantial Completion Date has been left blank for insertion of the Contractor's own Desired Substantial Completion Date, if he feels that the date (as stated in the specifications) cannot be met. Insertion of a desired date by the bidder does not change the specified Substantial Completion Date unless the Owner chooses to accept the bidder's desired date when awarding the contract.
   1. Specified Substantial Completion Date: May 1, 2026, 5:00 p.m.
   2. Contractor's Desired Substantial Completion Date: _____.

H. Base Bid Breakdown: For the purpose of logical comparison of orders of magnitude in the bids, the Owner requires a global breakdown of the components of the base bid. Contractors are required to provide this breakdown. Failure to do so will subject the bid to rejection. The sum of the following items must equal the Lump Sum Base Bid.

BREAKDOWN:

| | | |
|---|---|---|
| Division 01: | General Requirements – Allowances: | $ _____ |
| Division 01: | General Requirements – O&P: | $ _____ |
| Division 01: | General Requirements – Remaining Items: | $ _____ |
| Division 03: | Concrete: | $ _____ |
| | Subcontractor (Legal Name, Address: | _____ |
| | | _____ |
| Division 04: | Masonry: | $ _____ |
| | Subcontractor (Legal Name, Address): | _____ |
| | | _____ |
| Division 05: | Metals: | $ _____ |
| | Subcontractor (Legal Name, Address): | _____ |
| | | _____ |
| Division 06: | Wood and Plastic: | $ _____ |
| | Subcontractor (Legal Name, Address): | _____ |
| | | _____ |
| Division 07: | Thermal and Moisture Protection: | $ _____ |
| | Subcontractor (Legal Name, Address): | _____ |
| | | _____ |

**SECTION 004113**

**BID FORM**

| | | |
|---|---|---|
| Division 08: | Doors and Windows: | $ _____ |
| | Subcontractor (Legal Name, Address): | _____ |
| Division 09: | Finishes: | $ _____ |
| | Subcontractor (Legal Name, Address): | _____ |
| Division 10: | Specialties: | $ _____ |
| | Subcontractor (Legal Name, Address): | _____ |
| Division 11: | Equipment: | $ _____ |
| | Subcontractor (Legal Name, Address): | _____ |
| Division 22: | Plumbing: | $ _____ |
| | Subcontractor (Legal Name, Address): | _____ |
| Division 23: | Heating, Ventilation and Air Conditioning (HVAC): | $ _____ |
| | Subcontractor (Legal Name, Address): | _____ |
| Division 26: | Electrical: | $ _____ |
| | Subcontractor (Legal Name, Address): | _____ |
| Division 27: | Communications: | $ _____ |
| | Subcontractor (Legal Name, Address): | _____ |
| Division 31: | Earthwork: | $ _____ |
| | Subcontractor (Legal Name, Address): | _____ |
| Division 32: | Exterior Improvements: | $ _____ |
| | Subcontractor (Legal Name, Address): | _____ |
| Division 33: | Utilities: | $ _____ |
| | Subcontractor (Legal Name, Address): | _____ |

**SECTION 004113**

**BID FORM**

Miscellaneous Any items not identified above: $ _____

Subcontractor (Legal Name, Address): _____

_____

TOTAL (Should equal base bid): $ _____

FIRM NAME: _____

OFFICIAL ADDRESS: _____

Telephone Number: _____ Fax Number: _____

Email Address: _____

By: _____ Date: _____
(Signature)

_____
(Printed/Typed Name and Title)

Where the Bidder is a corporation, add Attest

_____ (SEAL)
Secretary (signature) Date

CERTIFIED OR CASHIERS CHECK, BID BOND, OR BANK DRAFT ENCLOSED IN THE FOLLOWING AMOUNT: $_____.

**END OF BID FORM**

**SECTION 004313**

**BID BOND**

## 1.1 BID BOND INFORMATION

A. KNOW ALL MEN BY THESE PRESENTS, THAT WE _____ as Principal, hereinafter called the Principal, and _____ a corporation duly organized under the laws of the State of Illinois as Surety, are held and firmly bound unto _____ as Obligee, hereinafter called Obligee, in the sum of _____ Dollars ($_____), for the payment of which sum well and truly to be made, the said Principal and the said Surety, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

B. WHEREAS, the Principal has submitted a bid for: Village Green Concessions.

C. NOW, THEREFORE, if the Obligee shall accept the bid of the Principal and the Principal shall enter into a Contract with the Obligee in accordance with the terms of such bid, and give such bond or bonds as may be specified in the bidding or Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; or in the event of the failure of the Principal to enter such Contract and give such bond or bonds, if the Principal shall pay to the Obligee the difference not to exceed the penalty hereof between the amount specified in said bid and such larger amount for which the Obligee 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.

D. The bid bond must comply with the rating level required for the performance and payment bond as stated in section 11.4 of AIA document A201.

Signed and sealed this _____ day of _____.

_____
(Principal) (SEAL)

_____ _____
(Witness) (Title)

_____
(Surety) (SEAL)

_____ _____
(Witness) (Title)

**SECTION 004325**

**SUBSTITUTION SHEET**

## 1.1 SUBSTITUTION INFORMATION

A. All bids shall be based upon the provisions of the proposed Contract Documents.

B. Bidders desiring to make substitutions for "proprietary brands" specified shall list such proposed substitutions below, together with the amount to be added or deducted from the amounts of their base bids.

C. The Owner reserves the right to reject all such substitutions, and such substitutions will not be used to determine the low bid.

D. Complete descriptions and technical data shall accompany all proposed substitutions.

E. NOTE: Manufacturer's names and material approved by the Architect during the bidding time, but not shown in Addenda, must be listed below if said material is to be considered.

F. BRAND/MAKE SPECIFED PROPOSED ADD DEDUCT

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____

NAME OF BIDDER: _____

DATE: _____.

**END OF SECTION**

**SECTION 004343**

**PREVAILING WAGE REQUIREMENTS**

## PART 1 – GENERAL

### 1.1 REQUIREMENTS

A. Each Contractor shall comply with the requirements of the Illinois Prevailing Wage Act 820 ILCS 130/.01 et seq. which regulates the wages of laborers, workers, and mechanics employed in any Public Works project by the State, County, City or by any public body or any political subdivision or by anyone under contract for Public Works, including but not limited to: wages, medical and hospitalization insurance and retirement for those trades covered by the Act.

B. If, during the course of work under this contract, the Department of Labor revises the prevailing rate of wages for any trade or occupation to be paid under this contract, the Contractor shall notify each Subcontractor of the changes in the prevailing rate of wages. The Contractor shall have the sole responsibility and duty to ensure that the revised prevailing rate of wages is paid by all Contractors and all Subcontractors to each laborer, worker, or mechanic to whom a revised rate is applicable. Revisions to the prevailing rate of wages as set forth above shall not result in an increase in the Contract Sum.

### 1.2 ACT AND ORDINANCES

A. The Illinois Prevailing Wage Act requires all contractors and subcontractors to pay laborers, workers, and mechanics performing services on a Public Works project no less than the “prevailing rate of wages” (hourly cash wages plus fringe benefits) in the county where the work is performed.

1. A copy of Illinois Department of Labor Prevailing Wages for Cook County effective – August 2024 is included herein for reference.
2. Refer to the Illinois Department of Labor’s web site for changes in the “prevailing rate of wage” throughout the duration of the project. All Contractors and Subcontractors rendering services under this contract must comply with all the requirements of the Illinois Prevailing Wage Act, including, but not limited to, all wage notice and recordkeeping duties.

**END OF SECTION**

# Cook County Prevailing Wage Rates posted on 8/15/2024

| | | | | | | Overtime | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Trade Title** | **Rg** | **Type** | **C** | **Base** | **Foreman** | **M-F** | **Sa** | **Su** | **Hol** | **H/W** | **Pension** | **Vac** | **Trng** | **Other Ins** | **Add OT 1.5x owed** | **Add OT 2.0x owed** |
| ASBESTOS ABT-GEN | All | ALL | | 50.15 | 51.15 | 1.5 | 1.5 | 2.0 | 2.0 | 17.71 | 16.92 | 0.00 | 0.91 | | 0.00 | 0.00 |
| ASBESTOS ABT-MEC | All | BLD | | 41.27 | 44.57 | 1.5 | 1.5 | 2.0 | 2.0 | 15.84 | 16.02 | 0.00 | 0.90 | | 3.11 | 6.21 |
| BOILERMAKER | All | BLD | | 55.76 | 60.77 | 2.0 | 2.0 | 2.0 | 2.0 | 6.97 | 26.44 | 0.00 | 3.34 | 1.95 | 0.00 | 38.26 |
| BRICK MASON | All | BLD | | 52.06 | 57.27 | 1.5 | 1.5 | 2.0 | 2.0 | 12.70 | 24.54 | 0.00 | 1.24 | 0.00 | 3.99 | 7.98 |
| CARPENTER | All | ALL | | 55.11 | 57.11 | 1.5 | 1.5 | 2.0 | 2.0 | 12.89 | 26.26 | 2.15 | 0.93 | 0.00 | 0.00 | 0.00 |
| CEMENT MASON | All | ALL | | 52.00 | 54.00 | 2.0 | 1.5 | 2.0 | 2.0 | 17.81 | 23.00 | 0.00 | 1.15 | | 2.00 | 4.00 |
| CERAMIC TILE FINISHER | All | BLD | | 47.09 | 47.09 | 1.5 | 1.5 | 2.0 | 2.0 | 13.00 | 16.82 | 0.00 | 1.09 | 0.00 | 5.17 | 10.34 |
| CERAMIC TILE LAYER | All | BLD | | 54.84 | 59.84 | 1.5 | 1.5 | 2.0 | 2.0 | 13.00 | 20.68 | 0.00 | 1.17 | 0.00 | 7.15 | 14.30 |
| COMMUNICATION ELECTRICIAN | All | BLD | | 49.86 | 54.85 | 1.5 | 1.5 | 2.0 | 2.0 | 15.60 | 14.43 | 1.25 | 1.22 | 0.15 | 0.00 | 0.00 |
| ELECTRIC PWR EQMT OP | All | ALL | | 62.10 | 68.14 | 1.5 | 1.5 | 2.0 | 2.0 | 13.08 | 20.88 | 0.00 | 3.32 | 0.00 | 18.64 | 37.28 |
| ELECTRIC PWR GRNDMAN | All | ALL | | 48.44 | 68.14 | 1.5 | 1.5 | 2.0 | 2.0 | 10.20 | 16.29 | 0.00 | 2.60 | 0.00 | 14.55 | 29.09 |
| ELECTRIC PWR LINEMAN | All | ALL | | 62.10 | 68.14 | 1.5 | 1.5 | 2.0 | 2.0 | 13.08 | 20.88 | 0.00 | 3.32 | 0.00 | 18.64 | 37.28 |
| ELECTRICIAN | All | ALL | | 55.55 | 61.11 | 1.5 | 1.5 | 2.0 | 2.0 | 19.06 | 20.61 | 1.50 | 1.78 | 0.40 | 0.00 | 0.00 |
| ELEVATOR CONSTRUCTOR | All | BLD | | 67.84 | 76.32 | 2.0 | 2.0 | 2.0 | 2.0 | 16.18 | 20.96 | 5.42 | 0.75 | | 0.00 | 0.00 |
| FENCE ERECTOR | All | ALL | | 51.00 | 53.00 | 1.5 | 1.5 | 2.0 | 2.0 | 13.74 | 18.32 | 0.00 | 0.75 | | 0.00 | 0.00 |
| GLAZIER | All | BLD | | 51.55 | 53.05 | 1.5 | 2.0 | 2.0 | 2.0 | 15.64 | 26.18 | 0.00 | 2.27 | 0.00 | 0.00 | 0.00 |
| HEAT/FROST INSULATOR | All | BLD | | 55.02 | 58.32 | 1.5 | 1.5 | 2.0 | 2.0 | 15.84 | 19.01 | 0.00 | 0.90 | | 4.60 | 9.20 |
| IRON WORKER | All | ALL | | 59.26 | 62.76 | 2.0 | 2.0 | 2.0 | 2.0 | 18.30 | 26.31 | 0.00 | 0.49 | 0.00 | 0.00 | 0.00 |
| LABORER | All | ALL | | 50.15 | 50.90 | 1.5 | 1.5 | 2.0 | 2.0 | 17.71 | 16.92 | 0.00 | 0.91 | | 0.00 | 0.00 |
| LATHER | All | ALL | | 55.11 | 57.11 | 1.5 | 1.5 | 2.0 | 2.0 | 12.89 | 26.26 | 2.15 | 0.93 | 0.00 | 0.00 | 0.00 |
| MACHINIST | All | BLD | | 58.39 | 62.39 | 1.5 | 1.5 | 2.0 | 2.0 | 9.93 | 8.95 | 1.85 | 1.47 | | 0.00 | 0.00 |
| MARBLE FINISHER | All | ALL | | 39.50 | 53.55 | 1.5 | 1.5 | 2.0 | 2.0 | 12.70 | 22.32 | 0.00 | 0.73 | 0.00 | 2.88 | 5.76 |
| MARBLE SETTER | All | BLD | | 51.00 | 56.10 | 1.5 | 1.5 | 2.0 | 2.0 | 12.70 | 24.01 | 0.00 | 0.92 | 0.00 | 3.73 | 7.45 |
| MATERIAL TESTER I | All | ALL | | 40.15 | | 1.5 | 1.5 | 2.0 | 2.0 | 17.71 | 16.92 | 0.00 | 0.91 | | 0.00 | 0.00 |
| MATERIALS TESTER II | All | ALL | | 45.15 | | 1.5 | 1.5 | 2.0 | 2.0 | 17.71 | 16.92 | 0.00 | 0.91 | | 0.00 | 0.00 |
| MILLWRIGHT | All | ALL | | 55.11 | 57.11 | 1.5 | 1.5 | 2.0 | 2.0 | 12.89 | 26.26 | 2.15 | 0.93 | 0.00 | 0.00 | 0.00 |

# Cook County Prevailing Wage Rates posted on 8/15/2024

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OPERATING ENGINEER | All | BLD | 1 | 60.80 | 64.80 | 2.0 | 2.0 | 2.0 | 2.0 | 23.70 | 20.80 | 2.00 | 2.70 | 0.00 | 0.00 | 0.00 |
| OPERATING ENGINEER | All | BLD | 2 | 59.50 | 64.80 | 2.0 | 2.0 | 2.0 | 2.0 | 23.70 | 20.80 | 2.00 | 2.70 | 0.00 | 0.00 | 0.00 |
| OPERATING ENGINEER | All | BLD | 3 | 56.95 | 64.80 | 2.0 | 2.0 | 2.0 | 2.0 | 23.70 | 20.80 | 2.00 | 2.70 | 0.00 | 0.00 | 0.00 |
| OPERATING ENGINEER | All | BLD | 4 | 55.20 | 64.80 | 2.0 | 2.0 | 2.0 | 2.0 | 23.70 | 20.80 | 2.00 | 2.70 | 0.00 | 0.00 | 0.00 |
| OPERATING ENGINEER | All | BLD | 5 | 64.55 | 64.80 | 2.0 | 2.0 | 2.0 | 2.0 | 23.70 | 20.80 | 2.00 | 2.70 | 0.00 | 0.00 | 0.00 |
| OPERATING ENGINEER | All | BLD | 6 | 61.80 | 64.80 | 2.0 | 2.0 | 2.0 | 2.0 | 23.70 | 20.80 | 2.00 | 2.70 | 0.00 | 0.00 | 0.00 |
| OPERATING ENGINEER | All | BLD | 7 | 63.80 | 64.80 | 2.0 | 2.0 | 2.0 | 2.0 | 23.70 | 20.80 | 2.00 | 2.70 | 0.00 | 0.00 | 0.00 |
| OPERATING ENGINEER | All | FLT | 1 | 69.35 | 69.35 | 1.5 | 1.5 | 2.0 | 2.0 | 23.70 | 20.80 | 2.00 | 2.70 | 0.00 | 0.00 | 0.00 |
| OPERATING ENGINEER | All | FLT | 2 | 67.85 | 69.35 | 1.5 | 1.5 | 2.0 | 2.0 | 23.70 | 20.80 | 2.00 | 2.70 | 0.00 | 0.00 | 0.00 |
| OPERATING ENGINEER | All | FLT | 3 | 63.35 | 69.35 | 1.5 | 1.5 | 2.0 | 2.0 | 23.70 | 20.80 | 2.00 | 2.70 | 0.00 | 0.00 | 0.00 |
| OPERATING ENGINEER | All | FLT | 4 | 58.85 | 69.35 | 1.5 | 1.5 | 2.0 | 2.0 | 23.70 | 20.80 | 2.00 | 2.70 | 0.00 | 0.00 | 0.00 |
| OPERATING ENGINEER | All | FLT | 5 | 70.85 | 69.35 | 1.5 | 1.5 | 2.0 | 2.0 | 23.70 | 20.80 | 2.00 | 2.70 | 0.00 | 0.00 | 0.00 |
| OPERATING ENGINEER | All | FLT | 6 | 58.85 | 69.35 | 1.5 | 1.5 | 2.0 | 2.0 | 23.70 | 20.80 | 2.00 | 2.70 | 0.00 | 0.00 | 0.00 |
| OPERATING ENGINEER | All | HWY | 1 | 59.00 | 63.00 | 1.5 | 1.5 | 2.0 | 2.0 | 23.70 | 20.80 | 2.00 | 2.70 | 0.00 | 0.00 | 0.00 |
| OPERATING ENGINEER | All | HWY | 2 | 58.45 | 63.00 | 1.5 | 1.5 | 2.0 | 2.0 | 23.70 | 20.80 | 2.00 | 2.70 | 0.00 | 0.00 | 0.00 |
| OPERATING ENGINEER | All | HWY | 3 | 56.40 | 63.00 | 1.5 | 1.5 | 2.0 | 2.0 | 23.70 | 20.80 | 2.00 | 2.70 | 0.00 | 0.00 | 0.00 |
| OPERATING ENGINEER | All | HWY | 4 | 55.00 | 63.00 | 1.5 | 1.5 | 2.0 | 2.0 | 23.70 | 20.80 | 2.00 | 2.70 | 0.00 | 0.00 | 0.00 |
| OPERATING ENGINEER | All | HWY | 5 | 53.80 | 63.00 | 1.5 | 1.5 | 2.0 | 2.0 | 23.70 | 20.80 | 2.00 | 2.70 | 0.00 | 0.00 | 0.00 |
| OPERATING ENGINEER | All | HWY | 6 | 62.00 | 63.00 | 1.5 | 1.5 | 2.0 | 2.0 | 23.70 | 20.80 | 2.00 | 2.70 | 0.00 | 0.00 | 0.00 |
| OPERATING ENGINEER | All | HWY | 7 | 60.00 | 63.00 | 1.5 | 1.5 | 2.0 | 2.0 | 23.70 | 20.80 | 2.00 | 2.70 | 0.00 | 0.00 | 0.00 |
| ORNAMENTAL IRON WORKER | All | ALL | | 57.51 | 60.51 | 2.0 | 2.0 | 2.0 | 2.0 | 14.31 | 26.50 | 0.00 | 2.00 | 0.00 | 0.00 | 0.00 |
| PAINTER | All | ALL | | 53.05 | 59.68 | 1.5 | 1.5 | 1.5 | 2.0 | 15.76 | 16.19 | 0.00 | 1.86 | 0.00 | 0.00 | 0.00 |
| PAINTER - SIGNS | All | BLD | | 45.49 | 51.09 | 1.5 | 1.5 | 2.0 | 2.0 | 8.20 | 16.81 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PILEDRIVER | All | ALL | | 55.11 | 57.11 | 1.5 | 1.5 | 2.0 | 2.0 | 12.89 | 26.26 | 2.15 | 0.93 | 0.00 | 0.00 | 0.00 |
| PIPEFITTER | All | BLD | | 57.00 | 60.00 | 1.5 | 1.5 | 2.0 | 2.0 | 13.65 | 22.85 | 0.00 | 3.12 | 0.00 | 0.00 | 0.00 |
| PLASTERER | All | BLD | | 50.00 | 53.00 | 1.5 | 1.5 | 2.0 | 2.0 | 17.81 | 21.22 | 0.00 | 1.15 | | 0.00 | 0.00 |
| PLUMBER | All | BLD | | 58.55 | 62.05 | 1.5 | 1.5 | 2.0 | 2.0 | 17.75 | 17.74 | 0.00 | 1.83 | | 0.00 | 0.00 |
| ROOFER | All | BLD | | 50.25 | 55.25 | 1.5 | 1.5 | 2.0 | 2.0 | 11.83 | 16.44 | 0.00 | 1.11 | 0.00 | 0.00 | 0.00 |
| SHEETMETAL WORKER | All | BLD | | 53.05 | 57.29 | 1.5 | 1.5 | 2.0 | 2.0 | 14.88 | 28.65 | 0.00 | 1.15 | 0.00 | 0.00 | 0.00 |

# Cook County Prevailing Wage Rates posted on 8/15/2024

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SIGN HANGER | All | BLD | | 35.72 | 38.58 | 1.5 | 1.5 | 2.0 | 2.0 | 7.15 | 4.60 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SPRINKLER FITTER | All | BLD | | 60.10 | 62.85 | 1.5 | 1.5 | 2.0 | 2.0 | 14.95 | 19.30 | 0.00 | 1.10 | 0.00 | 0.00 | 0.00 |
| STEEL ERECTOR | All | ALL | | 59.26 | 62.76 | 2.0 | 2.0 | 2.0 | 2.0 | 18.30 | 26.31 | 0.00 | 0.49 | 0.00 | 0.00 | 0.00 |
| STONE MASON | All | BLD | | 52.06 | 57.27 | 1.5 | 1.5 | 2.0 | 2.0 | 12.70 | 24.54 | 0.00 | 1.24 | 0.00 | 3.99 | 7.98 |
| SURVEY WORKER | All | BLD | | 56.50 | 57.50 | 1.5 | 1.5 | 2.0 | 2.0 | 17.75 | 14.15 | 0.00 | 1.49 | | 0.00 | 0.00 |
| SURVEY WORKER | All | HWY | | 56.50 | 57.50 | 1.5 | 1.5 | 2.0 | 2.0 | 17.75 | 14.15 | 0.00 | 1.49 | | 0.00 | 0.00 |
| TERRAZZO FINISHER | All | BLD | | 48.94 | 48.94 | 1.5 | 1.5 | 2.0 | 2.0 | 13.00 | 18.42 | 0.00 | 1.11 | 0.00 | 4.22 | 8.44 |
| TERRAZZO MECHANIC | All | BLD | | 52.85 | 56.35 | 1.5 | 1.5 | 2.0 | 2.0 | 13.00 | 19.81 | 0.00 | 1.15 | 0.00 | 4.47 | 8.94 |
| TRAFFIC SAFETY WORKER I | All | HWY | | 42.10 | 43.70 | 1.5 | 1.5 | 2.0 | 2.0 | 11.11 | 9.81 | 0.00 | 1.05 | 0.00 | 0.00 | 0.00 |
| TRAFFIC SAFETY WORKER II | ALL | HWY | | 43.10 | 44.70 | 1.5 | 1.5 | 2.0 | 2.0 | 11.11 | 9.81 | 0.00 | 1.05 | 0.00 | 0.00 | 0.00 |
| TRUCK DRIVER | E | ALL | 1 | 43.45 | | 1.5 | 1.5 | 2.0 | 2.0 | 13.15 | 16.09 | 0.00 | 0.25 | 0.00 | 0.00 | 0.00 |
| TRUCK DRIVER | E | ALL | 2 | 43.70 | | 1.5 | 1.5 | 2.0 | 2.0 | 13.15 | 16.09 | 0.00 | 0.25 | 0.00 | 0.00 | 0.00 |
| TRUCK DRIVER | E | ALL | 3 | 43.90 | | 1.5 | 1.5 | 2.0 | 2.0 | 13.15 | 16.09 | 0.00 | 0.25 | 0.00 | 0.00 | 0.00 |
| TRUCK DRIVER | E | ALL | 4 | 44.10 | | 1.5 | 1.5 | 2.0 | 2.0 | 13.15 | 16.09 | 0.00 | 0.25 | 0.00 | 0.00 | 0.00 |
| TRUCK DRIVER | W | ALL | 1 | 43.43 | | 1.5 | 1.5 | 2.0 | 2.0 | 11.70 | 16.11 | 0.00 | 0.25 | | 0.00 | 0.00 |
| TRUCK DRIVER | W | ALL | 2 | 43.58 | | 1.5 | 1.5 | 2.0 | 2.0 | 11.70 | 16.11 | 0.00 | 0.25 | 0.00 | 0.00 | 0.00 |
| TRUCK DRIVER | W | ALL | 3 | 43.78 | | 1.5 | 1.5 | 2.0 | 2.0 | 11.70 | 16.11 | 0.00 | 0.25 | 0.00 | 0.00 | 0.00 |
| TRUCK DRIVER | W | ALL | 4 | 43.98 | | 1.5 | 1.5 | 2.0 | 2.0 | 11.70 | 16.11 | 0.00 | 0.25 | 0.00 | 0.00 | 0.00 |
| TUCKPOINTER | All | BLD | | 51.53 | 52.53 | 1.5 | 1.5 | 2.0 | 2.0 | 10.05 | 22.66 | 0.00 | 1.15 | 0.00 | 0.00 | 0.00 |

**Legend**

**Rg** Region
**Type** Trade Type - All,Highway,Building,Floating,Oil & Chip,Rivers
**C** Class
**Base** Base Wage Rate
**OT M-F** Unless otherwise noted, OT pay is required for any hour greater than 8 worked each day, Mon through Fri. The number listed is the multiple of the base wage.
**OT Sa** Overtime pay required for every hour worked on Saturdays
**OT Su** Overtime pay required for every hour worked on Sundays
**OT Hol** Overtime pay required for every hour worked on Holidays
**H/W** Health/Welfare benefit
**Vac** Vacation
**Trng** Training

**Other Ins** Employer hourly cost for any other type(s) of insurance provided for benefit of worker.

Explanations COOK COUNTY

The following list is considered as those days for which holiday rates of wages for work performed apply: New Years Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day, Christmas Day and Veterans Day in some classifications/counties. Generally, any of these holidays which fall on a Sunday is celebrated on the following Monday. This then makes work performed on that Monday payable at the appropriate overtime rate for holiday pay. Common practice in a given local may alter certain days of celebration. If in doubt, please check with IDOL.

TRUCK DRIVERS (WEST) - That part of the county West of Barrington Road.

EXPLANATION OF CLASSES

ASBESTOS - GENERAL - removal of asbestos material/mold and hazardous materials from any place in a building, including mechanical systems where those mechanical systems are to be removed. This includes the removal of asbestos materials/mold and hazardous materials from ductwork or pipes in a building when the building is to be demolished at the time or at some close future date. ASBESTOS - MECHANICAL - removal of asbestos material from mechanical systems, such as pipes, ducts, and boilers, where the mechanical systems are to remain.

CERAMIC TILE FINISHER

The grouting, cleaning, and polishing of all classes of tile, whether for interior or exterior purposes, all burned, glazed or unglazed products; all composition materials, granite tiles, warning detectable tiles, cement tiles, epoxy composite materials, pavers, glass, mosaics, fiberglass, and all substitute materials, for tile made in tile-like units; all mixtures in tile like form of cement, metals, and other materials that are for and intended for use as a finished floor surface, stair treads, promenade roofs, walks, walls, ceilings, swimming pools, and all other places where tile is to form a finished interior or exterior. The mixing of all setting mortars including but not limited to thin-set mortars, epoxies, wall mud, and any other sand and cement mixtures or adhesives when used in the preparation, installation, repair, or maintenance of tile and/or similar materials. The handling and unloading of all sand, cement, lime, tile, fixtures, equipment, adhesives, or any other materials to be used in the preparation, installation, repair, or maintenance of tile and/or similar materials. Ceramic Tile Finishers shall fill all joints and voids regardless of method on all tile work, particularly and especially after installation of said tile work. Application of any and all protective coverings to all types of tile installations including, but not be limited to, all soap compounds, paper products, tapes, and all polyethylene coverings, plywood, masonite, cardboard, and any new type of products that may be used to protect tile installations, Blastrac equipment, and all floor scarifying equipment used in preparing floors to receive tile. The clean up and removal of all waste and materials. All demolition of existing tile floors and walls to be re-tiled.

COMMUNICATIONS ELECTRICIAN

Installation, operation, inspection, maintenance, repair and service of radio, television, recording, voice sound vision production and reproduction, telephone and telephone interconnect, facsimile, data apparatus, coaxial, fibre optic and wireless equipment, appliances and systems used for the transmission and reception of signals of any nature, business, domestic, commercial,

education, entertainment, and residential purposes, including but not limited to, communication and telephone, electronic and sound equipment, fibre optic and data communication systems, and the performance of any task directly related to such installation or service whether at new or existing sites, such tasks to include the placing of wire and cable and electrical power conduit or other raceway work within the equipment room and pulling wire and/or cable through conduit and the installation of any incidental conduit, such that the employees covered hereby can complete any job in full.

MARBLE FINISHER

Loading and unloading trucks, distribution of all materials (all stone, sand, etc.), stocking of floors with material, performing all rigging for heavy work, the handling of all material that may be needed for the installation of such materials, building of scaffolding, polishing if needed, patching, waxing of material if damaged, pointing up, caulking, grouting and cleaning of marble, holding water on diamond or Carborundum blade or saw for setters cutting, use of tub saw or any other saw needed for preparation of material, drilling of holes for wires that anchor material set by setters, mixing up of molding plaster for installation of material, mixing up thin set for the installation of material, mixing up of sand to cement for the installation of material and such other work as may be required in helping a Marble Setter in the handling of all material in the erection or installation of interior marble, slate, travertine, art marble, serpentine, alberene stone, blue stone, granite and other stones (meaning as to stone any foreign or domestic materials as are specified and used in building interiors and exteriors and customarily known as stone in the trade), carrara, sanionyx, vitrolite and similar opaque glass and the laying of all marble tile, terrazzo tile, slate tile and precast tile, steps, risers treads, base, or any other materials that may be used as substitutes for any of the aforementioned materials and which are used on interior and exterior which are installed in a similar manner.

MATERIAL TESTER I:  Hand coring and drilling for testing of materials; field inspection of uncured concrete and asphalt.

MATERIAL TESTER II:  Field inspection of welds, structural steel, fireproofing, masonry, soil, facade, reinforcing steel, formwork, cured concrete, and concrete and asphalt batch plants; adjusting proportions of bituminous mixtures.

OPERATING ENGINEER - BUILDING

Class 1. Asphalt Plant; Asphalt Spreader; Autograde; Backhoes with Caisson Attachment; Batch Plant; Benoto (requires Two Engineers); Boiler and Throttle Valve; Caisson Rigs; Central Redi-Mix Plant; Combination Back Hoe Front End-loader Machine; Compressor and Throttle Valve; Concrete Breaker (Truck Mounted); Concrete Conveyor; Concrete Conveyor (Truck Mounted); Concrete Paver Over 27E cu. ft; Concrete Paver 27E cu. ft. and Under: Concrete Placer; Concrete Placing Boom; Concrete Pump (Truck Mounted); Concrete Tower; Cranes, All; Cranes, Hammerhead; Cranes, (GCI and similar Type); Creter Crane; Spider Crane; Crusher, Stone, etc.; Derricks, All; Derricks, Traveling; Formless Curb and Gutter Machine; Grader, Elevating; Grouting Machines; Heavy Duty Self-Propelled Transporter or Prime Mover; Highlift Shovels or Front Endloader 2-1/4 yd. and over; Hoists, Elevators, outside type rack and pinion and similar machines; Hoists, One, Two and Three Drum; Hoists, Two Tugger One Floor; Hydraulic Backhoes; Hydraulic Boom Trucks; Hydro Vac (and similar equipment); Locomotives, All; Motor Patrol; Lubrication Technician; Manipulators; Pile Drivers and Skid Rig; Post Hole Digger; Pre-Stress Machine; Pump Cretes Dual Ram; Pump Cretes: Squeeze Cretes-Screw Type Pumps; Gypsum Bulker and Pump; Raised and Blind Hole Drill; Roto Mill Grinder; Scoops - Tractor Drawn; Slip-Form Paver; Straddle Buggies; Operation of Tie Back Machine; Tournapull; Tractor with Boom and Side Boom; Trenching Machines.

Class 2. Boilers; Broom, All Power Propelled; Bulldozers; Concrete Mixer (Two Bag and Over); Conveyor, Portable; Forklift Trucks; Highlift Shovels or Front Endloaders under 2-1/4 yd.; Hoists, Automatic; Hoists, Inside Elevators; Hoists, Sewer Dragging Machine; Hoists, Tugger Single Drum; Laser Screed; Rock Drill (Self-Propelled); Rock Drill (Truck Mounted); Rollers, All; Steam Generators; Tractors, All; Tractor Drawn Vibratory Roller; Winch Trucks with "A" Frame.

Class 3. Air Compressor; Combination Small Equipment Operator; Generators; Heaters, Mechanical; Hoists, Inside Elevators (remodeling or renovation work); Hydraulic Power Units (Pile Driving, Extracting, and Drilling); Pumps, over 3" (1 to 3 not to exceed a total of 300 ft.); Low Boys; Pumps, Well Points; Welding Machines (2 through 5); Winches, 4 Small Electric Drill Winches.

Class 4. Bobcats and/or other Skid Steer Loaders; Oilers; and Brick Forklift.

Class 5. Assistant Craft Foreman.

Class 6. Gradall.

Class 7. Mechanics; Welders.

OPERATING ENGINEERS - HIGHWAY CONSTRUCTION

Class 1. Asphalt Plant; Asphalt Heater and Planer Combination; Asphalt Heater Scarfire; Asphalt Spreader; Autograder/GOMACO or other similar type machines: ABG Paver; Backhoes with Caisson Attachment; Ballast Regulator; Belt Loader; Caisson Rigs; Car Dumper; Central Redi-Mix Plant; Combination Backhoe Front Endloader Machine, (1 cu. yd. Backhoe Bucket or over or with attachments); Concrete Breaker (Truck Mounted); Concrete Conveyor; Concrete Paver over 27E cu. ft.; Concrete Placer; Concrete Tube Float; Cranes, all attachments; Cranes, Tower Cranes of all types: Creter Crane: Spider Crane; Crusher, Stone, etc.; Derricks, All; Derrick Boats; Derricks, Traveling; Dredges; Elevators, Outside type Rack & Pinion and Similar Machines; Formless Curb and Gutter Machine; Grader, Elevating; Grader, Motor Grader, Motor Patrol, Auto Patrol, Form Grader, Pull Grader, Subgrader; Guard Rail Post Driver Truck Mounted; Hoists, One, Two and Three Drum; Heavy Duty Self-Propelled Transporter or Prime Mover; Hydraulic Backhoes; Backhoes with shear attachments up to 40' of boom reach; Lubrication Technician; Manipulators; Mucking Machine; Pile Drivers and Skid Rig; Pre-Stress Machine; Pump Cretes Dual Ram; Rock Drill - Crawler or Skid Rig; Rock Drill - Truck Mounted; Rock/Track Tamper; Roto Mill Grinder; Slip-Form Paver; Snow Melters; Soil Test Drill Rig (Truck Mounted); Straddle Buggies; Hydraulic Telescoping Form (Tunnel); Operation of Tieback Machine;  Tractor Drawn Belt Loader; Tractor Drawn Belt Loader (with attached pusher - two engineers); Tractor with Boom; Tractaire with Attachments; Traffic Barrier Transfer Machine; Trenching; Truck Mounted Concrete Pump with Boom; Raised or Blind Hole Drills (Tunnel Shaft); Underground Boring and/or Mining Machines 5 ft. in diameter and over tunnel, etc; Underground Boring and/or Mining Machines under 5 ft. in diameter; Wheel Excavator; Widener (APSCO).

Class 2. Batch Plant; Bituminous Mixer; Boiler and Throttle Valve; Bulldozers; Car Loader Trailing Conveyors; Combination Backhoe Front Endloader Machine (Less than 1 cu. yd. Backhoe Bucket or over or with attachments); Compressor and Throttle Valve; Compressor, Common Receiver (3); Concrete Breaker or Hydro Hammer; Concrete Grinding Machine; Concrete Mixer or Paver 7S Series to and including 27 cu. ft.; Concrete Spreader; Concrete Curing Machine, Burlap Machine, Belting Machine and Sealing Machine; Concrete Wheel Saw; Conveyor Muck Cars (Haglund or Similar Type); Drills, All; Finishing Machine - Concrete; Highlift Shovels or Front Endloader; Hoist - Sewer Dragging Machine; Hydraulic Boom Trucks (All Attachments); Hydro-Blaster; Hydro

Excavating (excluding hose work); Laser Screed; All Locomotives, Dinky; Off-Road Hauling Units (including articulating) Non Self-Loading Ejection Dump; Pump Cretes: Squeeze Cretes - Screw Type Pumps, Gypsum Bulker and Pump; Roller, Asphalt; Rotary Snow Plows; Rototiller, Seaman, etc., self-propelled; Self-Propelled Compactor; Spreader - Chip - Stone, etc.; Scraper - Single/Twin Engine/Push and Pull; Scraper - Prime Mover in Tandem (Regardless of Size); Tractors pulling attachments, Sheeps Foot, Disc, Compactor, etc.; Tug Boats.

Class 3. Boilers; Brooms, All Power Propelled; Cement Supply Tender; Compressor, Common Receiver (2); Concrete Mixer (Two Bag and Over); Conveyor, Portable; Farm-Type Tractors Used for Mowing, Seeding, etc.; Forklift Trucks; Grouting Machine; Hoists, Automatic; Hoists, All Elevators; Hoists, Tugger Single Drum; Jeep Diggers; Low Boys; Pipe Jacking Machines; Post-Hole Digger; Power Saw, Concrete Power Driven; Pug Mills; Rollers, other than Asphalt; Seed and Straw Blower; Steam Generators; Stump Machine; Winch Trucks with "A" Frame; Work Boats; Tamper-Form-Motor Driven.

Class 4. Air Compressor; Combination - Small Equipment Operator; Directional Boring Machine; Generators; Heaters, Mechanical; Hydraulic Power Unit (Pile Driving, Extracting, or Drilling); Light Plants, All (1 through 5); Pumps, over 3" (1 to 3 not to exceed a total of 300 ft.); Pumps, Well Points; Vacuum Trucks (excluding hose work); Welding Machines (2 through 5); Winches, 4 Small Electric Drill Winches.

Class 5. SkidSteer Loader (all); Brick Forklifts; Oilers.

Class 6. Field Mechanics and Field Welders

Class 7. Dowell Machine with Air Compressor; Gradall and machines of like nature.

OPERATING ENGINEER - FLOATING

Class 1. Craft Foreman; Master Mechanic; Diver/Wet Tender; Engineer; Engineer (Hydraulic Dredge).

Class 2. Crane/Backhoe Operator; Boat Operator with towing endorsement; Mechanic/Welder; Assistant Engineer (Hydraulic Dredge); Leverman (Hydraulic Dredge); Diver Tender.

Class 3. Deck Equipment Operator, Machineryman, Maintenance of Crane (over 50 ton capacity) or Backhoe (115,000 lbs. or more); Tug/Launch Operator; Loader/Dozer and like equipment on Barge, Breakwater Wall, Slip/Dock, or Scow, Deck Machinery, etc.

Class 4. Deck Equipment Operator, Machineryman/Fireman (4 Equipment Units or More); Off Road Trucks; Deck Hand, Tug Engineer, Crane Maintenance (50 Ton Capacity and Under) or Backhoe Weighing (115,000 pounds or less); Assistant Tug Operator.

Class 5. Friction or Lattice Boom Cranes.

Class 6. ROV Pilot, ROV Tender

SURVEY WORKER

Operates survey equipment (such as levels, transits, data collectors, GPS and robotic total stations) for the purpose of performing construction layout and/or grade checking.

SURVEY FOREMAN

Operates survey equipment (such as levels, transits, data collectors, GPS and robotic total stations) for the purpose of performing construction layout and/or grade checking; oversees survey crew operations; and/or coordinates work of survey crews.

TERRAZZO FINISHER

The handling of sand, cement, marble chips, and all other materials that may be used by the Mosaic Terrazzo Mechanic, and the mixing, grinding, grouting, cleaning and sealing of all Marble, Mosaic, and Terrazzo work, floors, base, stairs, and wainscoting by hand or machine, and in addition, assisting and aiding Marble, Masonic, and Terrazzo Mechanics.

TRAFFIC SAFETY Worker I

Traffic Safety Worker I - work associated with the delivery, installation, pick-up and servicing of safety devices during periods of roadway construction, including such work as set-up and maintenance of barricades, barrier wall reflectors, drums, cones, delineators, signs, crash attenuators, glare screen and other such items, and the layout and application or removal of conflicting and/or temporary roadway markings utilized to control traffic in construction zones, as well as flagging for these operations.

TRAFFIC SAFETY WORKER II

Work associated with the installation and removal of permanent pavement markings and/or pavement markers including both installations performed by hand and installations performed by truck.

TRUCK DRIVER - BUILDING, HEAVY AND HIGHWAY CONSTRUCTION - EAST & WEST

Class 1. Two or three Axle Trucks. A-frame Truck when used for transportation purposes; Air Compressors and Welding Machines, including those pulled by cars, pick-up trucks and tractors; Ambulances; Batch Gate Lockers; Batch Hopperman; Car and Truck Washers; Carry-alls; Fork Lifts and Hoisters; Helpers; Mechanics Helpers and Greasers; Oil Distributors 2-man operation; Pavement Breakers; Pole Trailer, up to 40 feet; Power Mower Tractors; Self-propelled Chip Spreader; Skipman; Slurry Trucks, 2-man operation; Slurry Truck Conveyor Operation, 2 or 3 man; Teamsters; Unskilled Dumpman; and Truck Drivers hauling warning lights, barricades, and portable toilets on the job site.

Class 2. Four axle trucks; Dump Crets and Adgetors under 7 yards; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment under 16 cubic yards; Mixer Trucks under 7 yards; Ready-mix Plant Hopper Operator, and Winch Trucks, 2 Axles.

Class 3. Five axle trucks; Dump Crets and Adgetors 7 yards and over; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnatrailers or turnapulls when pulling other than self-loading equipment or similar equipment over 16 cubic yards; Explosives and/or Fission Material Trucks; Mixer Trucks 7 yards or over; Mobile Cranes while in transit; Oil Distributors, 1-man operation; Pole Trailer, over 40 feet; Pole and Expandable Trailers hauling material over 50 feet long; Slurry trucks, 1-man operation; Winch

trucks, 3 axles or more; Mechanic--Truck Welder and Truck Painter.

Class 4. Six axle trucks; Dual-purpose vehicles, such as mounted crane trucks with hoist and accessories; Foreman; Master Mechanic; Self-loading equipment like P.B. and trucks with scoops on the front.

Other Classifications of Work:

For definitions of classifications not otherwise set out, the Department generally has on file such definitions which are available. If a task to be performed is not subject to one of the classifications of pay set out, the Department will upon being contacted state which neighboring county has such a classification and provide such rate, such rate being deemed to exist by reference in this document. If no neighboring county rate applies to the task, the Department shall undertake a special determination, such special determination being then deemed to have existed under this determination. If a project requires these, or any classification not listed, please contact IDOL at 217-782-1710 for wage rates or clarifications.

LANDSCAPING

Landscaping work falls under the existing classifications for laborer, operating engineer and truck driver. The work performed by landscape plantsman and landscape laborer is covered by the existing classification of laborer. The work performed by landscape operators (regardless of equipment used or its size) is covered by the classifications of operating engineer. The work performed by landscape truck drivers (regardless of size of truck driven) is covered by the classifications of truck driver.

MATERIAL TESTER & MATERIAL TESTER/INSPECTOR I AND II

Notwithstanding the difference in the classification title, the classification entitled "Material Tester I" involves the same job duties as the classification entitled "Material Tester/Inspector I". Likewise, the classification entitled "Material Tester II" involves the same job duties as the classification entitled "Material Tester/Inspector II".

**SECTION 004850**

**CERTIFICATE OF COMPLIANCE WITH ILLINOIS DRUG-FREE WORKPLACE ACT**

## 1.1 CERTIFICATE OF COMPLIANCE WITH ILLINOIS DRUG-FREE WORKPLACE ACT INFORMATION

A. _____, Contractor, having 25 employees, does hereby certify pursuant to Section 3 of the Illinois Drug-Free Workplace Act (Ill. Rev. Stat. ch. 127 par. 132.313) that [he, she, it] shall provide a drug free workplace for all employees engaged in the performance of work under the contract by complying with the requirements of the Illinois Drug Free Workplace Act and, further certified, that [he, she, it] is not ineligible for award of this contract by reason of debarment for a violation of the Illinois Drug-Free Workplace Act.

B. Firm Name: _____

C. By: _____
(Authorized Agent of Contractor)

**SECTION 004860**

**SUBSTANCE ABUSE PREVENTION POLICY**

## 1.1 SUBSTANCE ABUSE PREVENTION POLICY

A. Pursuant to P.A. 95-0635 (the "Substance Abuse Prevention on Public Works Act"), employees of the Contractor and employees of any Subcontractor are prohibited from the use of drugs or alcohol, as defined in the Act, while performing work on any public works project.

Before the Contractor or Subcontractor commences work, the Contractor and any Subcontractor shall have in place a written Substance Abuse Prevention Program for the prevention of substance abuse among its employees which meets or exceeds the requirements in P.A. 95-0635 or shall have a collective bargaining agreement in effect dealing with the subject matter of P.A. 05-0635.

The Contractor and any Subcontractor shall file with the public body engaged in the construction of the public works: a copy of the substance abuse prevention program along with a cover letter certifying that their program meets the requirements of the Act or a letter certifying that the Contractor or Subcontractor has a collective bargaining agreement in effect dealing with the subject matter of this Act. A certification form is attached and must be completed by the Contractor and each Subcontractor to this Contract.

**SECTION 004860**

**SUBSTANCE ABUSE PREVENTION POLICY**

_____
(Date)

Village of Hoffman Estates
1900 Hassell Road
Hoffman Estates, Illinois 60169

Re: Substance Abuse Prevention Program

Pursuant to Public Act 95-0635, the undersigned hereby certifies that it is in compliance with the terms and provisions of the Substance Abuse Prevention on Public Works Act. In particular, the undersigned hereby represents and warrants to the Owner as follows:

**[complete either A or B below]**

A. The undersigned representative of the Contractor/Subcontractor certifies that the contracting entity has signed collective bargaining agreements that are in effect for all of its employees, and that deal with the subject matter of Public Act 95-0635.

_____
Contractor/Subcontractor (type or print)

_____
Name of Authorized Representative (type or print)

_____
Title of Authorized Representative (type or print)

Date: _____ _____
Signature of Authorized Representative

B. The undersigned representative of the Contractor/Subcontractor certifies that the contracting entity has in place for all of its employees not covered by a collective bargaining agreement that deals with the subject of the Act, the attached substance abuse prevention program that meets or exceeds the requirements of Public Act 95-0635 **[attach a copy of the program].**

_____
Contractor/Subcontractor (type or print)

_____
Name of Authorized Representative (type or print)

_____
Title of Authorized Representative (type or print)

Date: _____ _____
Signature of Authorized Representative

**SECTION 004870**

**CERTIFICATE OF COMPLIANCE WITH ILLINOIS HUMAN RIGHTS ACT**

## 1.1 CERTIFICATE OF COMPLIANCE WITH ILLINOIS HUMAN RIGHTS ACT INFORMATION

A. _____, Contractor, does hereby certify pursuant to P.A. 87-1257, the Illinois Human Rights Act, that(he, she, it) has adopted a written sexual harassment policy that includes at a minimum the following information: (i) the illegality of sexual harassment; (ii) the definition of sexual harassment under Illinois law; (iii) a description of sexual harassment, utilizing examples; (iv) an employer's internal complaint process, including penalty; (v) the legal recourse, investigative and complaint process available through the Department of Human Rights Commission; (vi) directions on how to contact the Department and Commission; and (vii) protection against retaliation as provided by Section 6-101 of the Illinois Human Rights Act.

B. Firm Name: _____

C. By: _____
(Authorized Agent of Contractor)

**SECTION 004950**

**BIDDER ELIGIBILITY CERTIFICATION AND NON-COLLUSION AFFIDAVIT**

## 1.1 BIDDER ELIGIBILITY CERTIFICATION AND NON-COLLUSION AFFIDAVIT INFORMATION

A. Public Act 85-1295 (Illinois Revised Statutes, 1987, ch. 38, art. 33E) requires that all contractors bidding for public agencies in the State of Illinois certify that they are not barred from bidding on public contracts for bid rigging or bid rotation.

B. The following certification must be signed and submitted with bidder's bid proposal. FAILURE TO DO SO WILL RESULT IN DISQUALIFICATION OF THE BIDDER.

1. _____, as part of its bid on
   (Name of Contractor)
2. Contract for – Village Green Concessions, hereby certifies that said contractor is not barred from bidding on the aforementioned contract as a result of a violation of either Section 33E 3 or 33E-4 of Article 33E of Chapter 38 of the Illinois Revised Statutes.
3. The undersigned further certifies and affirms that this proposal was prepared independently for this project and that it contains no fees or amounts other than for legitimate execution of this work as specified and that it includes no understandings or agreements in restraint of trade.

Firm Name: _____

By: _____
(Authorized Agent of Contractor)

_____
(Title)

Subscribe and sworn to before me

this _____ day of _____.

_____
(Notary Public)

**SECTION 004960**

**FAIR EMPLOYMENT PRACTICES AFFIDAVIT OF COMPLIANCE**

## 1.1 FAIR EMPLOYMENT PRACTICES AFFIDAVIT OF COMPLIANCE

A. THIS AFFIDAVIT MUST BE EXECUTED AND SUBMITTED WITH THE SIGNED CONTRACT FORM. NO CONTRACTS WILL BE ACCEPTED BY THE BOARD OF TRUSTEES OF THE VILLAGE UNLESS SAID AFFADIVIT IS SUBMITTED CONCURRENTLY WITH THE CONTRACT.

_____
(Name)

being first duly sworn, deposes and says that he/she is the

_____
(Title)

of _____
(Name of Company)

and that he/she has the authority to make the following affidavit that he/she has knowledge of the Village Bid Specifications and Documents relating to Fair Employment Practices and knows and understands the contents thereof: that he/she certifies hereby that is the policy of

_____
(Name of Company)

to recruit, hire. train, upgrade, promote and discipline its employees without regard to race, color, creed, religion, age, sex, or physical mental handicap; and that the Company has and enforces policies which prohibit sexual harassment in the workplace.

_____
(Signature)

SUBSCRIBED and sworn to before me

this _____ day of _____

_____
(Notary Public)

**SECTION 004970**

**INDEMNITY HOLD HARMLESS AGREEMENT**

## 1.1 INDEMNITY HOLD HARMLESS AGREEMENT

A. To the fullest extent permitted by law, the Contractor hereby agrees to defend, indemnify and hold harmless the Village, its officials, agents and employees against all injuries, deaths, loss, damages, claims, patent claims, suits, liabilities, judgments, cost and expenses, which may in anywise accrue against the Village, its officials, agents and employees, arising in whole or in part of in consequence of the performance of this work by the Contractor, its employees, or subcontractors, or which may in anywise result in therefore, except that arising out of the sole legal cause of the Village, its agents or employees, the Contractor shall, at its own expense, appear, defend and pay all charges of attorneys and all cost and other expenses arising therefore or incurred in connections therewith, and, if any judgment shall be rendered against the Village, its officials, agents and employees, in any such action, the Contractor shall, at its own expense, satisfy and discharge the same.

Contractor expresses, understands and agrees that any performance bond or insurance policies required by this contract, or otherwise provided by the Contractor, shall in no way limit the responsibility to indemnify, keep and save harmless and defend the Village, its officials, agents and employees as herein provided.

The Contractor further agrees that to the extent that money is due the Contractor, by virtue of this contract as shall be considered necessary in the judgment of the Village may be retained by the Village to protect itself against said loss until such claims, suits, or judgments shall have been settled or discharged and/or evidence to that extent shall have been furnished to the satisfaction of the Village.

CONTRACTOR:

_____
(Signature)

SUBSCRIBED and sworn to before me

this _____ day of _____

_____
(Notary Public)

**SECTION 007213**

**GENERAL CONDITIONS**

**FORM OF GENERAL CONDITIONS**

**1.1 AIA Document A201, General Conditions of the Contract for Construction, 2017 Edition, attached, is the General Conditions between the Owner and Contractor.**

**1.2 AIA Document A101-Exhibit A, Insurance and Bonds, 2017 Edition, attached, is the Insurance and Bonds requirements, for the Owner and Contractor, for the project.**

**1.3 A Letter of Intent to Award a Construction Contract will be issued to the approved contractor upon approval of the Owner. This Letter of Intent shall serve as the Notice to proceed and the Contract for Construction, with all the terms and conditions referenced in the contract documents, until the contract, referenced above, has been fully executed. The awarded contractor shall begin all construction services as specified upon receipt of this Letter of Intent.**

**END OF SECTION**

DRAFT

# AIA® Document A201™ – 2017

## *General Conditions of the Contract for Construction*

**for the following PROJECT:**
*(Name and location or address)*

Village of Hoffman Estates - ~~General~~»Village Green Improvements – Phase I[JP1]
«~~REVISED 07142020~~ 07282020 »

**THE OWNER:**
*(Name, legal status and address)*

«Village of Hoffman Estates
1900 Hassell Road
Hoffman Estates, Illinois 60169
Telephone Number: (847) 882-9100
Fax Number: (847) 781-2679»

**THE ARCHITECT:**
*(Name, legal status and address)*

« «Tria Architecture, Inc.»« »
«901 McClintock Drive, Suite 100
Burr Ridge, Illinois 60527»

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**ADDITIONS AND DELETIONS:** The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

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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**User Notes:** (1798846788)

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## ARTICLE 1 GENERAL PROVISIONS

### § 1.1 Basic Definitions

#### § 1.1.1 The Contract Documents

The Contract Documents consist of the Invitation to Bid, Instruction to Bidders, Bid Form, Agreement between Owner and Contractor (hereinafter the Agreement), Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Schedules, 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, (4) an Architect's Supplemental Instruction, or (5) a written order for a minor change in the Work issued by the Architect.

#### § 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. Figured dimensions shall be followed in preference to measurements by scale. All dimensions shall be checked against field measurements of existing conditions to be taken by the Contractor.

#### § 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.

**§ 1.1.9** In the event that the Owner retains a Construction Manager at Risk for the Project, the term "Contractor" as used herein shall refer to the Contractor or Construction Manager at Risk.

### § 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 and items reasonably inferable therefrom. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all.

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**§ 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.

**§ 1.2.1.2** Where conflicts exist within or between parts of the Contract Documents, or between the Contract Documents and applicable standards, codes and ordinances, the Contractor shall seek a clarification in writing from the Architect. In the event that the Architect does not respond within fourteen (14) days, the more stringent or higher quality or greater quantity requirements shall apply.

**§ 1.2.1.3** Large-scale drawings take precedence over small-scale drawings, figured dimensions over scaled dimensions and noted materials over graphic representations. Words in singular shall include a plural whenever applicable, or the context so indicates.

**§ 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.

**§ 1.2.3.1** In the event of conflicts or discrepancies among the Contract Documents, interpretations will be based on the following priorities: 1) The Agreement, 2) Addenda, with those of later date having precedence over those of earlier date, 3) The General Conditions of the Contract for Construction, 4) Drawings and Specifications.

**§ 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. The descriptive headings of this Agreement are inserted for convenience only and shall not control or affect the meaning or construction of any provisions following them.

**§ 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.

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**§ 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.

### § 2.2 Information and Services Required of Owner

**§ 2.2.1** All permits and fees shall be obtained and paid for by the Contractor under the Contract Documents. The Contractor shall also be responsible to obtain all temporary permits including, but not limited to, demolition and canopy permits required to execute the Work

**§ 2.2.2** 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.

**§ 2.2.3** If the employment of the Architect terminates, the Owner shall employ a successor whose status under the Contract Documents shall be that of the Architect.

**§ 2.3.1 Surveys.** 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.

**§ 2.3.2** 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.

**§ 2.3.3** 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

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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 seven-day (7) 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 immediately, without prejudice to other remedies the Owner may have, correct such default or neglect. In such case, an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor, the cost of correcting such deficiencies, including but not limited to, attorney's fees, compensation for the Architect's additional services and expenses incurred in connection with such default, neglect or failure. Said Change Order shall be deemed signed by the Contract for the purposes stated in Section 7.2.1 even if the Contractor fails to physically sign such Change Order. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, at the Owner's option, the excess shall be deducted from any payment thereafter due or shall be paid by the Contractor immediately upon demand of the Owner. This right shall be in addition to and not in restriction or derogation of the Owner's rights under Article 14 hereof.

**§ 2.6 ADDITIONAL RIGHTS**

The rights stated in Article 2 shall be in addition and not in limitation of any other rights of the Owner granted in the Contract Documents or at law or in equity.

**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, has inspected the local conditions under which the Work is to be performed, and has reviewed the Contract Documents, and correlated personal observations and inspections, and the bid, with all of the requirements of the Contract Documents.

**§ 3.2.1.1** It shall be the duty of the Contractor to verify all dimensions given on the Drawings, and to report any error or inconsistency to the Architect before commencing Work.

**§ 3.2.1.2** If the Contractor finds any details, construction procedures or materials shown on the Drawings or called for in the Specifications which the Contractor believes may not be satisfactory for the use shown, the Contractor shall so notify the Architect at least five (5) days before bids are due. Signing of the Agreement and starting the Work by the Contractor shall indicate the Contractor agreement with all details, construction procedures, and materials so shown and/or specified and shall indicate the Contractor's willingness to construct the Project in strict accordance with the Contract Documents and to guarantee the Project in full compliance with the warranty provisions of the Contract Documents. By executing this Agreement, the Contractor further acknowledges that it has satisfied itself as to the nature and location of the Work, the general and local conditions under which the Work is to be performed, including those bearing upon transportation, disposal, handling and storage of materials availability of labor, water, electric power, roads and uncertainties of weather, ground water table or similar physical conditions of the ground, the character, quality and quantity of surface and subsurface materials to be encountered, the character of equipment and facilities needed prior to and during the prosecution of the Work, and all other matters which can in any way affect the Work or the cost thereof . Any failure by the Contractor to become acquainted with all the available information concerning these conditions will not relieve the Contractor from any obligations with respect to the Contract Documents.

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**§ 3.2.1.3** If Work is required in a manner that makes it impossible to produce the quality required by the Contract Documents, or should discrepancies appear among the Contract Documents, the Contractor shall request in writing an interpretation from the Architect before proceeding with the Work. The Contractor shall perform the work at no additional cost to the Owner in accordance with the Architect's determination.

**§ 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. The Contractor shall promptly report to the Owner and the Architect any errors, omissions, or inconsistencies in the Contract Documents. The Contractor shall not be liable to the Owner or Architect for damage resulting from errors, inconsistencies, or omissions in the Contract Documents unless the Contractor recognized or should have recognized such error, inconsistency, or omission, and failed to report it to the Architect, in which case the Contractor shall not be entitled to an increase in the Contract Sum or Contract Time and the Contractor shall bear all attributable costs for correction. The Contractor agrees to release and hold harmless the Owner for errors, inconsistencies or omissions in the Contract Document which should have been discovered by the Contractor.

**§ 3.2.3** The Contractor shall verify the accuracy of all grades, elevations, existing conditions, dimensions and locations. In all cases of interconnection of the Contractor's Work with existing or other work, the Contractor shall verify at the site all dimensions relating to such existing or other work. Any errors due to the Contractor's failure to so verify all such grades, elevations, existing conditions, locations or dimensions shall be promptly rectified by him without extra cost to the Owner. Neither the Owner nor the Architect guarantee the exactness of grades, elevations, dimensions, existing conditions or locations given on any drawings issued by the Architect or work installed by other contractors.

**§ 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 the obligations in Sections 3.2.2 and 3.2.3, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies, or omissions in the Contract Documents or for differences between field measurements or conditions and the Contract Documents, unless the Contractor recognized or should have recognized the error, inconsistency, omission, or difference and failed to report it.

**§ 3.2.5** In no event shall the Architect or Owner have control over, charge of, or any responsibility for construction means, methods, techniques, sequences, or procedures or for safety precautions and programs in connection with this Work, notwithstanding any of the rights and authority granted the Owner in the Contract Documents.

### § 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. The Contractor shall review any construction or installation procedure (including those recommended by any product manufacturer). The Contractor shall provide written notice to the Architect:

(a) If a specified product deviates from good construction practices.
(b) If following the Specifications will affect any warranties.

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(c) Any objections which the Contractor may have to the Specifications.

The responsibilities imposed on the Contractor by this Section shall be in addition to, and not be limited by, any and all other provisions of these Contract Documents.

**§ 3.3.2** The Contractor shall engage workmen who are skilled in performing the Work and all Work shall be performed with care and skill and in a good workmanlike manner under the full time supervision of the approved superintendent described in Section 3.9.3. The Contractor shall be liable for all property damage including repairs or replacement of the Work and economic losses which proximately result from the breach of this duty. The Contractor shall be responsible to the Owner for the acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and any other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors or claiming by, through or under the Contractor, and for any damages, losses, costs and expenses resulting from such acts or omissions.

**§ 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.

**§ 3.3.4** The Contractor shall not be relieved of 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 of or performed by persons other than the Contractor.

**§ 3.3.5** The Contractor shall coordinate all portions of the work with separate Owner-employed contractors, if any.

**§ 3.3.6** The Contractor shall assign a competent, technically-trained office project manager to the Project who shall perform all office functions including checking, approving and coordinating shop drawings and approving purchasing and disbursement pay-out requests and correspondence, and responding to Owner inquiries.

### § 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 **Substitutions:** Before or after the after the award of the Contract, a request by the Contractor for a substitution of materials or equipment in place of those specified in the Contract Documents will be considered only under one or more of the following conditions:

(a) Required for compliance with interpretation of code requirements or insurance regulations then existing.
(b) Unavailability of specified products, through no fault of the Contractor.
(c) Subsequent information discloses inability of specified products to perform properly or to fit in designated space.
(d) Manufacturer/fabricator refuses to certify or guarantee performance of specified product as required.
(e) When it is clearly seen, in the judgment of the Architect and with the Owner's approval, that a substitution would be substantially to the Owner's best interests, in terms of cost, time, or other considerations.

By making requests for substitutions hereunder, the Contractor:

.1 represents that the Contractor has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified;
.2 represents that the Contractor will provide the same warranty for the substitution that the Contractor would for that specified;
.3 certifies that the cost data presented is complete and includes all related costs under this Contract except the Architect's redesign costs, and waives all claims for additional costs related to the substitution which subsequently become apparent; and

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.4 will coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.

**§ 3.4.2.1** Substitution requests shall be written, timely and accompanied by adequate technical, cost data and information to satisfy one or more conditions above. Requests shall include a complete description of the proposed substitution, name of the material or equipment for which it is to be substituted, drawings, cut sheets, performance and test data and any other data or information necessary for a complete evaluation by the Architect.

**§ 3.4.2.2** The Contractor may make a substitution only upon the written 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. The Contractor shall be responsible for any damages to property or injuries to persons, or to any other harm, caused by the Contractor's employees.

**§ 3.4.4** After the Agreement has been executed, the Owner and the Architect will consider a formal request for the substitution of products in place of those specified only under the conditions set forth in Section 7.5.

**§ 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 otherwise required or permitted by the Contract Documents and that the Work will be free from faults and defects and in conformance with the Contract Documents. The warranty will not be affected by the specification of any product or procedure unless the Contractor objects promptly to such product or procedure and advises the Architect of possible substitute products or procedures which will not affect the warranty. This warranty shall not be restricted by the limitations of any manufacturer's warranty. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective in the Owner's sole discretion. Inability or refusal of the Subcontractor or supplier responsible for the defective work to correct such work shall not excuse the Contractor from performing under the warranty. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

**§ 3.5.2** Unless a specific guarantee is required in a particular division of the Specifications that is longer in duration than one (1) year from the date of Final Completion, the Work shall be guaranteed by the Contractor against defects in material and workmanship for a period of one (1) year from the date of Final Completion (date of issuance of final payment to the Contractor).

**§ 3.5.3** 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**

Retail sales tax shall not be included in the bid amount. The Owner is exempted by Section 3 of the Illinois Use Tax Act (Section 3, House Bill 1610, approved July 31, 1961, Illinois Revised Statutes 1967, Chapter 120, Section 439.3) from paying any of the taxes imposed by the Act and sales to Owner are exempt by Section 2, House Bill 1609, approved July 31, 1961, Illinois Revised statutes 1967, Chapter 120, Section 441) from any of the taxes imposed by the Act. The Department of Revenue of the State of Illinois under Rule No. 15, issued August 9, 1961, has declared that sales of materials to construction contractors for conversion into real estate for schools, governmental bodies, agencies and instrumentalities are not taxable retail sales. The Contractor shall be responsible for any sales, consumer, use and similar taxes for the Work.

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

**§ 3.7.1** The Contractor shall secure all permits, licenses and inspections necessary for proper execution and completion of the Work which are customarily secured after execution of the Contract and which are legally required when bids are received.

**§ 3.7.1.1** All cash deposits, bonds, fees, inspections, licenses, or permit fees shall be paid for by the Contractor.

**§ 3.7.1.2** Prior to submission of all applications for permits, licenses or inspections the Contractor shall submit a copy of the application or written notice to the Owner for approval.

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**§ 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 observes or believes that portions of the Contract Documents are at variance with applicable laws, statutes, ordinances, building codes, and rules and regulations, the Contractor shall promptly notify the Architect and Owner in writing for clarification by the Architect. If the Contractor performs Work knowing it to be contrary to any 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 cost, damages, losses and expenses 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.. 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. The site conditions contemplated by this Section include, but are not limited to, materials containing asbestos, polychlorinated biphenyl (PCB), or hazardous materials as defined in the Contract Documents.

**§ 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 fluent in the English language 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. Important communications by the superintendent shall be confirmed in writing. Other communications by the superintendent shall be similarly confirmed on written request in each case. Failure of the superintendent to

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supervise the job properly shall be deemed as a default by the Contractor under the Contract Documents as determined by the Owner with the advice of the Architect.

**§ 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. If the Owner has any objection to the proposed superintendent, the Owner shall notify the Contractor in writing within seven (7) days of its objection, and the Contractor shall propose a replacement.

**§ 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 and Architect's written consent.

**§ 3.9.4** The Contractor's superintendent must be dedicated solely to the Project and must be at the Project site at all times that Work is being performed at the site, whether the Work is performed by the Contractor's own forces or by any subcontractors. The superintendent must be at the Project site from the first day of on-site activities until a minimum of thirty (30) days after the date of Substantial Completion until all punch list items have been completed. Failure by the Contractor to provide full-time on-site supervision shall constitute grounds for termination of the Contract Documents by the Owner with seven days written notice.

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

**§ 3.10.1** The Contractor, promptly after being awarded the Project, shall prepare and submit for the Owner's and Architect's review its Construction Schedule for the Work of the Contractor. Such Construction Schedule shall not exceed the completion dates, delivery dates or time limits required in the Contract Documents. The Construction Schedule shall be revised by the Contractor at appropriate intervals as required by the conditions of the Work and Project, and shall provide for expeditious execution of the Work and shall be submitted to the Owner and Architect for review and approval. 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 shall prepare and keep current, for the Architect's record only, a schedule of submittals (the "Submittal Schedule") which is coordinated with the approved Construction Schedule and allows the Architect reasonable time, as indicated in the Contract Documents, to review submittals. Neither the Contractor's preparation of the Submittal Schedule nor the Architect's receipt or review shall modify the Contractor's responsibility to make required submittals or to do so in a timely manner to provide for review in accordance with Section 4.2.7 as modified herein.

**§ 3.10.3** The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect. The Owner's or Architect's failure to object to a submitted schedule that exceeds time limits current under the Contract Documents shall not relieve the Contractor of its obligations to meet those limits, nor shall it make the Owner or Architect liable for any of the Contractor's damages incurred as a result of increased construction time or not meeting those time limits. Similarly, the Architect's or Owner's failure to object to a Contractor's schedule showing performance in advance of such time limits shall not create or infer any rights in favor of the Contractor for performance in advance of such time limits.

**§ 3.10.4** At the time of each Application for Payment, the Contractor shall provide to the Owner and the Architect an update on the Project schedule and a written status report, which includes a description of the progress of the Work and if progress is behind schedule, the Contractor's plan to recover the Work to meet the approved Construction Schedule. The report shall also include a summary of the Contractor's meetings with subcontractors.

**§ 3.10.5** The Contractor shall hold meetings at least weekly (or at such intervals as are otherwise acceptable to the Owner and Architect) at the site. The Contractor shall provide the subcontractors, Architect and the Owner with a meeting schedule. The Contractor shall require subcontractors currently working at the site(s) to have a representative present for such meetings.

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**§ 3.10.6** Within twenty-one (21) days of the award of the Project, the Contractor shall provide a written report to the Architect and the Owner that includes a list of the Contractor's suppliers, a list of materials and equipment to be purchased from suppliers and fabricators, the time required for fabrication, and the scheduled delivery dates for materials and equipment. Copies of the Contractor's purchase orders shall be delivered to the Architect and the Owner as soon as possible after receipt by the Contractor.

### § 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 along with all operating manuals for all equipment, shall be available to the Architect at all times and delivered to the Architect for submittal to the Owner after completion of the Work but before the final Application for Payment.

**§ 3.11.1** The Contractor shall maintain at the site(s) one set of record drawings for the Owner and Architect of the as built plans and specifications for concealed work, particularly concealed piping and conduit. Any deviations from conditions shown on the Contract Drawings shall be shown and dimensioned on these record drawings. The Contractor shall develop layout drawings for concealed work that is schematically indicated on Contract Drawings in order to have dimensioned layouts of such concealed work. This requirement does not authorize any deviations without approval of the Architect.

**§ 3.11.1.1** The field information in the record drawings to be so marked shall include at a minimum:

(1) Significant deviations of any nature made during construction;

(2) Location of underground mechanical and electrical services, utilities, and appurtenances, referenced to permanent surface improvements.

(3) Location of mechanical and electrical services, utilities, and appurtenances that are concealed in the building, referenced to accessible features of the building.

**§ 3.11.2** The Contractor shall maintain and shall require its subcontractors to maintain at the site(s) an accurate record of deviations and changes in the Work from the Contract Documents; shall indicate all such deviations and changes on reproducible transparencies of the Contract Documents; and shall turn over to the Architect upon completion of the Work all such record drawings, documents and information, such as final shop drawings and sketches, marked prints and similar data indicating the as-built conditions. Plumbing, HVAC and Electrical Contractors/Subcontractors shall be required to record all changes or deviations in the work from the Contract Documents. . The cost of recording and transferring the changes or deviations to the transparencies shall be included in the Contract Sum for the respective Work. The as-built transparencies shall be delivered by the Contractor to the Architect prior to the final acceptance of the Project and issuance of final payment.

### § 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

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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**. When professional certification or performance criteria of materials, systems or equipment is required by the Contract Documents, the Contractor shall provide the person or party providing the certification with full information of the relevant performance requirements and on the conditions under which the materials, systems, or equipment will be expected to operate at the Project site. The certification shall be based on performance under the operating conditions at the Project site. The Architect shall be entitled to rely on the accuracy and completeness of such certifications.

**§ 3.12.10.2** When 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.

**§ 3.13.1** Only material and equipment which is to be used directly in the construction of this Project shall be brought to and stored on the job site by the Contractor. After equipment is no longer needed on this Project, it shall be promptly removed from the job site. Protection of all construction materials and equipment stored at the Job Site is the sole responsibility of the Contractor.

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**§ 3.13.2** The Contractor and its Subcontractors, and their respective employees, agents, and consultants, shall not enter any part or portion of the building work sites when students are present without the Owner's written authorization.

### § 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 which consent shall not be unreasonably withheld. The Contractor's consent is not required.

**§ 3.14.3** Only tradespersons skilled and experienced in cutting and patching shall perform such 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. The Contractor shall remove and clean up hazardous materials as required by the Contract Documents and in compliance with all applicable laws, rules regulations and codes.

**§ 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.

**§ 3.15.3** All exterior and interior Work shall be cleaned by the Contractor using specific materials as recommended for surfaces to be cleaned. Damage to any surfaces due to improper cleaning methods of materials shall be repaired to the satisfaction of the Architect and Owner, by the Contractor, at no cost to the Owner.
The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress at all times and 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, except to the extent of Contractor's fault. 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 waives any right of contribution against and shall defend, indemnify and hold harmless Owner, any Owner's Representative, the Architect and each of their respective officers, directors, officials, board members, agents, consultants and employees from and against all claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from or in connection with the performance of the Work, provided that any such claim, damage, loss or expense (these are collectively referred to as "claims") is caused by or alleged to be caused by an act or omission of Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable in the performance of the Agreement, regardless of whether or not it is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or otherwise reduce any other right or obligation of indemnity or contribution which would otherwise exist as to any party or person described in this Contract. The obligations of the Contractor under this Section 3.18.1 shall be construed to include, but not be limited to, injury or damage consequent upon failure to use or misuse by the Contractor, his agents, Sub-Contractors, and employees of any scaffold, hoist, crane, stay, ladder, support, or other mechanical contrivance erected or constructed by any person, or any or all other kinds of equipment, whether or not owned or furnished by the Owner.

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**§ 3.18.2** The Contractor agrees to indemnify, defend, save and hold harmless the following indemnitees: the Architect and The Owner and each of their respective board members, directors, officers, officials, agents, consultants, and employees, individually and collectively, from all claims, demands, actions and the like, of every nature and description, made or instituted, by third parties, arising or alleged to arise out of the work under this Agreement, as a result of any act or omission of either the Contractor or any Subcontractor, or any of their employees or agents. The Contractor and its Subcontractor shall name the Owner, the Architect and their respective board members, officers, officials, directors, agents and employees, individually and collectively, as additional insureds on their commercial general liability for claims arising out of the operations of the Contractor/Subcontractor, automobile liability and excess/umbrella coverage which insurance shall be primary coverage as respects the additional insureds. The Contractor and Subcontractor/s shall furnish Owner with copies of such policies prior to beginning any Work.

**§ 3.18.3** "Claims, damages, loses and expenses" as these words are used herein shall be construed to include, but not be limited to (1) injury or damage consequent upon the failure of or use or misuse by Contractor, its Subcontractors, agents, servants or employees, of any hoist, rigging, blocking, scaffolding, or any and all other kinds of items of equipment, whether or not the same be owned, furnished or loaned by Owner; (2) all attorneys' fees and costs incurred in defense of the claim or in bringing an action to enforce the provision of this Indemnity or any other indemnity contained in the Contract Documents; and (3) all costs, expenses, lost time, opportunity costs and other similar indirect or incident damages incurred by the party being indemnified or its employees, agents or consultants.

**§ 3.18.4** In the event that the Contractor or its Subcontractors are requested but refuse to honor the indemnity obligations hereunder or to provide a defense, then the party indemnifying shall, in addition to all other obligations, pay the cost of bringing any such action, including attorneys' fees, time expended by the party being indemnified and their employees in the defense of any litigation covered by this indemnity provision at their usual rates, including costs and expenses, to the party requesting indemnity.

**§ 3.18.5** 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. The Contractor hereby knowingly and intentionally waives the right to assert, under the case of Kotecki v. Cyclops Welding Corp., 146 Ill.2nd 155 (1991) that Contractor's liability may be limited to the amount of its statutory liability under the Workers' Compensation Act, and agrees that Contractor's liability to indemnify and defend the Owner and Architect is not limited by the so called "Kotecki Cap". The Contractor shall include this provision in each of its Subcontract agreements and shall require its Subcontractors to be so bound.

**§ 3.18.6** The Contractor shall include in each and every Subcontract with any and all subcontractors and/or material suppliers performing Work and require each and every Subcontractor and/or material supplier performing Work to agree to be bound by all of the provisions 3.18.1 through 3.18.9 under the Contract Documents.

**§ 3.18.7** The Contractor's indemnity obligations hereunder shall specifically include all claims and judgments which may be made against the indemnitees under federal or state law or the law of the other governmental bodies having jurisdiction, and further, against claims and judgments arising from violation of public ordinances and requirements of governing authorities due to Contractor's or Contractor's employees method of execution of the Work.

**§ 3.18.8** The indemnification provisions of this Section 3.18 are not intended to circumvent the Construction Contract Indemnification for Negligence Act, 740 ILCS 35/0.01 et seq. and shall not be construed as such, but in such a way to effect its enforcement.

**§ 3.18.9** The Contractor shall indemnify and hold harmless the Owner in the event of labor or trade union conflicts or disputes between the Contractor and Subcontractors and their respective employees. The Contractor shall endeavor to adjust and resolve such conflicts and disputes which affect the timely completion of the Work. Such conflicts or disputes shall not be a basis or excuse for the violation of the Contract Documents by the Contractor or its Subcontractors, and shall not provide the Contractor with relief from complying with dates for Substantial Completion or Final Completion. Labor or trade union disputes that affect production or delivery of materials or equipment, or the installation, shall be at no cost to the Owner. The Contractor shall notify the Architect and the Owner in writing as

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soon as possible as to any labor or trade disputes which may affect the Work and its timely completion. In such event, the Contractor shall provide a written proposal to the Architect and the Owner which includes any comparable substitution(s) necessary to complete the Work.

**§ 3.18.10** None of the foregoing provisions shall deprive the Owner or the Architect of any action, right or remedy otherwise available to them or either of them at law.

**§ 3.19** If the Work is to be performed by trade unions, the Contractor shall make all necessary arrangements to reconcile, without delay, damage, or cost to the Architect or the Owner, any conflict between the Contract Documents and any agreements or regulations of any kind at any time in force among members or councils which regulate or distinguish what activities shall not be included in the Work of any particular trade. In case the progress of the Work is affected by any undue delay in furnishing or installing any items or materials or equipment required under the Contract Documents because of the conflict involving any such agreement or regulation, the Architect may require that other material or equipment of equal kind and quality be provided at no additional cost to the Owner.

## 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, and Architect. Consent shall not be unreasonably withheld.

**§ 4.1.3** The Architect's and its consultants' services will terminate sixty (60) days after (1) the date of Substantial Completion of the Work or (2) the anticipated date of Substantial Completion identified in the Contract Documents, whichever is earlier. Any services required of the Architect and its consultants after this date will be back-charged to the Contractor by the Owner.

### § 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 as agreed to by Owner and Architect to become generally familiar with the progress and quality of the Work to endeavor to determine that the Work, when completed, will be in accordance with the Contract Documents, and to endeavor to guard the Owner against defects and deficiencies in the Work. 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 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

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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. However, this Section shall not be deemed to prohibit direct communication between the Owner and the Architect.

**§ 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. The Contractor shall provide to the Architect (1) mechanics lien waivers for itself and each of its Subcontractors for any monies sought for payment, (2) certified payroll statements and documentation as per the Illinois Prevailing Wage Act and (3) sworn statements listing subcontractors and materialmen before issuing Payment Certificates, and if such sworn statement or waivers are not provided, the Architect's Certificates shall be conditioned upon and subject to the receipt of such waivers.

**§ 4.2.6** The Architect has authority to reject Work that does not conform to the Contract Documents. Any Work rejected by the Architect shall be reported promptly to the Owner in writing 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. The Contractor shall make submittals to the Architect in a manner to allow for the Architect's reasonable prompt review and to allow for timely ordering of components of the Work to affect no delay in the Work.

**§ 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; however, the issuance of such final Certificate of Payment shall not bind the Owner to any payment unless it accepts such final Certificate for Payment. The Owner's acceptance shall not be unreasonably withheld. Additionally, the Architect shall review all warranties and related documents and provide a recommendation to the Owner as to whether the warranties comply with the Contract Documents.

**§ 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 initially 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

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requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If the Contractor submits such written request to the Architect, the Contractor will simultaneously provide a copy of such request to the Owner. The Architect will consult with the Owner regarding any request by the Contractor before responding to the Contractor.

**§ 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. The Architect will provide the Owner with a copy of any response provided pursuant to this Section.

## 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** As soon as practicable after award of the Contract, the Contractor , 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.

**§ 5.2.1.1** In addition to the information which may be required prior to the award of the Project, not later than twenty-one (21) days after Notice of Award of the Project, the Contractor shall furnish to the Owner through the Architect the names of persons or entities proposed as manufacturers for each of the products identified in the General Requirements and, where applicable, the name of the installing Subcontractor.

**§ 5.2.2** The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made an objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection. All subcontracts between the Contractor and subcontractors shall be made in writing, shall be assignable to the Owner, and shall contain the following sentence, 'The Owner is an intended third-party beneficiary of this Subcontract.'

**§ 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 No additional costs shall be allowed for a change required due to an objection by the Owner, Contractor, or Architect

**§ 5.2.4** The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected without written approval of the Owner. The Contractor further acknowledges and agrees that after award of the Project to the Contractor, any savings on changes to subcontract or substitute subcontractors will be for the benefit of the Owner and

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will not be used for the benefit of the Contractor or to increase the Contractor's profit on the Project. The foregoing benefit to the Owner shall include any adjustment in the amount of the price of a subcontract to less than the quoted price of the subcontractor upon which the Contractor's fixed bid price or Contract Sum was based. Further, if a manufacturer or supplier of any machinery or equipment, including, but not limited to, heating and air conditioning units or systems, changes specifications or offers incentives, discounts or lower prices after award of the Contract to the Contractor, those savings will inure to the benefit of the Owner and not the Contractor, subcontractor, manufacturer or supplier.

### § 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.

**§ 5.3.1** The Contractor shall be responsible for its Subcontractors and shall carry insurance which covers the Contractor for liability arising from its Subcontractors and shall ensure that its Subcontractors are carrying insurance to protect the Subcontractors as well as the Owner, Architect and Architect's consultants.

**§ 5.3.2** The Owner and Architect assume no responsibility for overlapping, gaps or omission of parts of the Work by various Contractor in awarding subcontracts.

### § 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** Intentionally Deleted.

**§ 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 without altering the Owner's Agreement with the Contractor.

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**§ 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.

### § 6.2 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.

**§ 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.

### § 6.3 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.

**§ 7.1.4** For any changes in the Work requested by the Contractor involving more than a three (3) calendar day extension of time, the Contractor shall submit critical path schedule showing the original schedule and impact of the proposed change justifying the requested extension of time. The Owner may at its option refuse the extension of time and have the Contractor perform the Work within the original schedule provided all reasonable costs for completing the Work including overtime and acceleration costs are included in the Change Order.

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**§ 7.1.5** If a proposal for extra work is requested by the Owner from the Contractor which involves additional time, at the Owner's option, the Owner may extend the completion date for that portion of the Work included in the change, without extending the Contract Time for the remainder of the Work.

**§ 7.1.6** Changes which involve credits to the Contract Sum shall include overhead, profit, general conditions, and bond and insurance costs.

**§ 7.1.7** For any adjustments to the Contract Sum based on other than the unit price method, overhead, profit, and General Conditions combined shall be calculated at the following percentages of the cost attributable to the change in the Work:

.1 For the Contractor for Work performed by the Contractor's own forces, ten percent of the Cost of the Work for the change.

.2 For the Contractor, for Work performed by the Contractor's Subcontractors five percent of the amount due the Subcontractor.

.3 For each Subcontractor or Sub-subcontractor involved, for Work performed by that Subcontractor's or Sub-subcontractor's own forces, ten percent of the Cost of Work for the change.

.4 For each Subcontractor, for Work performed by the Subcontractor's Sub-subcontractors, five percent of the amount due the Sub-subcontractor.

.5 Costs to which overhead, profit, and general conditions is to be applied shall be determined in accordance with the Contract Documents.

.6 When both additions and credits are involved in any one change, the allowance for overhead and profit shall be figured on the basis of the net increase, if any;

**§ 7.1.8** In order to facilitate checking of quotations for extras or credits, all proposals shall be accompanied by:

.1 A complete itemization of costs including labor, material.

.2 Subcontractor's, Sub-subcontractor's and material suppliers for their portions of the work itemized to include labor, material.

.3 Labor costs shall be indicated hourly wage and fringe benefits. Labor hours shall be provided for each phase of the work.

.4 Material costs shall include unit costs and units required where applicable.

**§ 7.1.9** The Contractor understands that Change Orders to the Contract which increase or decrease the Cost of the Work by $10,000 or more, or the time of completion by 30 days or more, will require written documentation by the Owner that the changes:

.1 were not reasonably foreseeable at the time the Contract was signed;

.2 were not within the contemplation of the Contract as signed; and

.3 are in the best interest of the Owner and authorized by law.

**§ 7.1.10** The Contractor shall provide written notice to the Architect and the Owner if overtime labor rates are included in the computation of the cost of a proposed Change Order or Construction Change Directive.

**§ 7.1.11** In the event that the Contractor and the Owner do not reach agreement on a Change Order or a Construction Change Directive, the Owner may, in its discretion, delete the labor, materials and equipment that are the subject of the Change Order or the Construction Change Directive from the Work to be performed under the Contract Documents. The Owner shall receive credit from the Contractor for the labor, materials, and equipment, including Contractor overhead and profit attributable to the deleted work. The Owner may complete the deleted work through another contractor or subcontractor.

### § 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.

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**§ 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** Actual 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** Actual costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;

**.3** Actual rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

**.4** Actual costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and

**.5** Actual costs of supervision and field office personnel directly attributable to the change. Cost of supervision, unless directly attributable to change, will not be allowable as an itemized cost for any additions (or credited for deletions) unless a change in the Contract Time is made.

Overtime when specifically authorized by the Owner shall be paid for by the Owner on the basis of a premium payment only, plus the cost of insurance and taxes based on the premium payment. Overhead and profit will not be paid by the Owner for overtime. Field tickets must be signed by the Owner or Architect for verification of overtime hours.

**§ 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. Upon resolution of exact scope, Contract Sum change, and Contract Time change, a Change Order shall be prepared incorporating the Construction Change Directive.

**§ 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 computed in accordance with Section 7.3.4 shall be actual net cost as confirmed

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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 or decrease, if any, with respect to that change. Also, if the amount of either the credit or the addition is in dispute, the amount of the other, non-disputed item may not be included in Applications for Payment. Overhead and profit will be included in credits to the same extent they are included in additive Change Orders.

**§ 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.

**§ 7.3.11** Change Orders that result in a net decrease in or credit to the Contract Sum must include a credit to the Owner for the Contractor's overhead and profit as described in Section 7.1.7.

### § 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 promptly 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 working day, excluding weekends and legal holidays.

### § 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. The Contractor shall bear all additional costs incurred to meet the Contract Time, which may require working overtime without additional compensation.

**§ 8.2.4** The Contractor shall reimburse the Owner for all fees or expenses, including without limitation, the Architect, engineers and legal expenses, for additional services necessitated by Contractor's failure to obtain Substantial Completion within the time established in the agreement, for more than two (2) inspections for Substantial Completion, or for more than one (1) final inspection.

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### § 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 ; or (5) by other causes that the Contractor asserts, and the Owner Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

**§ 8.3.2** The Contractor shall not be entitled to recover from the Owner, and hereby waives all rights that it or its Subcontractors or any other person may otherwise have to recovery, any costs, expenses and damages of any nature that it or its Subcontractors or any other person may suffer by reason of delay in the performance of the Work or any portion thereof, the extension of Contract Time granted herein being the Contractor's sole and exclusive remedy.

**§ 8.3.3** The Contractor shall not be entitled to any increase in the Contract Sum as a result of any delays in the progress of the Work. The Contractor's sole remedy for delay shall be an extension of time. This Section 8.3 does not preclude recovery of damages for delay by the Owner under other provisions of the Contract Documents.

**§ 8.3.4** Notwithstanding other provisions in this Contract, Contractor shall not be entitled to any recovery of damages arising out of any event or delay caused within Contractor's control and/or for "Acts of God", including, without limitation, adverse weather conditions (which shall include typical rain events that can be reasonably predicted through historical data) which prevents such early or timely completion of the Work.

**§ 8.3.5** Where a delay occurs that is beyond the Contractor's control and when the delay is not reasonably unacceptable, the Contractor has an affirmative duty to mitigate the effect of that delay on the progress of the Work. An extension of the Substantial Completion date will not be granted to the extent that the Contractor breaches said duty to mitigate.

**§ 8.3.6** The stated dates for Substantial Completion and Final Completion of the Work are material inducements to the Owner in entering into the Contract Documents and all time limits stated in the Contract Documents are of the essence 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

At the pre-construction meeting, the Contractor shall submit to the Owner and the Architect a detailed schedule of values allocating the Contract Sum to 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 twenty (20) days before the Owner's submission date for its Board's review and approval of such payment at the next Owner's Board meeting or, if the Owner's Board approves otherwise, 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

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Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents. The form of Application for Payment shall be a notarized AIA Document G702, Application and Certification for Payment, supported by AIA Document G703, Continuation Sheet.

**§ 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. However, this Section will not apply to routine retainage the Contractor intends to withhold from the Subcontractor pursuant to the Subcontract.

**§ 9.3.1.3** No interest will be paid upon retention.

**§ 9.3.1.4** The Contractor shall submit all payment requests to the Architect for all work completed during the previous time period. Requests submitted late will not be processed until the following month. The Contractor shall include the Contractor's waiver of lien for the full amount of the Application for Payment and Subcontractors' partial waivers of lien in the amounts of the previous month's payment

**§ 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. The Contractor shall submit requisitions from suppliers and Subcontractors to substantiate the amounts requested on the Application for Payment for materials or equipment stored on or off site. The Owner shall have no responsibility or liability to the Contractor for the safekeeping of materials and equipment stored at the site or 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.

**§ 9.3.4** The Contractor shall submit its application for payment as outlined in Section 9.3 on the first of the month, and the Owner will make payment in accordance with ~~the Local Government Prompt Payment Act~~this Agreement upon Applications properly certified by the Architect. Each partial payment request shall be made monthly and Contractor shall request payment of ninety percent (90%) of the portion of the Contract Sum properly allocable to labor, materials and equipment incorporated in the work less the aggregate of previous payments in each case. When the Project is 50% complete, the Owner shall reduce retainage- to 5% until the Contract has been fully and satisfactorily performed.

**§ 9.3.5** Before each certificate for payment is issued, the Contractor shall furnish to the Architect a complete statement of the amounts due to Subcontractors, parties supplying material, and for his own materials and labor, on AIA Document G702 and G702A "Application and Certificate for Payment."

**§ 9.3.6** A Sworn "Contractor's Affidavit" shall be submitted with each payment request in sufficient form for the Owner to determine Contractor's right to payment and compliance with the Illinois Mechanic's Lien law. Each payment request shall include executed waivers of lien in conformity with information set forth on a properly completed Contractor's Affidavit. The Contractor shall submit waivers on a current basis with each Application for Payment, and the Subcontractors and suppliers shall submit partial waivers of lien for the amount paid to them from the prior month's pay application.

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**§ 9.3.7** All material necessary for the construction of this Project, delivered upon the premises, shall not be removed from the premises without written consent of the Architect.

**§ 9.3.8** The Contractor's request for final payment shall include: (1) the Contractor's Final Lien Waiver in the full amount of the contract; and (2) final lien waivers in the full amount of their contracts from all subcontractors and suppliers for which final lien waivers have not previously been submitted.

### § 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.

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**§ 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.

**§ 9.5.5** The Owner shall not be required to make payment unless in its own independent judgment it accepts the Architect's Certificate.

### § 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. In the event that the Owner elects to utilize an escrow agent, the Owner and the escrow agent may elect to make payments due the Contractor to the Contractor and its subcontractors.

**§ 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 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** Intentionally Deleted.

**§ 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

Intentionally Deleted.

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### § 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. The Work will not be considered suitable for Substantial Completion review until all Project systems included in the Work are operational as designed and scheduled, all designated or required governmental inspections and certifications have been made and posted (other than for the failure of Contractor), designated instruction of the Owner's personnel in the operation of systems has been completed and documents, and all final finishes within the Project are in place. In general, the only remaining Work shall be minor in nature, so that the Owner could occupy the Project on that date and the completion of the Work by the Contractor would not materially interfere or hamper the Owner's normal business operations and/or use and enjoyment of the Project. As a further condition of Substantial Completion acceptance, the Contractor shall certify that all remaining Work will be completed within thirty calendar days or within the time stated elsewhere in the Contract Documents following the Date of Substantial Completion. Upon the Owner's written consent, the Date of Substantial Completion of landscaping portions of the Work or other designated portions of the Work may be as mutually acceptable to the Owner and the Contractor. The Contractor shall secure and deliver to the Owner written warranties and guarantees from its Subcontractors, Sub-Subcontractors and suppliers bearing the date of Substantial Completion or some other date as may be agreed to by the Owner and stating the period of warranty as required by the Contract Documents.

**§ 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. With respect to Work enumerated on the list accompanying the Certificate of Substantial Completion, the guarantee or warranty period shall start at the time of subsequent acceptance of this Work in writing by Owner.

**§ 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.

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**§ 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** All Work identified on Contractor's Punch List and thereafter identified in Architect's inspection shall be completed within thirty (30) days of issuance of the Certificate of Substantial Completion. 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.
**§ 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** 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.

### § 9.11 LIQUIDATED DAMAGES

**§ 9.11.1** The Contractor is solely responsible for substantially completing the Work by the scheduled Substantial Completion Date for each Phase of the Work. This responsibility includes all work of the Contractor and that of its Subcontractors and suppliers. The Contractor acknowledges that the Owner will suffer significant financial loss, and there will be disruption to the Owner if the Project is not complete on or before the Substantial Completion Date for the Work set forth in the Contract Documents. The Contractor further acknowledges that the measure of such loss and the disruption to the Owner would not be susceptible to precise calculation. To protect the Owner against said loss and disruption to the Owner and not as a penalty, the Owner and the Contractor hereby agree that the Contractor and the Contractor's Surety, if any, shall be liable for and shall pay to the Owner, Liquidated Damages as per the Liquidated Damages Sliding Scale below for each calendar day of delay, per each School Campus, per Phase in Substantial Completion. Substantial Completion for the Project refers to all scheduled work being a minimum 99% complete.

**LIQUIDATED DAMAGES SLIDING SCALE**

| Original Awarded Bid Cost | Liquidated Damages per Calendar Day |
|---|---|
| $0 - $499,999.99 | $500 |
| $500,000.00 - $999,999.99 | $600 |
| $1,000,000.00 - $3,999,999.99 | $700 |
| $4,000,000.00 - $7,999,999.99 | $800 |
| $8,000,000.00 - $11,999,999.99 | $900 |
| $12,000,000.00 - $19,999,999.99 | $1,000 |
| $20,000,000.00 - Above | $1,500 |

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**§ 9.11.2** Payments of Liquidated Damages are in addition to other direct damages that may be incurred by the Owner and not a penalty. All such Liquidated Damages may be set-off against any monies that may be due the Contractor. The Owner's approval or making of progress payments or final payment, with or without knowledge that the Work was untimely, shall not constitute or be deemed a waiver of the Owner's rights or claims, or of the Owner's ability to receive Liquidated Damages under the Contract or common law.

**§ 9.11.3** In the event that Article 9.11.1 is found to be unenforceable, the Owner shall be entitled to recover its actual damages, including consequential, incident or indirect damages, for a failure to complete the Work by the scheduled Substantial Completion Date for each Phase of the Work.

## 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. Neither the Owner nor the Architect shall be responsible for any safety precautions or programs in connection with the Work.

### § 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. at its sole cost and expense, 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.

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**§ 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 twenty-one (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.

**§ 10.3.1.1** The Contractor shall not cause or permit any "Hazardous Materials" (as defined herein) to be brought upon, kept or used in or about the Projects site(s) except to the extent such Hazardous Materials: (1) are necessary for the prosecution of the Work; and (2) have been approved in writing by the Owner. Any Hazardous Materials allowed to be used on the Project site(s) shall be used, stored, and disposed of in writing as directed in writing by the Owner. Any Hazardous Materials allowed to be used in the Project site(s) shall be used, stored, and disposed of in compliance with all applicable laws relating to such Hazardous Materials. Any unused or surplus hazardous Materials, as well as, any other Hazardous Materials that have been placed, released, or discharged on the Project site(s) by the Contractor or any of its employees, agents, suppliers, or subcontractors, shall be removed from the Project site(s) at the earlier of (1) completion of the Work requiring the use of such Hazardous Materials; (2) the completion of the Work as a whole; or (3) within twenty-four (24) hours following the Owner's demand for such removal. Such removal shall be undertaken by the Contractor at its sole cost and expense and shall be performed in accordance with all applicable laws. The Contractor shall immediately notify the Owner of any release or discharge of any Hazardous Materials on the Project site(s). The Contractor shall provide the Owner with copies of all warning labels on products that the Contractor or any of its subcontractors will be using in connection with the Work, and the Contractor shall be responsible for making any and all disclosures required under applicable "Community Right to Know" or similar laws. The Contractor shall not clean or service any tools, equipment, vehicles, materials, or other items in such a manner as to cause a violation of any laws or regulations relating to Hazardous Materials. All residue and waste materials resulting from any such cleaning or servicing shall be collected and removed from the Project site(s) in accordance with all applicable laws and regulations. The Contractor shall immediately notify the Owner of any citations, orders, or warnings issued to or received by the Contractor, or of which the Contractor otherwise becomes aware, that relate to any Hazardous Materials on the Project site(s). Without limiting any other indemnification provisions pursuant to law or specified in this Agreement, the Contractor shall indemnify, defend (at the Contractor's sole cost, and with legal counsel approved by the Owner), and hold the Owner and Architect harmless from any and all claims, demands, losses, damages, disbursements, liabilities, obligations, fines, penalties, costs, and expenses for removing and remedying the effect of any Hazardous Materials on, under, from, or about the Project site(s), arising out of or relating to, directly or indirectly, the Contractor's or its subcontractor's failures to comply with any of the requirements herein. As used herein, the term "Hazardous Materials" means any hazardous or toxic substances, materials, and wastes listed in the United States Department of transportation Materials Table, or listed by the Environmental Protection Agency as hazardous substances, and all substances, materials, or wastes that are or become regulated under federal, state, or local law.

**§ 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

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Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

**§ 10.3.3** Intentionally Deleted.

**§ 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. 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.

**§ 10.4 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 liability policies as required 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** Liability of Contractor and Subcontractor is not limited by purchase of insurance. Nothing contained in the insurance requirements of the Contract Documents is to be construed as limiting the liability of the Contractor, the liability of any Subcontractor of any tier, or either of their respective insurance carriers. Owner does not, in any way, represent that the coverages or limits of insurance specified is sufficient or adequate to protect the Owner, Contractor, Architect, or any Subcontractor's interest or liability, but are merely minimums. The obligation of the Contractor and every Subcontractor of any tier to purchase insurance shall not, in any way, limit their obligations to the Owner in the event that the Owner should suffer an injury or loss in excess of the amount recoverable through insurance, or any loss or portion of the loss which is not covered by either Contractor's or any Subcontractor's insurance.

**§ 11.1.5 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

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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.

**§ 11.3 Waivers of Subrogation – Intentionally Deleted.**

**§ 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 Owner's 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 Contractor shall pay the Subcontractors, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

**§ 11.5.2** The Owner as fiduciary shall have the power to adjust and settle a loss with insurers.

## 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 Final Completion**

**§ 12.2.2.1** In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Final 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, at Contractor's sole cost and expense, 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** Intentionally Deleted.

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**§ 12.2.2.3** In the case of any Work performed in correcting defects pursuant to guarantees or warranties provided or referred to by this Article 12, the warranty or guarantee period shall begin anew from the date of the completion or correction of such Work.

**§ 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 and pay all attorney's fees and expenses related thereto immediately upon demand.

**§ 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 State of Illinois.

### § 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.

**§ 13.4.3** The Owner and the Architect reserve the right to accept or reject any substitutions bid upon. If substitutions are not specifically accepted in writing, materials specified as "standard" shall be used in construction of this project.

**§ 13.4.4** Any material specified by reference to the number, symbol or title of specific standards, such as commercial standards, federal specifications, trade association standards, or similar standards, shall comply with requirements in the latest revision thereof and any amendment of supplement thereto in effect on the date of the Instruments of Service, except as limited to type, class or grade, or modified in such reference by a given date. The standards related to, except as modified in the Specifications, shall have full force and effect as though printed in the Specifications.

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**§ 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, shall be at the Contractor'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. Notwithstanding any other term or provision in this Article 13 to the contrary, in the event that any testing or inspection of the Work or any part thereof reveals defects in materials or workmanship, then the Contractor shall remedy such defects and shall bear all costs and expenses associated with such testing which is related to determining whether such defects have been properly remedied.

**§ 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**

Any references in this Agreement to interest being assessed against the Owner are hereby deleted.

**§ 13.6** The Contractor shall provide credit for the Owner and Architect in the Contractor's promotional materials for the Project.

**§ 13.7 REGULATIONS**

**§ 13.7.1** The Contractor and/or Subcontractor warrant/s that it is familiar with and it shall comply with Federal, State and local laws, statutes, ordinances, rules and regulations, Owner's Board Rules and Policies, and the orders and decrees of any courts or administrative bodies or tribunals in any manner affecting the performance of the contract including without limitation Workmen's Compensation Laws, minimum salary and wage statutes and regulations, laws with respect to permits and licenses and fees in connection therewith, laws regarding maximum working hours, and, without limitation, such other laws and regulations as are specifically described below. Additionally, the Contractor and subcontractor warrant that they shall comply with any amendments to such federal, state and local laws, statutes, ordinances, rules and regulations that are enacted thereafter during the performance of the Work and under this Agreement. To the extent that there are any violations of any of the applicable laws, rules, regulations and/or court orders/decrees mentioned herein, the Contractor and Subcontractor shall be responsible for indemnifying and holding both the Owner and Architect free and harmless from all costs, fees and expenses incurred, directly or indirectly and including without limitation attorneys' fees, by the Owner or the Architect in responding to and complying with demands made by any of the governmental departments/agencies and/or the courts, or an aggrieved employee or person and such amounts may be withheld from the payments to be made on the project. It is the intention that the Owner and Architect shall suffer no time loss or other additional expenses in complying with any

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inquiry made with regard to any compliance with the applicable laws, rules and regulations referenced herein. No plea of misunderstanding or ignorance thereof will be considered.

**§ 13.7.1.1** Whenever required or upon the request of the Architect or Owner, the Contractor or Subcontractor shall furnish the Architect and the Owner with satisfactory proof of compliance with said federal, state and local laws, statutes, ordinances, rules, regulations, orders, and decrees.

**§ 13.7.2** The Contractor shall comply with the non-discrimination federal, state and local laws, including without limitation:

**§ 13.7.2.1** Equal Employment Opportunities Act, American with Disabilities Act and Human Rights Act. The Contractor acknowledges that this Contract is subject to and governed by the rules and regulations of the Illinois Human Rights Act (the "Human Rights Act"), including the mandatory provisions that each contractor have in place written sexual harassment policies that shall include, at minimum, the following information: (i) the illegality of sexual harassment; (ii) the definition of sexual harassment under state law; (iii) a description of sexual harassment, utilizing examples; (iv) the vendor's internal complaint process including penalties; (v) the legal recourse, investigation and complaint process available through the Department and the Commission; and (vii) protection against retaliation as provided by Section 6-101 of said Act and that it has a written sexual harassment policy in place in full compliance with Section 105(A)(4) of the Human Rights Act, 775 LICS 5/2-105(A)(4). The Contractor agrees to fully comply with the requirements of the Illinois Human Rights Act, 775 LICS 5/1-101 et seq., including but not limited to, the provision of sexual harassment policies and procedures pursuant to Section 2-105 of the Act. The Contractor further agrees to comply with all federal Equal Employment Opportunity Laws, including, but not limited to, the Americans with Disabilities Act, 42 U.S.C. Section 12101 et seq., and rules and regulations promulgated thereunder. The provisions of Section 14.2 are included in this Amendment pursuant to the requirements of the regulations of the Illinois Department of Human Rights, Title 44, Part 750, of the Illinois Administrative Code, and Contractor shall be required to comply with these provisions only if and to the extent they are applicable under the law.

**§ 13.7.2.2** As required by Illinois law, in the event of the Contractor's non-compliance with the provisions of this Equal Employment Opportunity Clause, the Illinois Human Rights Act or the Rules and Regulations of the Illinois Department of Human Rights ("Department"), the Contractor may be declared ineligible for future contracts or subcontracts with the State of Illinois or any of its political subdivisions or municipal corporations, and the Contract may be canceled or voided in whole or in part, and such other sanctions or penalties may be imposed or remedies invoked as provided by statute or regulation. During the performance of this Contract, the Contractor agrees as follows:

**§ 13.7.2.2.1** That it will not discriminate against any employee or applicant for employment because of race, color, religion, creed, sex, marital status, national origin or ancestry, age, citizenship, physical or mental handicap or disability, military status, unfavorable discharge from military service or arrest record status: and further that it will examine all job classifications to determine if minority persons or women are underutilized and will take appropriate affirmative action to rectify any such underutilization.

**§ 13.7.2.2.2** That, in all solicitations or advertisements for employees placed by it or on its behalf, it will state that all applicants will be afforded equal opportunity without discrimination because of race, color, religion, sex, marital status, national origin or ancestry, age, physical or mental handicap unrelated to ability, or an unfavorable discharge from military service.

**§ 13.7.2.2.3** That it will submit reports as required by the Department's Rules, furnish all relevant information as may from time to time be requested by the Department or the contracting agency, and in all respect comply with the Illinois Human Rights Act and the Department's Rules.

**§ 13.7.2.2.4** That it will permit access to all relevant books, records, accounts and work sites by personnel of the contracting agency and the Department for purposes of investigation to ascertain compliance with the Illinois Human Rights Act and the Department's Rules.

**§ 13.7.2.2.5** That it will include verbatim or by reference the provisions of this clause in every subcontract it awards under which any portion of the Contract obligations are undertaken or assumed, so that such provisions will be binding upon such subcontractor. In the same manner as with other provisions of this Contract, the Contractor will be liable

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for compliance with applicable provisions of this clause by such subcontractors; and further it will promptly notify the contracting agency and the Department in the event any subcontractor fails or refuses to comply therewith. In addition, the Contractor will not utilize any subcontractor declared by the Illinois Human Rights Commission to be ineligible for Contractors or subcontracts with the State of Illinois or any of its political subdivisions or municipal corporation.

**§ 13.7.3** Illinois Department of Labor Requirements and Prevailing Wage Act.

**§ 13.7.3.1** The Contractor agrees to comply with and that this Agreement is subject to and governed by the Illinois Prevailing Wage Act (820 ILCS 130/0.01 et seq.). The Contractor shall ensure that any Subcontractors shall comply with the Illinois Prevailing Wage Act. Contractor and Subcontractors shall include in Bids the cost for the current prevailing wage. As changes are made in these prevailing wages, the Contractor and Subcontractors performing work on the project will be responsible for conforming to the changes and shall have the responsibility for determining when changes are made. No additional costs are to be incurred by the Owner as a result of changes in the prevailing wage. All record keeping requirements are the obligation of the Contractor and Subcontractors.

**§ 13.7.3.2** To the extent that there are any violations of the Prevailing Wage Act and any demands are made upon the Owner, Contractor or Architect by the Illinois Department of Labor or by any employee of the Contractor or a Subcontractor performing work on the project, the Contractor or the particular Subcontractor and Contractor shall be responsible for indemnifying and holding the Owner, Contractor and Architect free and harmless from all costs incurred, directly or indirectly, by the Owner, Contractor or Architect in responding to and complying with demands made by the Department of Labor, or an aggrieved employee and such amounts may be withheld from the payments to be made on the project. It is the intention that the Owner, Contractor and Architect shall suffer no time loss or other additional expenses in complying with any inquiry made with regard to this Act.

**§ 13.7.3.3** It shall be mandatory upon the Contractor and upon any Subcontractors thereof to pay all laborers, workman, and mechanics employed by them not less than the prevailing wages in the locality for each craft or type of workman or mechanic needed to perform such work and the general prevailing rate for legal holidays and overtime work as ascertained by the Illinois Department of Labor and pursuant to Illinois law and statutes in such case made and provided.

**§ 13.7.3.4** The Contractor and each Subcontractor shall (1) make and keep, for a period not less than 3 years, records of all laborers, mechanics, and other workers employed by them on the Project; the records shall include each worker's name, address, telephone number when available, social security number, classification or classifications, the hourly wages paid in each pay period, the number of hours worked each day, and the starting and ending times of work each day; and (2) submit monthly, in person, by mail, or electronically a certified payroll to the Owner in charge of the project. The certified payroll shall consist of a complete copy of the records identified in the Prevailing Wage Act. The certified payroll shall be accompanied by a statement signed by the Contractor and/or Subcontractor which avers that: (i) such records are true and accurate; (ii) the hourly rate paid to each worker is not less than the general prevailing rate of hourly wages required by the Prevailing Wage Act; and (iii) the Contractor and/or Subcontractor is aware that filing a certified payroll that he or she knows to be false is a Class B misdemeanor. The Contractor is not prohibited from relying on the certification of a lower tier Subcontractor, provided the Contractor does not knowingly rely upon a Subcontractor's false certification. Any Contractor and/or Subcontractor subject to the Prevailing Wage Act who fails to submit a certified payroll or knowingly files a false certified payroll is in violation of the Prevailing Wage Act and guilty of a Class B misdemeanor. The records submitted in accordance with the Prevailing Wage Act herein shall be considered public records, except an employee's address, telephone number, and social security number, and made available in accordance with the Freedom of Information Act.

**§ 13.7.3.5** Upon 2 business days' notice, the Contractor and each Subcontractor shall make available for inspection the records identified in the Prevailing Wage Act to the Owner in charge of the project, its officers and agents, and to the Director of Labor and his deputies and agents. Upon 2 business days' notice, the Contractor and each Subcontractor shall make such records available at all reasonable hours at a location within this State.

**§ 13.7.4** Public Contract Fraud Act. The Contractor agrees to comply with and that this Agreement is subject to and governed by the Illinois Public Contract Fraud Act (30 ILCS 545/0.01).

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**§ 13.7.5** Public Construction Contract Act. The Contractor agrees to comply with and that this Agreement is subject to and governed by the Illinois Construction Contract Act (30 ILCS 557/1).

**§ 13.7.6** Public Construction Bond Act. The Contractor agrees to comply with and that this agreement is subject to and governed by the Illinois Public Construction Bond Act (30 ILCS 550/0.01). If the Contractor furnishes material or labor on the project, or assume any Contracts for material or labor awarded or entered into by the Owner, Contractor first shall supply and deliver to Owner a bond conditioned upon the completion of the Contract, and the payment of such material and labor, as required by the Illinois Public Construction Bond Act. 30 ILCS 550/1 et seq.

**§ 13.7.7** Public Works Preference Act. The Contractor agrees to comply with and that this agreement is subject to and governed by the Illinois Public Works Preference Act (30 ILCS 560/0.01).

**§ 13.7.8** Employment of Illinois Workers on Public Works Act.
The Contractor agrees to comply with and that that his Agreement is subject to and governed by the Illinois Employment of Illinois Workers on Public Works Act (30 ILCS 570/0.01).

**§ 13.7.9** Public Works Contract Change Order Act. The Contractor agrees to comply with and that this Agreement is subject to and governed by the Illinois Public Works Contract Change Order Act (50 ILCS 525/1).

**§ 13.7.10** Local Government Professional Services Selection Act. The Contractor agrees to comply with and that this Agreement is subject to and governed by the Illinois Local Government Professional Services Selection Act (50 ILCS 510/0.01).

**§ 13.7.11** Veterans Preference Act. The Contractor agrees to comply with and that this Agreement is subject to and governed by the Illinois Veterans Preference Act (330 ILCS 55/0.01) that, in the employment and appointment to fill positions in the construction, addition to, or alteration of all public works undertaken or contracted for by the State, or by any political subdivision thereof, preference shall be given to persons who have been members of the armed forces of the United States or who, while citizens of the United States, were members of the armed forces of allies of the United States in time of hostilities with a foreign country, and have served under one or more of the following conditions: (1) the veteran served a total of at least 6 months, or (2) the veteran served for the duration of hostilities regardless of the length of engagement, or 3) the veteran served in the theater of operations but was discharged on the basis of a hardship, (4) the veteran was released from active duty basis of a hardship, or because of a service connected disability and was honorably discharged. But such preference shall be given only to those persons who are found to possess the business capacity necessary for the proper discharge of the duties of such employment. No political subdivision or person contracting for such public works is required to give preference to veterans, not residents of such district, over residents thereof, who are not veterans.

**§ 13.7.12** As used in this Section: "Time of hostilities with a foreign country" means any period of time in the past, present, or future during which a declaration of war by the United States Congress has been or is in effect or during which an emergency condition has been or is in effect that is recognized by the issuance of a Presidential proclamation or a Presidential executive order and in which the armed forces expeditionary medal or other campaign service medals are awarded according to Presidential executive order.

**§ 13.7.12.1** "Armed forces of the United States" means the United States Army, Navy, Air Force, Marine Corps, Coast Guard. Service in the Merchant Marine that constitutes active duty under Section 401 of federal Public Law 95 202 shall also be considered service in the Armed Forces of the United States for purposes of this Section.

**§ 13.7.13** Drug Free Workplace. The Contractor certifies by the execution of this Contract that the Contractor will provide a drug free workplace in compliance with the Illinois Drug Free Workplace Act (30 ILCS 580/1 et seq.), including provision of providing notifications, imposing sanctions, providing assistance with counseling, and complying with all other requirements of said Act.

**§ 13.7.14** Bid Rigging and Rotating. The Contractor certifies that the Contractor is in compliance with Illinois law and not barred from bidding on the Contract as a result of a conviction for either bid-rigging or bid rotating under Article 33E of the Criminal Code of 1961(720 ILCS 5/33E).

**§ 13.7.15** Concurrent with the execution of this Contract, the Contractor shall execute the Certificate of Eligibility.

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**§ 13.7.16** The Substance Abuse Prevention on Public Works Projects Act, 820 ILCS 265/1 *et seq*., ("Act") prohibits any employee of the Contractor or any Subcontractor on a public works project to use, possess or be under the influence of a drug or alcohol, as those terms are defined in the Act, while performing work on the project. The Contractor/Subcontractor will comply with certification and other requirements regarding same.

**§ 13.7.17** The Contractor must not barred from entering into this contract because of any delinquency in the payment of any tax administrated by the Illinois Department of Revenue, unless it is being contested. Contractor understands that making a false statement regarding delinquency in taxes is a Class A misdemeanor and, in addition, voids the contract and allows the Owner to recover in a civil action all amounts paid to the Contractor.

## ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

### § 14.1 Termination by the Contractor

**Intentionally Deleted.**

### § 14.2 Termination by the Owner for Cause

**§ 14.2.1** If the Contractor shall institute proceedings or consent to proceedings requesting relief or arrangement under the Federal Bankruptcy Act or any similar or applicable federal or state law, or if a petition under any federal or state bankruptcy or insolvency law is filed against the Contractor and such petition is not dismissed within sixty (60) days after the date of said filing, or if the Contractor admits in writing his inability to pay his debts generally as they become due, or if he makes a general assignment for the benefit of his creditors, or if a receiver, liquidator, trustee or assignee is appointed on account of his bankruptcy or insolvency; or if a receiver of all or any substantial portion of the Contractor's properties is appointed; or if the Contractor abandons the Work; or if he fails, except in cases for which extension of time is provided, to prosecute promptly and diligently the Work or to supply enough properly skilled workmen or proper materials for the Work; or if he submits an Application for Payment, sworn statement, waiver of lien, affidavit or document of any nature whatsoever which is intentionally falsified; or if he fails to make prompt payment to Subcontractors or for materials or labor or otherwise breaches his obligations under any subcontract with a Subcontractor; or if a mechanic's or material man's lien or notice of lien is filed against any part of the Work or the site of the Project and not promptly bonded or insured over by the Contractor in a manner satisfactory to the Owner; or if the Contractor disregards any laws, statutes, ordinances, rules, regulations or orders of any governmental body or public or quasi-public authority having jurisdiction of the Work or the site of the Project; or if he otherwise violates any provision of the Contract Documents; then the Owner, without prejudice to any right or remedy available to the Owner under the Contract Documents or at law or in equity, the Owner may, after giving the Contractor and the surety under the Performance Bond and under the Labor and Material Payment Bond described in Section 11.5, seven (7) days' written notice, terminate the employment of the Contractor. If requested by the Owner, the Contractor shall remove any part or all of his equipment, machinery and supplies from the site of the Project within seven (7) days after the date of such request, and in the event of the Contractor's failure to do so, the Owner shall have the right to remove or store such equipment, machinery and supplies at the Contractor's expense. In case of such termination, the Contractor shall not be entitled to receive any further payment for Work performed by the Contractor through the date of termination. The Owner's right to terminate the Owner-Contractor Agreement pursuant to this Section 14.2.1 shall be in addition to and not in limitation of any rights or remedies existing hereunder or pursuant hereto or at law or in equity.

**§ 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.

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**§ 14.2.4** If the unpaid balance of the Contract Sum exceeds all costs to the Owner of completing the Work, then the Contractor shall be paid for all Work performed by the Contractor to the date of termination. If such costs to the Owner of completing the Work exceed such unpaid balance, the Contractor shall pay the difference to the Owner immediately upon the Owner's demand. The costs to the Owner of completing the Work shall include, but not be limited to, the cost of any additional architectural, managerial and administrative services required thereby, any costs incurred in retaining another contractor or other subcontracts, any additional interest or fees which the Owner must pay by reason of a delay in the completion of the Work, attorneys' fees and expenses, and any other damages, costs, and expenses the Owner may incur by reason of completing the Work or any delay thereof. . The amount, if any, to be paid to the Contractor shall be certified by the Architect, upon application, in the manner provided in Section 9.4, and this obligation for payment shall survive termination of the Contract.

**§ 14.2.5** The Owner may, upon seven (7) days written notice to the Contractor, terminate the Agreement between the Owner and Contractor without cause. Upon written request and submittal of the appropriate documentation as required by the Owner, the Owner shall pay the Contractor for all work performed by the Contractor to the date of termination that has been approved by the Owner. The Owner may, upon the Contractor executing such a confirmatory assignments as the Owner shall request, accept and assume all of the Contractor's obligations under all subcontracts executed in accordance with the terms of the Contract Documents that may accrue after the date of such termination and that the Contractor has incurred in good faith in connection with the Work. Upon receipt of notice of termination, the Contractor shall cease all operations on the date specified by the Owner, terminate subcontracts not assumed by the Owner, make no further orders of materials or equipment, complete work not terminated (if any), and provide such reports as may be requested by the Owner and the Architect as to the status of the Work and the Work remaining to be completed. The Owner's right to terminate the Contract under this Section shall be in addition to, and not in limitation of, its rights to stop the Work without terminating 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 to the Contract 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

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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 within seven (7) calendar days after the event giving rise to the Claim for additional time. 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.

**§ 15.1.6.3** The criteria on which the term "weather delays" shall be based on the normal average amount of precipitation received in the project areas, as recorded over a period of the last five (5) years by NOAA, National Climatic Data Center. Any extension of time due to unusually severe weather must be requested by the Contractor on the basis of documented records of the actual precipitation for a minimum period of three (3) months' time, compared with the normal average for the area. Also, the criteria shall include the number of excessive precipitation days over the same period and whether or not the Contractor's force worked on said days or any stage of construction was affected.

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**§ 15.1.6.4** Delay caused by any Subcontractor shall be the responsibility of the Contractor. The Contractor shall, therefore, ensure that all Subcontractors at all time provide sufficient personnel, equipment and materials to substantially complete the Work in the time specified herein.

**§ 15.1.6.5** Where a delay occurs which is beyond the Contractor's control, the Contractor has an affirmative duty to mitigate the effect of that delay on the progress of the Work but without any obligation to bear any cost. An extension of the Substantial Completion date will not be granted to the extent that the Contractor breaches said duty to mitigate.

**§ 15.1.7 Waiver of Claims for Consequential Damages**

The Contractor waives claims against the Owner and Architect for consequential damages arising out of or relating to this Contract. This waiver includes

1. 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 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. 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.

**§ 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 subject to litigation.

**§ 15.2.6** -Intentionally Deleted.

**§ 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.

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**§ 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.

## ARTICLE 16 LIMIT TO AVOID INCORPORATION OF RESPONSIBILITY BY REFERENCE

**§ 16.1** Where any specification which is incorporated herein by reference, through the words "and/or as directed by the Architect," or phrases having a similar effect appear to give the Architect the right to direct something other than that specified, the Architect has in fact no such right to except as it may be established in specific instances in portions of this Instruments of Service other than in said specifications.

## ARTICLE 17 INCORPORATION OF CONTRACT TERMS WITH SUBCONTRACTORS

**§ 17.1** Contractor agrees that s/he will be responsible to incorporate all of the terms and conditions herein, including all amendments to this Contract, with any and all of the Subcontractors as well as any Subcontractors retained by Subcontractors. Contractor acknowledges that it is the Owner's intent that all of the terms and conditions herein, including all amendments to this Contract, will be adhered to by the Contractor and all Subcontractors performing any Work on the Project.

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# AIA® Document A101™ – 2017 Exhibit A

## *Insurance and Bonds*

This Insurance and Bonds Exhibit is part of the Agreement, between the Owner and the Contractor, dated the « » day of « » in the year « »
*(In words, indicate day, month and year.)*

for the following **PROJECT**:
*(Name and location or address)*

«Village of Hoffman Estates - Village Green Improvements – Phase I »
« »

**THE OWNER:**
*(Name, legal status and address)*

Village of Hoffman Estates
1900 Hassell Road
Hoffman Estates, Illinois 60169
Telephone Number: (847) 882-9100
Fax Number: (847) 781-2679»

**THE CONTRACTOR:**
*(Name, legal status and address)*

« »« »
« »

**TABLE OF ARTICLES**


**A.1 GENERAL**

**A.2 OWNER'S INSURANCE**

**A.3 CONTRACTOR'S INSURANCE AND BONDS**

**A.4 SPECIAL TERMS AND CONDITIONS**


### ARTICLE A.1 GENERAL

Contractor shall purchase and maintain insurance, and provide bonds, as set forth in this Exhibit from companies lawfully authorized to do business in the jurisdiction in which the Project is located. As used in this Exhibit, the term General Conditions refers to AIA Document A201™–2017, General Conditions of the Contract for Construction.

### ARTICLE A.2 OWNER'S INSURANCE

**§ A.2.1 General**

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**§ A.2.2 Liability Insurance**

The Owner shall be responsible for purchasing and maintaining the Owner's usual general liability insurance.

**ADDITIONS AND DELETIONS:** The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

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 Document A201™–2017, General Conditions of the Contract for Construction. Article 11 of A201™–2017 contains additional insurance provisions.

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**§ A.2.3 Required Property Insurance**
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## ARTICLE A.3 CONTRACTOR'S INSURANCE AND BONDS

**§ A.3.1 General**

**§ A.3.1.1 Certificates of Insurance.** The Contractor shall provide certificates of insurance acceptable to the Owner evidencing compliance with the requirements in this Article A.3 at the following times: (1) prior to commencement of the Work; (2) upon renewal or replacement of each required policy of insurance; and (3) upon the Owner's written request. An additional certificate evidencing continuation of commercial liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment and thereafter upon renewal or replacement of such coverage until the expiration of the periods required by Section A.3.2.1 and Section A.3.3.1. The certificates will show the Owner as an additional insured on the Contractor's Commercial General Liability and excess or umbrella liability policy or policies.

**§ A.3.1.2 Deductibles and Self-Insured Retentions.** The Contractor shall disclose to the Owner any deductible or self-insured retentions applicable to any insurance required to be provided by the Contractor.

**§ A.3.1.3 Additional Insured Obligations.** To the fullest extent permitted by law, the Contractor shall cause the commercial general liability coverage to include (1) the Owner, the Architect, and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions for which loss occurs during completed operations. The additional insured coverage shall be primary and non-contributory to any of the Owner's general liability insurance policies and shall apply to both ongoing and completed operations. To the extent commercially available, the additional insured coverage shall be no less than that provided by Insurance Services Office, Inc. (ISO) forms CG 20 10 07 04, CG 20 37 07 04, and, with respect to the Architect and the Architect's consultants, CG 20 32 07 04. The Contractor shall also cause the automobile liability policy to include the Owner, the Architect and the Architect's consultants as additional insureds.

**§ A.3.2 Contractor's Required Insurance Coverage**

**§ A.3.2.1** The Contractor shall purchase and maintain the following types and limits of insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:
*(If the Contractor is required to maintain insurance for a duration other than the expiration of the period for correction of Work, state the duration.)*

«Coverages shall be maintained without interruption from date of commencement of the Work until 60 days after the date of Final Completion or for such other period for maintenance of completed operations coverage as specified in the Contract Documents. With respect to the Contractor's completed operations coverage, until expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents. »

**§ A.3.2.2 Commercial General Liability**

**§ A.3.2.2.1** Commercial General Liability insurance for the Project written on an occurrence form with policy limits of not less than «One Million Dollars » ($ «1,000,000 » ) each occurrence, «Two Million Dollars » ($ «2,000,000 » ) general aggregate, and «One Million Dollars » ($ «1,000,000 » ) aggregate for products-completed operations hazard, providing coverage for claims including

- **.1** damages because of bodily injury, sickness or disease, including occupational sickness or disease, and death of any person;
- **.2** personal injury and advertising injury;
- **.3** damages because of physical damage to or destruction of tangible property, including the loss of use of such property;
- **.4** bodily injury or property damage arising out of completed operations; and
- **.5** the Contractor's indemnity obligations under Section 3.18 of the General Conditions.

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**.6** Liability insurance should be written on the comprehensive general liability basis, and shall include, but not be limited to the following sub-lines:

A. Premises and Operations including X, C, U coverages (explosion, collapse, underground).
B. Products and Completed Operations to be maintained for two (2) years after Final Completion.
C. Independent Contractor's Protective.
D. Broad Form Comprehensive General Liability Endorsement:
   1. Contractual Liability, including contractors' obligation under Section 3.18.
   2. Personal Injury & Advertising Injury Liability
   3. Premises Medical Payments
   4. Fire Legal Liability - Real Property
   5. Broad Form Property Damage Liability (including Completed Operations)
   6. Incidental Medical Malpractice Liability
   7. Additional Persons Insured, including employees for personal and advertising injury.
   8. Extended Bodily Injury Liability

**.10** If liability insurance is written under the new simplified form - Commercial General Liability, the above listed coverages should be included.

**.11** If the General Liability coverages are provided by a Commercial General Liability Policy on a claims-made basis, the policy date or retroactive date shall predate the contract; the termination date of the policy shall be no earlier than the termination date of coverages required to be maintained after final payment, certified in accordance with Section 9.10.2, and an extended period endorsement "Supplemental Tail," must be purchased.

**.12** In any and all claims against the Owner or the Architect, or any of their officers, directors, board members, officials, agents or employees, by any employee or Contractor, any subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the insurance obligation under this Section shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for the Contractor or subcontractor under the Worker's Compensation Act, disability benefit acts or other employees benefits acts.

**§ A.3.2.2.2** The Contractor's Commercial General Liability policy under this Section A.3.2.2 shall not contain an exclusion or restriction of coverage for the following:

**.1** Claims by one insured against another insured, if the exclusion or restriction is based solely on the fact that the claimant is an insured, and there would otherwise be coverage for the claim.

**.2** Claims for property damage to the Contractor's Work arising out of the products-completed operations hazard where the damaged Work or the Work out of which the damage arises was performed by a Subcontractor.

**.3** Claims for bodily injury other than to employees of the insured.

**.4** Claims for indemnity under Section 3.18 of the General Conditions arising out of injury to employees of the insured.

**.5** Claims or loss excluded under a prior work endorsement or other similar exclusionary language.

**.6** Claims or loss due to physical damage under a prior injury endorsement or similar exclusionary language.

**.7** Claims related to residential, multi-family, or other habitational projects, if the Work is to be performed on such a project.

**.8** Claims related to roofing, if the Work involves roofing.

**.9** Claims related to exterior insulation finish systems (EIFS), synthetic stucco or similar exterior coatings or surfaces, if the Work involves such coatings or surfaces.

**.10** Claims related to earth subsidence or movement, where the Work involves such hazards.

**.11** Claims related to explosion, collapse and underground hazards, where the Work involves such hazards.

**§ A.3.2.3** Automobile Liability covering vehicles owned, and non-owned vehicles used, by the Contractor, with policy limits of not less than «One Million Dollars » ($ «1,000,000 » ) per accident, for bodily injury, death of any

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person, and property damage arising out of the ownership, maintenance and use of those motor vehicles along with any other statutorily required automobile coverage.

**§ A.3.2.4** Umbrella Excess Liability insurance in the amount of Two Million Dollars ($2,000,000) over commercial general liability insurance, automobile liability insurance and Employer's Liability insurance.

**§ A.3.2.5** Workers' Compensation at statutory limits.

**§ A.3.2.6** Employers' Liability with policy limits not less than «One Million Dollars » ($ «1,000,000 » ) each accident, «One Million Dollars » ($ «1,000,000 » ) each employee, and «One Million Dollars » ($ «1,000,000 » ) policy limit.

**§ A.3.2.7** Jones Act, and the Longshore & Harbor Workers' Compensation Act, as required, if the Work involves hazards arising from work on or near navigable waterways, including vessels and docks

**§ A.3.2.8** If the Contractor is required to furnish professional services as part of the Work, the Contractor shall procure Professional Liability insurance covering performance of the professional services, with policy limits of not less than «One Million Dollars » ($ «1,000,000 » ) per claim and «One Million Dollars » ($ «1,000,000 » ) in the aggregate.

**§ A.3.2.9** If the Work involves the transport, dissemination, use, or release of pollutants, the Contractor shall procure Pollution Liability insurance, with policy limits of not less than «One Million Dollars » ($ «1,000,000 » ) per claim and «One Million Dollars » ($ «1,000,000 » ) in the aggregate.

**§ A.3.3 Contractor's Other Insurance Coverage**

**§ A.3.3.1** Insurance selected and described in this Section A.3.3 shall be purchased from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:
*(If the Contractor is required to maintain any of the types of insurance selected below for a duration other than the expiration of the period for correction of Work, state the duration.)*

« The Contractor shall purchase and maintain insurance covering the Owner's contingent liability for claims which may arise from operations under the Agreement and that will protect the Owner and the Architect and their respective officers, directors, board members, its agents and employees from and against all claims, damages, losses and expenses including attorney's fees and all other defense costs whether in legal or administrative actions arising (a) out of or resulting from the performance of the work provided that any such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury or to destruction of tangible property (other than the work itself) including the loss of use resulting therefrom and (b) out of any claim made by any employee of the contractor or any subcontractor or by the Illinois Department of Labor for the amount of any wages or salaries which should have been paid to such employees and interest thereon, fines or other assessments relating to such violation, pursuant to provisions of the Prevailing Wage Act, 820 ILCS 130/0.01 et seq., regardless of whether or not it is caused in part by a party to whom insurance is afforded pursuant to this department. »

**§ A.3.3.2** The Contractor shall purchase and maintain the following types and limits of insurance.
*(Select the types of insurance the Contractor is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance. Where policy limits are provided, include the policy limit in the appropriate fill point.)*

[ «X» ] **§ A.3.3.2.1** General liability insurance. The policy shall be based on a $5,000 deductible, applicable to all losses for each occurrence. The Contractor shall be solely response for any and all losses up to $5,000 per loss. .The Contractor shall disclose to the Owner the amount of any deductible, and the Owner shall be responsible for losses within the deductible. Upon request, the Contractor shall provide the Owner with a copy of the property insurance policy or policies required. The Owner shall adjust and settle the loss with the insurer and be the trustee of the proceeds of the property insurance

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in accordance with Article 11 of the General Conditions.

[ « » ] **§ A.3.3.2.2 Railroad Protective Liability Insurance**, with policy limits of not less than « » ($ « » ) per claim and « » ($ « » ) in the aggregate, for Work within fifty (50) feet of railroad property.

[ « » ] **§ A.3.3.2.3 Asbestos Abatement Liability Insurance**, with policy limits of not less than « » ($ « » ) per claim and « » ($ « » ) in the aggregate, for liability arising from the encapsulation, removal, handling, storage, transportation, and disposal of asbestos-containing materials.

[ « » ] **§ A.3.3.2.4** Insurance for physical damage to property while it is in storage and in transit to the construction site on an "all-risks" completed value form.

[ « » ] **§ A.3.3.2.5** Property insurance on an "all-risks" completed value form, covering property owned by the Contractor and used on the Project, including scaffolding and other equipment.

[ « » ] **§ A.3.3.2.6 Other Insurance**
*(List below any other insurance coverage to be provided by the Contractor and any applicable limits.)*

| Coverage | Limits |
| --- | --- |
| | |

### § A.3.3.3 Other Insurance Requirements

**§ A3.3.3.1** Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required of the Contractor by this Exhibit A shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by this Exhibit A. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness. On the Certificate of Insurance, delete in the cancellation provision the following words, 'Endeavor to' and 'but failure to mail such notice shall impose no obligation or liability of any kind upon the company, its agents or representatives.

**§ A3.3.3.2** The insurance company issuing the comprehensive general liability insurance coverage required for the performance of this contract shall be licensed to do business in Illinois with Best's Insurance Guide (current edition) rating of "A" or better and satisfactory to the Owner.

**§ A3.3.3.3** The Contractor shall name the Owner and the Architect and each of their respective officers, directors, officials, board members, agents and employees as additional insureds on the Contractor's general liability policy for claims arising from the Contractor's operations, the automobile liability policy and the excess/ umbrella liability policy. The foregoing policies shall be endorsed to be primary over any other insurance which the additional insureds may have and shall contain a severability of interests clause. The Contractor shall require each of its subcontractors to comply with the requirements of this Section A3.3.3.3.

**§ A3.3.3.4** Under no circumstances shall the Contractor be relieved of providing insurance as required by this Contract. If inspection of Certificates by Owner would reasonably reveal any deficiencies in coverage as required by this Contract, Contractor shall not be relieved of its obligation to prove insurance coverages as required herein and may not assert any defense of waiver, acquiescence, estoppels, or otherwise by the failure of Owner or its agents to object to the form of the Certificate, Policies or other documents provided by the Contractor to certify that the Contractor complied with the provisions of this Contract regarding insurance coverage.

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**§ A3.3.3.5** Liability of Contractor and Subcontractor is not limited by purchase of insurance. Nothing contained in the insurance requirements of the Contract Documents is to be construed as limiting the liability of the Contractor, the liability of any Subcontractor of any tier, or either of their respective insurance carriers. Owner does not, in any way, represent that the coverages or limits of insurance specified is sufficient or adequate to protect the Owner, Contractor, Architect, or any Subcontractor's interest or liability, but are merely minimums. The obligation of the Contractor and every Subcontractor of any tier to purchase insurance shall not, in any way, limit their obligations to the Owner in the event that the Owner should suffer an injury or loss in excess of the amount recoverable through insurance, or any loss or portion of the loss which is not covered by either Contractor's or any Subcontractor's insurance.

**§ A.3.4 Performance Bond and Payment Bond**

The Contractor shall provide surety bonds, from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located with a A.M. Best rating of "A" and with a surety company to which the Owner has no objection. The Contractor's Performance Bond and labor and materials Payment Bond shall be in the amount of one hundred percent (100%) of the Contract Sum, as follows:
*(Specify type and penal sum of bonds.)*

| Type | Penal Sum ($0.00) |
|---|---|
| Payment Bond | See above. |
| Performance Bond | See above. |

Payment and Performance Bonds shall be AIA Document A312™, Payment Bond and Performance Bond, or contain provisions identical to AIA Document A312™, current as of the date of this Agreement.

**§ A3.4.1** The Contractor shall deliver the required bonds to the Owner not later than ten days following the date of notification of the Award of Contract or if the Work is to be commenced prior thereto in response to a letter of intent, the Contractor shall, prior to the commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished.

**§ A3.4.2** The Contractor shall require the attorney in fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of the power of attorney. Such bonds shall be in the form of American Institute of Architect's Document A-311 or a similar form worded exactly the same as Doc. A-311 and shall bear the same date as, or a date subsequent to, the date of the Contract. The bonds shall be issued by a bonding company licensed to operate in the State of Illinois and approved by the Owner.

**§ A3.4.3** The failure of the Contractor to supply the required bonds within 10 days after the prescribed Agreement forms are presented for signature, or if the bonding company finds that the Contractor is NOT bondable, shall constitute a default, and the Owner may award the Contract to the next responsible low bidder.

**§ 3.4.5** If at any time the Owner becomes dissatisfied with any Surety or Sureties then upon the Bonds, or for any other reason such Bonds shall cease to be adequate security for the Owner, the Contractor shall, within five (5) days after notice to do so, substitute acceptable Bonds in such forms and sum and signed by such other Sureties as may be satisfactory to the Owner. No further payments shall be deemed due nor shall be made until the new Sureties shall have qualified.

**§ A3.4.6** Whenever the Contractor shall be and is declared by the Owner to be in default under the Contract, the Surety and Contractor are each responsible to make full payment to the Owner for any and all additional services of the Architect as which are required as a result of the Contractor's default and in protecting the Owner's right under the Agreement with the Contractor.

**§ A3.4.7** The Contractor must within ten (10) days after the execution of this Agreement furnish a Performance Bond agreeing to pay not less than the prevailing wage for work to be performed in accordance with the Contract and the laws of the State of Illinois, and agreeing to pay all sums of money due for labor, materials, apparatus, fixtures or machinery and transportation with respect thereto, as in said Payment Bond provided, each dated the

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same day as the Agreement, in the forms prescribed by the Owner and each in an amount equal to the Contract Sum with a corporate Surety or Sureties acceptable to the Owner authorized to do business in the State of Illinois. These Bonds shall be maintained by the Contractor and shall remain in full force and effect until final acceptance of the work by the Owner or sixty (60) days following the date of Final Payment, whichever occurs later. The Contractor shall agree and shall cause the Surety to agree to be bound by each and every provision of the Contract Documents.

§ A3.4.8 In the event the Surety will make any assignment for the benefit of creditors or commit any act of bankruptcy, or if it shall be declared bankrupt or if it shall file a voluntary petition in bankruptcy or shall in the opinion of the Owner be insolvent, the Contractor shall agree forthwith upon request of the Owner to furnish and maintain other corporate Surety with respect to such bonds satisfactory to the Owner.

## ARTICLE A.4 SPECIAL TERMS AND CONDITIONS

Special terms and conditions that modify this Insurance and Bonds Exhibit, if any, are as follows:

**§ A.4.1** The Contractor is responsible for determining that subcontractors are adequately insured against claims arising out of or relating to the Work. The premium cost and charges for such insurance shall be paid by each Subcontractor.

»

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**SECTION 011000**

**SUMMARY**

## PART 1 – GENERAL

### 1.1 PROJECT

A. Project Name: Village Green Concessions.
B. Owner's Name: Village of Hoffman Estates.
C. The Project consists of the construction of a Concession Stand on the Village Green.

### 1.2 CONTRACT DESCRIPTION

A. Work covered by Contract Documents: Construction of single-story masonry and metal framed structure to house kitchen and serving functions for a new concession stand on the Village Green. Scope includes all work specified in Bid Documents including concrete, masonry, light gauge metal framing, excavation, EPDM roofing, kitchen equipment, plumbing, mechanical, electrical, fire protection systems, finishes and others materials.
B. Definitions. The following terms are used throughout the Contract Documents. The work will be governed in accord with the definitions.
    1. Fabricated: Fabricated pertains to items specifically assembled or made of selected materials or components to meet individual design requirements.
    2. Manufactured: Manufactured means standard units, usually mass produced by an established manufacturer of the respective item.
    3. Provide: Provide means furnish and install.
    4. Shop fabricated or shop made: Shop fabricated or shop made refers to items made by a Contractor or Subcontractor in their own Shop.
C. Insurance
    1. Designated Purchaser:
        a. Refer to the AIA A101 Exhibit A Document for insurance requirements.
        b. The Contractor shall purchase and maintain Builder's Risk Insurance in accord with the General Conditions.
        c. The Contractor's insurance shall have a deductible of $5,000 per occurrence.
D. Contracts
    1. The Owner will award a single construction contract for all work specified in the Contract Documents.
    2. Upon award of the construction contract, the owner will issue a Letter of Intent to award a Construction Contract to the approved contractor. This Letter of Intent shall serve as a notice to proceed with the project according to the terms and conditions set forth in the Contract Documents, until the work under Contract Documents is completed. . The contractor shall commence all construction services as specified in the contract documents upon receipt of the Letter of Intent.

### 1.3 DUTIES OF CONTRACTOR

A. The contractor shall be responsible for providing and paying for:
    1. Labor, materials and equipment.
    2. Tools, construction equipment and machinery.
    3. Temporary water, heat and other utilities required for construction.
    4. Other facilities and services necessary for proper execution and completion of work.
B. The contractor shall be responsible for paying and securing all permits, governmental fees and licenses other than primary building permit necessary for the proper execution and completion of the Project.
C. The contractor shall comply with all codes, ordinances, rules, regulations, orders and other legal requirements of the public authorities which govern the performance of the work under the Contract Documents.
D. The contractor shall coordinate and have completed all inspections required by public authorities relating to the performance of the work under the Contract Documents including, but not limited to:
    1. Illinois Department of Public Health (IDPH) for all rough-in and final inspections of plumbing and food service work, as required.

2. All inspections required in Section 014000 to be performed by a Testing and Inspection Agency.

E. The contactor shall have duty to promptly submit written notice to the Architect of any known or observed variances of the Contract Documents from legal requirements that may govern the work. Upon notice to the Architect, appropriate modifications will be made to the Contract Documents to account for the legal requirements. In the event the contractor fails to provide notice of any variances, he shall assume responsibility for any work known to be contrary to those legal requirements.
   1. The contractor shall enforce strict discipline and maintain good order among employees and subcontractors. Contractor shall not employ any unfit person or those not skilled in the assigned task.

F. The contractor acknowledges that the Project is exempt from all State and Local use taxes. It shall be the duty of the contractor to: 1) obtain a sales tax exemption certificate number from the Owner; 2) place exemption certificate number on invoices for materials incorporated in work; 3) furnish copies of invoices to Owner upon request 4) file a notarized statement that all purchases made under exemption certificate were entitled to be exempt with Owner upon completion of work; and 5) pay any penalties assessed for the improper use of exemption certificate number.

## 1.4 OWNER OCCUPANCY

A. Construction may begin on site on September 15, 2025. Any on site construction activities prior to this date shall be approved by the Owner in advance.

B. The date of Substantial Completion shall be no later than May 1, 2026, 5:00 p.m. Note: Substantial Completion for this project refers to all scheduled work being a minimum 99% complete.

C. The date of Final Completion shall be no later than May 29, 2026, 5:00 p.m. Note: Final Completion for this project refers to all scheduled work, punch list and closeout items being 100% complete.

D. The Architect’s and their consultants’ services will terminate sixty (60) days after (1) the date of Substantial Completion of the Work or (2) the anticipated date of Substantial Completion identified in Specifications, whichever is earlier. Any work required of the Architect and their consultants after this date will be back-charged to the contractor by the Owner.

E. Refer to General Conditions for Liquidated Damages.

## 1.5 JOB OPERATIONS

A. Project Security:
   1. The contractor shall provide necessary precautions such as fences or barriers to protect Owner's personnel or members of the general public in the areas in which construction activity is on-going.
   2. The contractor shall securely close-off all areas of construction after working hours to prevent entry by unauthorized persons.

B. Project Hours:
   1. Village noise ordinance limits work to the hours of 7:00 am to 7:00 pm on weekdays and 8:00 am to 10:00 pm on Saturdays and Sundays (call to verify times).

## 1.6 WORK LIMITATIONS

A. All spaces around where work will be done may be occupied by Owner's personnel. Contractor shall limit the scope of its work during times of owner occupancy to prevent disturbing Owner.

B. Contractor shall schedule work in such a manner as to not disrupt mechanical or electrical systems for the existing adjacent buildings during times of Owner occupancy.

C. Contractor shall give Owner a minimum of three (3) days’ notice before commencing work in Owner occupied area.

## 1.7 CONTRACTOR USE OF SITE AND PREMISES

A. Contractor shall confine work at the Project site as permitted by: 1) Law; 2) Permits; 3) the Contract Documents; 4) As instructed by Owner or Owner's representative; and 5) As required for Owner's use of adjacent facilities.
B. Confer with Owner's representative and obtain full knowledge of all Project site rules and regulations affecting work.
C. Contractor shall conform to the Project Site rules and regulations while engaged in its work.
D. Contractor acknowledges that the Project Site rules and regulations take precedence over other rules and regulations that may exist outside such jurisdiction.
E. Contractor shall be obligated to permit the Owner's representative to examine the contractor's list of employees, including those of his subcontractors and their agents, working on the Project Site. Contractor shall
   1. Keep all vehicles, mechanized or motorized equipment locked and secured at all times when parked and unattended on Owner's premises.
   2. Contractor shall not, under any circumstance, leave any vehicle unattended with its motor or engine running, or with its ignition key in place.
   3. All traffic control subject to Owner's representative's approval.
F. Do not unreasonably encumber site with materials or equipment.
G. Contractor shall assume full responsibility for protection safety and safekeeping of products stored on premises.
H. Contractor shall move all stored products or equipment which interferes with operations of Owner or other subcontractors.
I. Contractor shall obtain and pay for the use of additional storage or work areas needed for operations.
J. Contractor shall limit use of the Project Site for work and storage to areas depicted in the drawing or area approved in advance by Owner.
K. The contractor acknowledges that adjacent sites may be used by the Owner or members of the general public requiring contractor to maintain appropriate safety measures.
L. The contractor shall provide access to and from the Project Site as required by law and by Owner:

## 1.8 SUBSTANCE ABUSE PREVENTION POLICY

A. Pursuant to the Substance Abuse Prevention on Public Works Act (820 IL CS 265/1, et seq.), employees of the contractor and employees of the contractor and employees of any subcontractor are prohibited from the use of drugs or alcohol , as defined in the Act, while performing on any public works project.
B. The contractor and any subcontractor shall file with the public body engaged in the construction of the public works: a copy of the substance abuse prevention program along with a cover letter certifying that their program meets the requirements of the Act or a letter certifying that the contractor or subcontractor has a collective bargaining agreement in effect dealing with the subject matter of this Act. A certification form is attached and must be completed by the contractor and each subcontractor to this contract.

## 1.9 WORK SEQUENCE

A. Construction services as specified herein shall commence upon issuance of the Letter of Intent to Award a Construction Contract.
B. Certificate of Insurance and all Bonds to be submitted to the Architect within 3 business days upon issuance of the Letter of Intent.
C. All Shop Drawings to be submitted to the Architect within 21 calendar days upon issuance of the Letter of Intent.

**SECTION 011000**

**SUMMARY**

**PART 2 – PRODUCTS – NOT USED**

**PART 3 – EXECUTION – NOT USED**

**END OF SECTION**

**SECTION 012100**

**ALLOWANCES**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Cash allowances.
B. Inspection and testing Allowances.
C. Payment and modification procedures relating to allowances.

### 1.2 RELATED SECTIONS
A. Section 012900 - Price and Payment Procedures: Additional payment and modification procedures.

### 1.3 SELECTION AND PURCHASE
A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
C. Purchase products and systems selected by Architect from the designated supplier.
D. Any unused allowance funds will be credited back to Owner by Change Order prior to close out.

### 1.4 SUBMITTALS
A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.
B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
C. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.
D. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

### 1.5 COORDINATION
A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.
B. Architect Responsibilities:
   1. Consult with Contractor for consideration and selection of products, suppliers, and installers.
   2. Select products in consultation with Owner and transmit decision to Contractor.
   3. Prepare Allowance Authorization.
C. Contractor Responsibilities:
   1. Assist Architect in selection of products, suppliers, and installers.
   2. Obtain proposals from suppliers and installers and offer recommendations.
   3. On notification of which products have been selected, execute purchase agreement with designated supplier and installer.
   4. Arrange for and process shop drawings, product data, and samples. Arrange for delivery.

### 1.6 CASH ALLOWANCES
A. Costs Included in cash allowances:
   1. Allowances shall cover the cost to the Contractor of materials and equipment delivered to the site and all required taxes, less applicable trade discounts.
   2. Contractor's costs for unloading and handling at the site, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Base Bid and not in the allowances.

**SECTION 012100**

**ALLOWANCES**

## 1.7 INSPECTION AND TESTING ALLOWANCES

A. Costs Included in Inspecting and Testing Allowances: Cost of engaging the inspecting or testing agency of record; execution of inspecting and tests; and reporting results.

B. Costs Not Included in the Inspecting and Testing Allowances:
   1. Costs of testing services used by Contractor separate from Contract Document requirements.
   2. Costs of testing services used by the Contractor from a source other than the testing agency of record.
   3. Costs of retesting upon failure of previous tests as determined by Architect.
   4. The allowance does not include incidental labor required to assist the testing agency or costs for retesting if previous tests and inspections result in failure. The cost for incidental labor to assist the testing agency shall be included in the Contract Sum.

## PART 2 – PRODUCTS – NOT USED

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

### 3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

### 3.3 SCHEDULE OF ALLOWANCES

A. Allowance No. 1: Testing and Inspection Allowance: Include the sum of $15,000 for payment of inspecting and testing services specified in Section 014000 by a testing agency selected by the Owner.

B. Allowance No. 2: Cash Allowance: Include the sum/price of $250,000 for use at the Owner's discretion.

**END OF SECTION**

**SECTION 012300**

**ALTERNATES**

## PART 1 - GENERAL

### 1.1 SECTION INCLUDES
A. Alternate submission procedures.
B. Documentation of changes to Contract Sum and Contract Time.

### 1.2 RELATED SECTIONS
A. Section 002113 – Instructions to Bidders: Instructions for preparation of pricing for alternatives.

### 1.3 ACCEPTANCE OF ALTERNATES
A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Immediately accepted alternates will be identified in the Owner-Contractor Agreement.
B. The Owner may accept any Alternate within 60 days of the date of contract.
C. State the amount of Alternates prices to be added or deducted from the Base Bid price on the Bid Form.
D. Perform all portions of the work affected by this Section in accordance with the requirements of the Contract Documents.
E. Comply with requirements relative to materials and workmanship contained in the respective specification sections.
F. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.

### 1.4 SCHEDULE OF ALTERNATES
**Alternate No. 1: Change of Substantial Completion Date**

State the amount to be DEDUCTED from the lump sum base bid if the Date of Substantial Completion is changed from the specified date to the contractor's desired date as listed on the Bid Form.

**Alternate No. 2: To provide 8" diameter HDPE water line piping in lieu of 6" diameter PVC C900 Certa-Lok RJIB water line piping where indicated on the Civil drawings.**

State the amount to be ADDED or DEDUCTED from the lump sum base bid to provide 8" diameter HDPE water line piping in lieu of 6" diameter PVC C900 Certa-Lok RJIB water line piping where indicated on the Civil drawings.

## PART 2 – PRODUCTS – NOT USED

## PART 3 – EXECUTION – NOT USED

**END OF SECTION**

**SECTION 012700**

**UNIT PRICES**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. List of unit prices, for use in preparing Bids.
B. Measurement and payment criteria applicable to Work performed under a unit price payment method.
C. Defect assessment and non-payment for rejected work.

### 1.2 RELATED SECTIONS
A. Unit prices listed on Bid Form

### 1.3 COSTS INCLUDED
A. Unit Prices included on the Bid Form shall include full compensation for all required labor, products, tools, equipment, plant, transportation, services and incidentals; erection, application or installation of an item of the Work; overhead and profit.

### 1.4 APPLICATION
A. Enter unit prices for each work item in Bid Form in space provided. Omission may result in rejection of bid.
B. Contractor shall take all measurements and compute quantities. Measurements and quantities will be verified by field measurement or assessment.

### 1.5 UNIT QUANTITIES SPECIFIED
A. Quantities indicated in the Bid Form are for bidding and contract purposes only. Quantities and measurements of actual Work will determine the payment amount.

### 1.6 MEASUREMENT OF QUANTITIES
A. Measurement methods delineated in the individual specification sections complement the criteria of this section. In the event of conflict, the requirements of the individual specification section govern.
B. Take all measurements and compute quantities. Measurements and quantities will be verified by Architect.
    1. Contractor shall provide necessary equipment, workers, and survey personnel as required at no additional cost to Owner.
C. Measurement Devices:
    1. Weight Scales: Inspected, tested and certified by the applicable state Weights and Measures department within the past year.
    2. Platform Scales: Of sufficient size and capacity to accommodate the conveying vehicle.
    3. Metering Devices: Inspected, tested and certified by the applicable State department within the past year.
D. Measurement by Weight: Concrete reinforcing steel, rolled or formed steel or other metal shapes will be measured by handbook weights. Welded assemblies will be measured by handbook or scale weight.
E. Measurement by Volume: Measured by cubic dimension using mean length, width and height or thickness.
F. Measurement by Area: Measured by square dimension using mean length and width or radius.
G. Linear Measurement: Measured by linear dimension, at the item centerline or mean chord.
H. Stipulated Sum/Price Measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as a completed item or unit of the Work.
I. Perform surveys required to determine quantities, including control surveys to establish measurement reference lines. Notify Architect prior to starting work.
J. Contractor's Engineer Responsibilities: Sign surveyor's field notes or keep duplicate field notes, calculate and certify quantities for payment purposes.

**SECTION 012700**

**UNIT PRICES**

## 1.7 PAYMENT

A. Payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities of Work which is incorporated in or made necessary by the Work and accepted by the Architect, multiplied by the unit sum/price.

B. Payment will not be made 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 the transporting vehicle.
   4. Products placed beyond the lines and levels of the required Work.
   5. Products remaining on hand after completion of the Work.
   6. Loading, hauling, and disposing of rejected Products.

## 1.8 DEFECT ASSESSMENT

A. Replace Work, or portions of the Work, not conforming to specified requirements.

B. If, in the opinion of Owner, it is not practical to remove and replace the Work, Owner will direct one of the following remedies:
   1. The defective Work may remain, but the unit sum/price will be adjusted to a new sum/price at the discretion of Owner.
   2. The defective Work will be partially repaired to the instructions of the Owner, and the unit sum/price will be adjusted to a new sum/price at the discretion of Owner.

C. The individual specification sections may modify these options or may identify a specific formula or percentage sum/price reduction.

D. The authority of Architect to assess the defect and identify payment adjustment is final.

## 1.9 SCHEDULE OF UNIT PRICES

A. Contractor shall include unit prices in Bid Form for specified item.
   1. Install 6” Ductile Iron Water Service Piping
   2. Install 1-1/2” Copper Water Service Piping
   3. Install 6” diameter Water Line PVC C900 Certa-Lok RJIB Piping
   4. Install 8” diameter Water Line HDPE Piping
   5. Install 6” Sanitary Sewer Service PVC SDR 26
   6. Install 4” Sanitary Sewer Service PVC SDR 26
   7. Install 4” Sanitary Sewer Service 4” PVC C900
   8. Install 18” Storm Sewer RCP pipe
   9. Install 6” Storm Sewer PVC SDR 26
   10. Install 6” Storm Sewer PVC C900;
   11. Install 4” Storm Sewer PVC SDR 26
   12. Install 4” Storm Sewer PVC C900
   13. Install 4” Storm Sewer Underdrain perforated pipe SDR 35;
   14. Removal and Replacement of Unsuitable Soil, Replaced with compacted CA-6
   15. Installation of the Typical Concrete Sidewalk Section Including Excavation, Stone Base, and Concrete
   16. Seed Restoration
   17. Rain Garden Plantings
   18. Winter Protection Enclosure for Masonry Work.
   19. Continuous Heating of Winter Protection Enclosure for Masonry Work.

**PART 2 – PRODUCTS – NOT USED**

**PART 3 – EXECUTION – NOT USED**

**END OF SECTION**

**SECTION 012900**

**PRICE AND PAYMENT PROCEDURES**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Procedures for preparation and submittal of applications for progress payments.
B. Change order procedures.

### 1.2 RELATED SECTIONS
A. Section 012100 - Allowances: Payment procedures relating to allowances.
B. Section 012700 - Unit Prices: Monetary values of unit prices, payment and modification procedures relating to unit prices.
C. Section 017700 - Closeout Submittals.

### 1.3 SCHEDULE OF VALUES
A. Submit a printed schedule on AIA Form G703 - Application and Certificate for Payment Continuation Sheet or Architect approved similar.
B. Submit Schedule of Values within 15 days of receiving the Letter of Intent and a minimum of 15 business days prior to submitting the first application for payment.
C. Include in each line item, the amount of Allowances specified. For unit cost Allowances, identify quantities taken from Contract Documents multiplied by the unit cost to achieve the total for the item.
D. Submit separate quantities and amounts for material and labor for each respective line item.
E. List separate amounts for any applicable submittals and shop drawing preparation if payment will be required. No payment will be authorized for submittals not listed on the Schedule of Values.
F. Revise schedule to list approved Change Orders, with each Application For Payment.
G. Support values given with data to substantiate their correctness.
H. Submit quantities of designated materials.
I. List quantities of materials specified under unit prices.
J. Include in the line items a total amount of Contractor's overhead and profit.
K. Payment for materials stored on or off site will be limited to those materials listed separately in Schedule of Values.
L. Form of Submittal
    1. Submit typewritten Schedule of Values on 8-1/2 x 11 paper format.
    2. Utilize the Table of Contents of this Project Manual.
    3. Identify each line item with number and title of the specification Section.
    4. Separate costs under the various phases.
M. Preparation
    1. Itemize separate line cost for each of following cost items:
        a. Overhead and profit.
        b. Bonds.
        c. Insurance.
        d. General Requirements.
        e. Site mobilization.
    2. Itemize separate line item cost for work specified in each section of the specifications. Identify work of:
        a. Contractor's own labor forces.
        b. All subcontractors.
        c. All major suppliers of products or equipment.
    3. Break down installed costs into:
        a. Delivered cost of product, with taxes paid.
        b. Labor cost.
    4. For each line item which has an installed value of more than $10,000.00 break down costs to list amount of labor and amount of materials under each item.
        a. Contractor, subcontractor or supplier.
        b. Specification section number.
        c. Description of work or material.

d. Quantity.
e. Unit Price.
f. Scheduled value.
g. % of Contract.

5. Round off figures to nearest ten dollars.
6. Make sum of total costs of all items listed in Schedule equal to total contract sum.

N. Review and Resubmittal
1. After review by Architect, revise and resubmit Schedule as directed by Architect.
2. Follow original submittal procedure.

O. Update
1. Update Schedule of Values when:
a. Change in cost occurs.
b. Change of subcontractor or supplier occurs.
c. Change of product or equipment occurs.
2. Provide written justification for any changes requested by contractor.

## 1.4 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Submit at intervals stipulated in the Agreement.
B. Present required information in typewritten form.
C. Form: AIA G702 Application and Certificate for Payment and AIA G703 - Continuation Sheet including continuation sheets when required or Architect approved equal.
D. For each item, provide a column for listing each of the following:
1. Item Number.
2. Description of work.
3. Scheduled Values.
4. Previous Applications.
5. Work in Place and Stored Materials under this Application.
6. Authorized Change Orders.
7. Total Completed and Stored to Date of Application.
8. Percentage of Completion
9. Balance to Finish.
10. Retainage.

E. Each item on the application for payment shall include retainage in the amount of 10% of the total work completed and stored to date of application. Upon reaching Substantial Completion, and with prior authorization of the Owner and the Architect, the retainage may be reduced to 5% for each item that is deemed substantially complete on the subsequent application for payment.
F. Execute certification by signature of authorized officer.
G. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for Stored Products.
H. List each authorized Change Order as a separate line item, for each respective subcontractor or material supplier listing Change Order number and dollar amount as for an original item of Work.
I. Submit three pencil copies of each Application for Payment for review and approval by Architect and Owner.
J. Revise Application and Certificate of payment as directed by Architect.
K. Once the pencil copy has been approved by Architect, send three hard copies, along with supporting documentation, to the corporate office of the Architect.
L. Include the following with the application:
1. Transmittal letter as specified for Submittals in Section 013300.
2. Construction progress schedule, revised and current as specified in Section 013300.
3. Current construction photographs specified in Section 013300.
4. Partial release of liens from Contractor for current period.
a. Release of liens to be provided on forms approved by the Architect prior to the first payment being submitted.

5. Partial release of liens from all Subcontractors and vendors from prior period.
   a. Release of liens to be provided on forms approved by the Architect prior to the first payment being submitted.
6. Affidavits attesting to off-site stored products, with original invoices. Statement of transfer of title upon payment and insurance coverage specifically identifying stored items.

M. When Architect requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

## 1.5 CERTIFIED PAYROLL FOR PUBLIC WORKS PROJECTS

A. As per the Prevailing Wage Act., all contractors and their subcontractors who are engaged in public works projects must provide a certified monthly payroll report to the Illinois Department of Labor.

B. Each Contractor or Subcontractor performing Work on this Project shall comply in all respects with all laws governing the employment of Labor, Social Security, and Unemployment Insurance of both the State and Federal government. There shall be paid to each employee engaged in Work under this Contract at the site of the Project, no less than the minimum wage for the classifications of labor employed in compliance with 820 ILCS 130/1 et seq. as now existing or hereafter amended.

C. In accordance with 820 ILCS 130/5, the Contractor and each subcontractor shall make and keep, for a period of not less than 3 years, records of all laborers, mechanics, and other workers employed by them on the Project; the records shall include each worker’s name, address, telephone number, social security number, classification or classifications, the hourly wages paid in each period, the number of hours worked each day, and the starting and ending times of each work day.

D. The Contractor and each subcontractor shall submit monthly to the Illinois Department of Labor. The certified payroll shall consist of a complete copy of the records and all certifications required by the Illinois Department of Labor.

E. With each monthly application for payment to the Owner, the contractor shall provide written confirmation that the Certified Payroll report has been properly submitted to the Illinois Department of Labor for all Contractors and Sub-Contractors.

F. Upon 2 business days notice, the contractor and each subcontractor shall make available for inspection for the records to the Owner, its officers and agents, and to the Director of Labor and his deputies and agents at all reasonable hours at a location within the State. The Contractor and each subcontractor shall permit his/her employees to be interviewed on the job, during working hours, by compliance investigators of the Department or the Department of Labor.

## 1.6 PROJECT DATA AND RECORDS

A. Books and accounts kept by the Contractor in connection with the Contract shall be open to inspection.

B. The Contractor and each subcontractor shall also keep an accurate record showing the names and occupation of all laborers, workmen and mechanics employed by them in connection with the Work, and also showing the actual hourly wages paid to each of the workers. This record shall be open at all reasonable hours.

C. The Contractor shall, when required, furnish a written statement, verified by affidavit, giving the names and addresses of all persons, firms and corporations, who have up to the date thereof furnished labor or material in or about the performance of the Contract, and the amounts due or to become due to said parties.

## 1.7 CHANGE ORDER PROCEDURES

A. Promptly implement Change Order procedures.
   1. Provide full written data required to evaluate changes.
   2. Maintain detailed records of work done on time-and-material/force account basis.
   3. Provide full documentation to Architect.

B. Designate in writing the member of Contractor's organization:

1. Who is authorized to accept changes in Work.
2. Who is responsible for informing others in Contractor's employ of authorization of changes in Work.
3. If other than the Owner, the Owner will designate in writing the person(s) authorized to execute Change Orders.

C. Initiation of Contract Changes:
   1. Requests for change by the Contractor shall be initiated in writing.
   2. Subcontractors initiating a request for change shall direct their requests to the Contractor.
   3. The Architect will review and direct the Contractor's requests for change to the Owner or Owner's Representative with recommendations.
   4. Requests for change affecting contract sum or contract completion shall be made prior to starting any changes to the construction work or purchasing of materials. Failure to make appropriate written requests will invalidate any claims for additional costs or time for said work.

D. Owner Authorizes:
   1. The Owner or Owner's Representative, having considered the necessity of the requested change and availability of funds will authorize the Architect to prepare a request for proposal (RFP).

E. Architect Prepares Request for Proposal:
   1. The Architect, following consultation with the Contractor regarding subcontracts which will be affected by the proposed change, will prepare a RFP for Contractor response.
   2. Two sets of the RFP and Supplemental Drawings and Specifications for each proposed change are transmitted to the Contractor.

F. Contractors Prepare Proposals:
   1. Detailed Breakdown of Material Equipment and Labor:
      a. The Contractor or Subcontractor whose work is affected by a proposed change shall prepare a proposal for change.
      b. The detailed breakdown shall be prepared in accordance with the Contract Documents.
      c. If a change affects work covered by agreed on prices, such prices shall be used as the basis for adjustments to the contract sum.
      d. In all other cases, adjustments to the contract sum shall be based on the Contractor's direct cost, including costs of material, labor, equipment, bonds and taxes as applicable.
      e. Labor rates shall be itemized on the detailed breakdown indicating the trade base wage rate, total union fringe benefits, FICA, unemployment compensation insurance and workmen's compensation insurance. Labor charges shall not include costs for inefficiencies of construction supervision or labor.
      f. Change order adjustments to the contract developed above shall include amounts for overhead and profit which do not exceed average amounts indicated in the Schedule of Values, or an amount of 15% of the change order cost, whichever is less, and that no overhead and profit shall be deducted from the total price for changes reducing the cost of the contract. If the changed work is performed by a subcontractor, no more than 10% may be added to the subcontractor's costs for overhead and profit. An additional not to exceed 5% (exclusive of the subcontractor overhead and profit indicated above) may be included for the Contractor's overhead and profit on all work provided directly by a subcontractor employed on the project.

G. Contractor Reviews:
   1. Reviews: The Contractor shall review all proposals for:
      a. Conformance with the RFP to ensure that all items and only those items of work affected by the proposed change are included.
      b. Assurance that the proposals are submitted in conformance with the Contract Documents.
   2. Transmittal: The Contractor shall forward to the Architect three complete sets of proposals with its recommendation regarding the proposal.
      a. In making recommendations, the Contractor shall certify that the price is appropriate and if it is not appropriate, shall state the reasons for not certifying the price.

b. Proposals, complete with all required information, shall be submitted to the Architect within three weeks of the date of the RFP in order to receive further consideration.

H. Architect Reviews:
1. The Architect reviews the Contractor's proposals for completeness and conformance with the RFP and Contract Documents. Proposals which are incomplete or have inadequate detailed breakdowns will be returned to the Contractors for resubmission.
2. The Architect will review and, when appropriate, approve all price proposals recommending Owner approve issuance of a change order.
3. When the Architect considers the costs or quantities to be inappropriate to the work requested, the Architect will notify the Contractor in writing of the concerns and the Contractor will provide the necessary backup materials to justify the submittal or modify the submittal.
4. Submittals not properly justified will not be forwarded to the Owner and written notice as to the reasons will be forwarded to the Contractor. After 30 days of said written notification and no further response by the Contractor, the request will be considered inappropriate and will receive no further consideration.

I. Architect Issues Change Order:
1. The Architect, having received what is believed to be an appropriate and acceptable Contractor proposal for the proposed change and having received Owner's approval to issue a change order, the Architect will issue a Change Order.
2. The Change Order package prepared by the Architect for submittal to the Owner shall contain the following items:
a. Three originals of the Change Order form with appropriate original signatures, along with supporting documentation including, but not limited to:
1) Request for Proposal with signatures.
2) Pristine copy of drawings and specifications.
3) On changes initiated by the Architect, a letter explaining the circumstances related to the need for the change.
4) On Owner requested Change Orders, a letter of request signed by the Owner's Representative.
5) Change Order Authorization Form for Owner's Signature and permanent record in accord with Public Act 85-1295. When required on public work--for changes greater than $10,000.00 or 30 Days.

J. Owner Approves or disapproves Change Order: For change in Contract Sum and/or Contract Time.

K. One copy of approved Change Order with original signatures will be returned to the Contractor, or notice and explanation as to why it has been rejected will be forwarded to the Contractor.

### 1.8 APPLICATION FOR FINAL PAYMENT

A. Submit all closeout documents and comply with all requirements as put forth in Section 017700 - Closeout Submittals.

B. Once closeout submittals have been approved by the Architect, prepare the Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due; including properly executed Consent of Surety.

C. Application for Final Payment will not be considered until the following have been accomplished:
1. All closeout procedures specified in Section 017700.

## PART 2 – PRODUCTS – NOT USED

## PART 3 – EXECUTION – NOT USED

**END OF SECTION**

**SECTION 012091**

**PERFORMANCE BOND**

## PART 1 – GENERAL

### 1.1 REQUIREMENTS

A. 100% Performance Bond to be provided on attached form to be completed by the Contractor's surety upon award of the Contract for Construction by the Owner.

**END OF SECTION**

# VILLAGE OF HOFFMAN ESTATES
# PERFORMANCE SURETY BOND

| | |
|---|---|
| **BOND NO.** | **DATE BOND EXECUTED:** |
| | |
| **PRINCIPAL:** | **BOND AMOUNT:**<br>**(written out & numerically)** |
| | |
| **CO-PRINCIPAL(S):** | **CONTRACT DOCUMENTS:** |
| | |
| **SURETY(IES):** | **PROJECT:** |
| | |

KNOW ALL MEN BY THESE PRESENTS, that we, the Principal(s) and Surety(ies) hereto, recite and declare that:

1. We are held and firmly bound to the obligee Village of Hoffman Estates, Illinois (hereinafter called "Village"), in the sum written above in lawful money of the United States of America, to be paid to the Village, its successors or assigns, for the payment whereof Principal(s), Co-Principals and Surety(ies) bind themselves, their4. heirs, executors, administrators, successors anda) assigns, jointly and severally, firmly by this Bond.

2. The condition of this Bond is that if the Principal shall in every respect perform all of its obligations under the Contract Documents identified above, which Contract Documents are incorporated herein by reference, then this Bond shall be void; otherwise, the Bond shall continuously remain in full force and effect until released by the Village. Contract Documents shall also include any agreements, bid documents, specifications, engineering, design, or construction requirements or other Village documents associated with the Project, including any laws, ordinances or governmental regulations related to the Project.

3. Surety waives all of its surety defenses including, but not limited to, the following:

a) It shall be the duty of the Principal to notify the Surety of any revision of the plans, profiles and specifications referred to in the Contract Documents. The Surety expressly waives any right to receive notice from the obligee or to review or approve any revisions to the plans, profiles and specifications referred to in the Contract Documents which are required to meet governmental standards. No such revisions of any kind in the work shall in any way affect the obligation of the Surety under this Bond;

b) Any extension of time beyond the period provided for in the Contract Documents for completion of its obligations under the Agreement shall in no way affect the obligation of the Surety under this Bond;

c) The failure or refusal of Village to take any action, proceeding, or steps to enforce any remedy or exercise any right under the Contract Documents, or that taking of any action, proceeding, or step by Village, acting in good faith upon the belief that same is permitted by the provisions of the Contract Documents, shall not in any way release Principal or Surety, or either of them, or their respective executors, administrators, successors, or assigns, from liability under this Bond. Surety hereby waives notice of any amendment, indulgence made, granted or permitted;

d) The Principal, Co-Principal and Surety intend that each provision of this Bond be valid and binding upon them and expressly agree to abide thereby;

e) In the event of a default of this Bond, the Village may terminate whatever rights Principal, Co-Principal and/or Surety may have to perform further work on the Project.

f) The requirement of any other entity to perform any obligations contained in the Contract Documents shall in no way affect the obligations of the Surety under this Bond.

4. Default:

A default shall be deemed to have occurred on the part of the Principal if Principal shall fail to complete its obligations under the Contract Documents within the time set forth therein or any extensions thereof; or, prior to the expiration of such period, if in the sole judgment of the Village, the Principal has:

1) abandoned the performance of its obligations under the Contract Documents; or

2) renounced or repudiated its obligations under the Contract Documents; or

3) clearly demonstrated through insolvency, or otherwise, that its obligations under the Contract Documents cannot be completed within the time allotted under the Contract Documents.

4)

If the Principal defaults in the performance of all or any part of the obligations specified in the Contract Documents, the Village shall give written notice of the default to the Surety, with a copy to the Principal and Co-Principal, if any. In the event of such default and notice, Surety shall, within 45 days of receipt of the default notice, give written notice to the Village stating whether Surety will assume the Contract Document obligations and the obligations of the Principal, and should it elect to assume said obligations, Surety shall be required to complete the obligations specified in the Contract Documents according to its terms and provisions within 180 days of said notice, but not before expiration of the period provided for under the Contract Documents and approved extensions thereof. In the event that Surety elects to assume the obligations of Principal as provided herein and thereafter fails to faithfully perform all or any part of the work, or should it unnecessarily delay all or any part of the work, then the Village may proceed as provided in Paragraph No. 5 of this Bond.

5. Should Surety following notice of default notify the Village that Surety elects not to assume the obligations of Principal under the Contract Documents, or fails within 45 days of receipt of the default notice as provided in Paragraph No. 4) above to notify the Village whether Surety elects to assume the obligations of Principal under the Contract Documents, or having elected to assume the obligations of Principal, should it then fail to perform, then in any event the Village may elect any

of the following procedures or any combination thereof:

a) Terminate whatever rights the Principal, Co-Principal and/or Surety may have to perform further work on the Project;

b) Take over or relet all or any part of the work under the Contract Documents which is not completed and complete the same for the account and at the expense of the Principal and Surety, who shall be jointly and severally liable to Village for the costs incurred in completion of the obligations under the Contract Documents and/or correction thereof. Such costs as identified in the Contract Documents shall include, but not be limited to, construction, engineering, surveying, maintenance, donations, impact fees, deterioration, administration, supervision, reasonable attorney's fees, and any costs associated or related to any litigation of the Bond agreement and shall be adjusted for inflation. The amount of Village's actual costs for completion and/or correction of the work required under the Contract Documents shall be conclusive of the extent of the liability of Principal and Surety and may exceed the Bond Amount;

c) Require the Surety to pay the Bond Amount to the Village as liquidated damages.

6. Should Surety, following notice of default notify the Village within 45 days of the receipt of the default notice choose to pay the Village for completion of the obligation under the Contract Documents, the Surety shall have the right to demand that the Village state a sum constituting the estimated costs at that time, of completion and/or correction of the work required under the Contract Documents, such as costs as defined in Paragraph No. 5b). Surety shall then immediately pay over to the Village the sum so stated and be released from any further obligations under this Bond. If funds are paid over under this section and the paid over funds are not sufficient to complete the work, the Village's sole remedy shall

be to proceed against the Principal(s) and Co-Principals for any deficiency. If there are any paid over funds not necessary for completion of the work, the Village will return the excess to Surety after completion of the work.

7. If any action or proceeding is initiated in connection with this Bond and any and all obligations arising hereunder the venue thereof shall be in State Court in the County of Cook, State of Illinois, it is further understood and agreed that this contract shall be governed by the laws of the State of Illinois, both as to interpretation and performance.

8. All notices sent to the Principal(s), Co-Principals, and Surety(ies) shall be sent to the address set forth on the signature page unless said Principal(s), Co-Principal(s) and Surety(ies) notify the Village in writing of any change. If the addresses of any of the Principal(s), Co-Principal(s) and Surety(ies) change, the Principal(s), Co-Principal(s) or Surety(ies) shall immediately notify the Village in writing of such change. Failure to notify the Village of any change in address is deemed to be a waiver of any requirement for notice under this Bond to the Principal(s), Co-Principal(s) or Surety(ies). All written notices to the Village required under the Bond shall be sent certified mail to the Village Clerk.

9. If any one or more of the provisions of this Bond are determined to be illegal or unenforceable by a court of competent jurisdiction, all other provisions shall remain effective.

10. No party other than the Village shall have any rights under this Bond as against the Surety.

11. As part of the obligation secured hereby and in addition the Bond Amount specified herein, there shall be included costs, interest and reasonable expenses and fees (including, without limitation, attorneys' fees and costs), incurred by the Village in enforcing this agreement, to be awarded by the court.

12. Nonpayment of the premiums associated with this Bond will not invalidate this Bond nor shall Village be obligated for the payment thereof. Surety agrees to deliver written notice of non-payment under this Bond or other actions to the Village.

13. Surety waives its right to trial by jury.

IN WITNESS WHEREOF, the parties have caused this Agreement to be signed and sealed as of the day and year set forth above.

**PRINCIPAL**

Type of Organization:

_____

State of Incorporation:

_____

Legal Name of Organization:

_____
_____
_____
_____

Address:

_____
_____
_____

Authorized Signature(s):

By:_____ By:_____
Signature Signature

_____ _____
(Type name and title) (Type name and title)

**ACKNOWLEDGMENT OF PRINCIPAL(S)**

STATE OF _____:
COUNTY/CITY OF_____:

I, _____ Notary Public in and for the State and County/City aforesaid, do hereby certify that _____ _____ whose name is signed to the foregoing bond, this day personally appeared before me in my State and County/City aforesaid and acknowledged the same.

Given under my hand this _____ day of _____, _____.
My commission expires:_____ _____
NOTARY PUBLIC

Surety:_____
Bond No.:_____

**CO-PRINCIPAL(S)**

Type of Organization: _____

State of Incorporation: _____

Legal Name of Organization: _____

Address: _____

Authorized Signature(s):

By: _____ By: _____
Signature Signature

_____ _____
(Type name and title) (Type name and title)

**ACKNOWLEDGMENT OF CO-PRINCIPAL(S)**

STATE OF _____:
COUNTY/CITY OF _____:

I, _____ Notary Public in and for the State and County/City aforesaid, do hereby certify that _____ whose name is signed to the foregoing bond, this day personally appeared before me in my State and County/City aforesaid and acknowledged the same.

Given under my hand this _____ day of _____, _____.
My commission expires: _____ _____
NOTARY PUBLIC

Surety: _____
Bond No.: _____

**CORPORATE SURETY**

Type of Organization: _____

Liability Limit: _____

Legal Name and Address: _____

Address: _____

Authorized Signature(s):

By: _____ By: _____
Signature Signature

_____ _____
(Type name and title) (Type name and title)

**ACKNOWLEDGMENT OF CORPORATE SURETY(S)**

STATE OF _____:
COUNTY/CITY OF _____:

I, _____ Notary Public in and for the State and County/City aforesaid, do hereby certify that _____ _____ whose name is signed to the foregoing bond, this day personally appeared before me in my State and County/City aforesaid and acknowledged the same.

Given under my hand this _____ day of _____, _____.
My commission expires:_____ _____
NOTARY PUBLIC

Surety:_____
Bond No.:_____

**SECTION 013218**

**CONSTRUCTION PROGRESS SCHEDULE**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Preliminary schedule.
B. Construction progress schedule, bar chart type.

### 1.2 RELATED SECTIONS
A. Section 011000 - Summary: Work sequence.

### 1.3 REFERENCES
A. AGC (CPM) - The Use of CPM in Construction - A Manual for General Contractors and the Construction Industry; Associated General Contractors of America; 1976.

### 1.4 PRECONSTRUCTION MEETING
A. Within 10 days after date of Agreement, submit preliminary schedule defining planned operations for the first 90 days of Work, with a general outline for remainder of Work
B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
    1. Include written certification that major contractors have reviewed and accepted proposed schedule.
        a. Within 10 days after joint review, submit complete schedule.
D. Submit updated schedule every 30 days or as requested by Architect.
E. Submit the number of opaque reproductions that Contractor requires, plus one copy which will be retained by Architect and Owner. Furnish additional copies when directed.
F. Submit under transmittal letter form specified in Section 013300.

### 1.5 QUALITY ASSURANCE
A. Scheduler: Contractor's personnel or specialist Consultant specializing in CPM scheduling with five years minimum experience in scheduling construction work of a complexity comparable to this Project, and having use of computer facilities capable of delivering a detailed graphic printout within 48 hours of request.

### 1.6 SCHEDULE FORMAT
A. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.
B. Diagram Sheet Size: Maximum 11x17 inches or width required.
C. Sheet Size: Minimum of 8-1/2 x 11 inches, Maximum of 24" x 36".
D. Scale and Spacing: To allow for notations and revisions.

### 1.7 START OF CONSTRUCTION SERVICES
A. Construction services as specified herein shall commence upon issuance of the Letter of Intent to Award a Construction Contract.

## PART 2 – PRODUCTS - NOT USED

## PART 3 – EXECUTION

### 3.1 PRELIMINARY SCHEDULE
A. Prepare (preliminary) schedule in the form of a horizontal bar chart.

## 3.2 CONTENT

A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
B. Identify each item by specification section number.
C. Identify work of separate stages and other logically grouped activities.
D. Provide sub-schedules for each stage of Work identified in Section 011000.
E. Provide sub-schedules to define critical portions of the entire schedule.
F. Include conferences and meetings in schedule.
G. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.
H. Provide separate schedule of submittal dates for shop drawings, product data, and samples, owner-furnished products, Products identified under Allowances, and dates reviewed submittals will be required from Architect. Indicate decision dates for selection of finishes.
I. Indicate delivery dates for owner-furnished products.
J. Coordinate content with schedule of values specified in Section 012900.
K. Provide legend for symbols and abbreviations used.

## 3.3 BAR CHARTS

A. Include a separate bar for each major portion of Work or operation.
B. Identify the first work day of each week.

## 3.4 NETWORK ANALYSIS

A. Prepare network analysis diagrams and supporting mathematical analyses using the Critical Path Method.
B. Illustrate order and interdependence of activities and sequence of work; how start of a given activity depends on completion of preceding activities, and how completion of the activity may restrain start of subsequent activities.
C. Mathematical Analysis: Tabulate each activity of detailed network diagrams, using calendar dates, and identify for each activity:
    1. Preceding and following event numbers.
    2. Activity description.
    3. Estimated duration of activity, in maximum 15 day intervals.
    4. Earliest start date.
    5. Earliest finish date.
    6. Actual start date.
    7. Actual finish date.
    8. Latest start date.
    9. Latest finish date.
    10. Total and free float; float time shall accrue to Owner and to Owner's benefit.
    11. Monetary value of activity, keyed to Schedule of Values.
    12. Percentage of activity completed.
    13. Responsibility.
D. Analysis Program: Capable of compiling monetary value of completed and partially completed activities, accepting revised completion dates, and re-computation of all dates and float.
E. Required Reports: List activities in sorts or groups:
    1. By preceding work item or event number from lowest to highest.
    2. By amount of float, then in order of early start.
    3. By responsibility in order of earliest possible start date.
    4. In order of latest allowable start dates.
    5. In order of latest allowable finish dates.
    6. Contractor's periodic payment request sorted by Schedule of Values listings.
    7. Listing of basic input data which generates the report.
    8. Listing of activities on the critical path.

### 3.5 REVIEW AND EVALUATION OF SCHEDULE

A. Participate in joint review and evaluation of schedule with Architect at each submittal.
B. Evaluate project status to determine work behind schedule and work ahead of schedule.
C. After review, revise as necessary as result of review, and resubmit within 5 days.

### 3.6 UPDATING SCHEDULE

A. Maintain schedules to record actual start and finish dates of completed activities.
B. Indicate progress of each activity to date of revision, with projected completion date of each activity.
C. Annotate diagrams to graphically depict current status of Work.
D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.
E. Indicate changes required to maintain Date of Substantial Completion.
F. Submit reports required to support recommended changes.
G. Provide narrative report to define problem areas, anticipated delays, and impact on the schedule. Report corrective action taken or proposed and its effect including the effects of changes on schedules of separate contractors.

### 3.7 DISTRIBUTION OF SCHEDULE

A. Distribute copies of updated schedules to Contractor's project site file, to Subcontractors, suppliers, Architect, Owner, and other concerned parties.
B. Instruct recipients to promptly report, in writing, problems anticipated by projections shown in schedules.

**END OF SECTION**

**SECTION 013300**

**ADMINISTRATIVE REQUIREMENTS**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Preconstruction meeting.
B. Site mobilization meeting.
C. Progress meetings.
D. Construction progress schedule.
E. Progress photographs.
F. Coordination drawings.
G. Submittals for review, information, and project closeout.
H. Number of copies of submittals.
I. Submittal procedures.

### 1.2 RELATED SECTIONS

A. Document 007213 - General Conditions: Dates for applications for payment.
B. Section 012900 - Price and Payment Procedures:
C. Section 013218 - Construction Progress Schedule: Form, content, and administration of schedules.
D. Section 017300 - Execution Requirements: Additional coordination requirements.
E. Section 017700 - Closeout Submittals: Project record documents.

### 1.3 PROJECT COORDINATION

A. Project Coordinator: Contractor.
B. Cooperate with the Contractor in allocation of mobilization areas of site; for field offices and sheds, for access, traffic, and parking facilities.
C. During construction, coordinate use of site and facilities through the Contractor.
D. Comply with procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.
E. Comply with instructions of the Contractor for use of temporary utilities and construction facilities.
    1. Direct and check-out of utilities, operational systems, and equipment.
    2. Record dates of start of operation of systems and equipment.
F. Coordinate field engineering and layout work under instructions of the Contractor.
G. Develop and implement procedure for review and processing of applications for progress and final payments: Submit recommendation to Architect for Certification to Owner for Payment.
H. Establish on-site lines of authority and communication; schedule and conduct project meetings among:
    1. Owner's Representative.
    2. Architect.
    3. Subcontractors.
I. Cost Control:
    1. Maintain cost accounting records for authorized work performed under Unit Costs.
    2. Develop and implement procedure for review and processing of applications for progress and final payments: Submit recommendation to Architect for Certification to Owner for Payment.
J. Administer processing of:
    1. Shop drawings, product data and samples.
    2. Field drawings.
    3. Coordination drawings.
    4. Closeout submittals.
K. Maintain Reports and Records at Job Site:
    1. Daily log of progress of work, available to Architect and Owner.
    2. Verify that all subcontractors maintain record documents on a current basis.

3. At completion of Project, assemble record documents from all subcontractors and deliver to the Architect in accordance with Section 017700.
4. Assemble documentation for handling of claims and disputes.

L. Contractor to verify that specified cleaning is done during progress of work and at the completion of each subcontractor's work.
M. Make the following types of submittals to Architect through the Project Coordinator:
1. Requests for interpretation.
2. Requests for substitution.
3. Shop drawings, product data, and samples.
4. Submittals for information.
5. Test and inspection reports.
6. Design data.
7. Manufacturer's instructions and field reports.
8. Applications for payment and change order requests.
9. Progress schedules.
10. Coordination drawings.
11. Closeout submittals.

N. Upon contractor's determination of Substantial Completion of work or portion thereof, notify Architect in writing as to project status and request inspection and compilation of punch list of incomplete or unsatisfactory items.
O. Upon Architect's Certification of Date of Substantial Completion, supervise correction and completion of work within specified period.
P. Upon Contractor's determination that Work is finally complete:
1. Submit written notice to Architect and Owner, that Work is ready for final inspection.
2. Secure and transmit to Architect required closeout submittals as put forth in Section 017700.

Q. Contractor to turn over to Architect for approval all items for closeout as put forth in Section 017700.

## PART 2 - PRODUCTS - NOT USED

## PART 3 – EXECUTION

### 3.1 PRECONSTRUCTION MEETING

A. Architect will schedule a meeting within 10 days of date of Letter of Intent.
B. Attendance Required:
1. Owner.
2. Architect.
3. Contractor:
4. Field Superintendent
5. Project Manager
6. Safety Representative.
7. Contractor's Major Subcontractors.

C. Minimum Agenda:
1. Items required to be submitted by Contractor at Preconstruction Meeting:
a. Fully executed bonds and Insurance Certificates
b. List of major Subcontractors and suppliers.
c. Tentative construction schedule.

*d.* Letter from Project Safety Representative certifying that: *he/she will be empowered as the Contractor's Safety Engineer, is responsible for enforcing all safety requirements, and is familiar with the Manual of Accident Prevention in Construction by the Associated General Contractors of America (current edition).* Also note that: *the Contractor will maintain a copy of said publication on site at all times, and will strictly enforce all applicable requirements noted within.*

2. Distribute and discuss documents required to be submitted by Contractor at Preconstruction meeting.
3. Execution of Owner-Contractor Agreement.
4. Identify critical work sequencing.
5. Discussion of schedule of values, and progress schedule.
6. Discussion of list of Subcontractors, list of Products, schedule of values, and progress schedule.
7. Designation of responsible personnel representing the parties to Contract; Owner, Architect and Contractor.
8. Establish chain of Authority.
9. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
10. Scheduling.
    a. Discuss major equipment deliveries and priorities.
11. Review of use of premises:
    a. Office and storage areas.
    b. Access to site and facilities.
12. Owner's requirements.
13. Security procedures.
14. Review requirements of and procedures for maintaining record documents.
15. Architect will record minutes and distribute copies within five days after meeting to participants, with copies to Contractor, Owner, participants, and those directly affected by decisions made.

**3.2 PROGRESS MEETINGS**

A. Contractor will schedule and administer meetings throughout progress of the Work at maximum bi-monthly intervals.
B. Contractor will make arrangements for meetings, prepare agenda with copies for participants 5 business days in advance of meeting date, preside at meetings.
C. Attendance Required: Job superintendent, major Subcontractors and suppliers, Owner, Architect, 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 which impede planned progress.
    5. Review of submittals schedule and status of submittals.
    6. Review of off-site fabrication and delivery schedules.
    7. Maintenance of progress schedule.
    8. Corrective measures to regain projected schedules.
    9. Planned progress during succeeding work period.
    10. Coordination of projected progress.
    11. Maintenance of quality and work standards.
    12. Effect of proposed changes on progress schedule and coordination.
    13. Other business relating to Work.
    14. Process Payment Requests Monthly.
E. Contractor shall record minutes and distribute copies within Five (5) calendar days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

## 3.3 COORDINATION DRAWINGS

A. Conduct coordination meetings in accordance with each respective section as work progresses. Contractor shall coordinate with Architect for such meetings.
B. Provide information required by Contractor for preparation of coordination drawings.
C. Review drawings prior to submission to Architect.

## 3.4 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
   1. Product data.
   2. Shop drawings.
   3. Samples for selection.
   4. Samples for verification.
B. Submit to Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
C. Samples will be reviewed only for aesthetic, color, or finish selection.
D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 017700 - CLOSEOUT SUBMITTALS.
E. Samples required for color, texture, and/or finish selections must be submitted as a physical representation of the available selections. Electronic color charts will not be accepted.

## 3.5 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
   1. Design data.
   2. Certificates.
   3. Test reports.
   4. Inspection reports.
   5. Manufacturer's instructions.
   6. Manufacturer's field reports.
   7. Other types indicated.
B. Submit for Architect's knowledge as contract administrator or for Owner.

## 3.6 SUBMITTALS FOR PROJECT CLOSEOUT

A. When the following are specified in individual sections, submit them at project closeout:
   1. Project record documents.
   2. Operation and maintenance data.
   3. Warranties.
   4. Bonds.
   5. Lien Waivers.
   6. Other types as indicated.
B. Submit for Owner's benefit during and after project completion.

## 3.7 NUMBER OF COPIES OF SUBMITTALS

A. Documents for Review or for information:
   1. The Contractor has the option of providing Submittals for review or for information either as a hard copy or electronically as outlined below.
   2. If Submittal is provided as a hard copy:
      a. Submit the number of copies which the Contractor requires, plus three copies which will be retained by the Architect.
   3. If Submittal is provided electronically:
      a. Deliver one copy of submittal to Architect via email or Compact Disc in PDF file format.
      b. At Architect’s discretion, the reviewed submittal, with any corrections, will be returned as one electronic copy in PDF format, or as one hard copy delivered to the Contractor.

B. Documents for Project Closeout: Shall be submitted as hard copies only. Make one reproduction of submittal originally reviewed. Submit one extra of submittals for information.
C. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
   1. After review, produce duplicates.
   2. Retained samples will not be returned to Contractor unless specifically so stated.

**3.8 SUBMITTAL PROCEDURES**

A. Sequentially number the transmittal form and clearly indicate the respective specification section number for reference. Revise submittals with original number and a sequential alphabetic suffix.
B. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.
C. 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 the requirements of the Work and Contract Documents.
D. Deliver submittals to Architect at business address or via email.
E. Schedule submittals to expedite the Project, and coordinate submission of related items.
F. For each submittal for review, allow 10 days excluding delivery time to and from the Contractor.
G. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.
H. Provide space for Contractor and Architect review stamps.
I. Shop drawings which incorporate, in part or in whole, direct reproductions of the contract documents, are not acceptable and will be returned, without review, to the contractor, for resubmittal.
J. All shop drawings which are poorly prepared or handwritten will be returned, without review, to the contractor for resubmittal. Architect’s determination of properly prepared shop drawings is final.
K. Electronic Media/Files
   1. Construction drawings for this project have been prepared by the Architect and Engineer utilizing the following Computer Aided Drawing (CAD) System: Auto Cad Release 2015.
   2. Contractors and Subcontractors may purchase electronic media files of the Contract Documents.
   3. Upon request to purchase electronic media or files, the Contractor shall complete the “Request for Electronic Drawing Files” issued by the Architect and issue the appropriate fee to the Architect.
   4. Sheets can be formatted to provide background information only, background plus various layers of equipment; or of complete sheets as issued for construction.
   5. The Contractor may utilize these CAD Drawings in the preparation of their Shop Drawings and as built drawings only.
   6. The information issued is provided in a good faith effort to expedite the Project and simplify the efforts of the Contractor with no guarantee by the issuer as to the accuracy or correctness of the information provided. The Architect accepts no responsibility or liability for the Contractor’s or subcontractor’s use of these CAD documents.
   7. The use of these CAD documents by the Contractor(s) does not relieve them of their responsibility to field measure existing conditions and to properly fit the work to the Project.
   8. These documents will be provided when purchased for the convenience of the Contractor and this Project. Ownership and use of the issued documents are governed by the terms of the General Conditions.
L. Submittals
   1. **Submit all submittals within 21 calendar days after date of Letter of Intent.** Failure to do so may cause scheduled contractor payments to be withheld.

2. **Submit all manufacturer's letter's confirming prompt ordering of all material and equipment within 21 calendar days after date of Letter of Intent.** Failure to do so may cause scheduled contractor payments to be withheld. Confirmation Letters are to include the following:
   a. Order date.
   b. Manufacturing date.
   c. Delivery date.
   d. Confirmation that no factors will deter delivery on schedule.
   e. Any other pertinent information.
3. Submit four prints of shop drawings, and number of copies of product data and samples which Contractor requires for distribution and future submission under Section 017300 plus one copy which will be retained by Architect.
4. Submit number of samples specified in each of specification sections.
5. Accompany submittals with transmittal letter, in duplicate, containing:
   a. Date.
   b. Project title and number.
   c. Contractor's name and address.
   d. Relevant Specification section number.
   e. The number of shop drawings, product data and samples submitted.
   f. Notification of any deviations from Contract Documents.
   g. Other pertinent data.
6. Submittals shall include:
   a. Date and revision dates.
   b. Project title and number.
   c. Names of:
      1) Architect
      2) Architect's consultant(s)
      3) Subcontractor
      4) Sub-subcontractor.
      5) Supplier.
      6) Manufacturer.
      7) Separate detailer when pertinent.
   d. Identification of product or material.
   e. Relation to adjacent structure or material.
   f. Field dimensions, clearly identified as such.
   g. Specification section and page number.
   h. Specified standards, such as ASTM number or Federal Specification.
   i. A blank space, 4" x 6" for Architect's stamp.
   j. Identification of previously approved deviation(s) from Contract Documents.
   k. Identification of color selections required and color selection charts.
7. All shop drawing submittals received by the Architect which do not bear the contractor's approval stamp and initials or signatures will be returned, without review, to the contractor, for resubmittal.
8. All shop drawing submittals which do not contain a reproducible transparency set of the submittal will be returned without review, to the contractor, for resubmittal.

M. Resubmission Requirements
   1. Shop Drawings:
      a. Definition: Shop Drawings are original drawings prepared by Contractor, subcontractor, sub-subcontractor, supplier, or distributor, which illustrates some portion of the work, showing fabrication, layout, setting or erection details.
      b. Revise initial drawings as directed and resubmit in accordance with submittal procedures.
      c. Indicate on drawings all changes which have been made in addition to those requested by Architect.
      d. Clearly indicate by revision number and date, each resubmittal of each shop drawing.

e. When revised for resubmission, identify all changes made since previous submission.
f. Shop drawings which incorporate, in part or in whole, direct reproductions of the contract documents, will NOT be accepted and will be returned without review.

2. Product data and samples: Submit new data and samples as specified for initial submittal.
3. Make all resubmittals within 10 business days after date of Architect's previous review.

N. Distribution of Submittals After Review
1. Contractor will distribute copies of shop drawings and product data which carry Architect's stamp to:
a. Contractor's file.
b. Job site file.
c. Record documents file.
d. Subcontractors.
e. Suppliers.
f. Fabricators.
g. Other contractors as required.
2. Distribute samples as directed in accordance with Contract Documents.
3. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.

O. Contractor Responsibilities
1. Review shop drawings, product data and samples prior to submission to the next level of authority.
2. Verify:
a. Field dimensions and drawing dimensions.
b. Field construction criteria.
c. Catalog numbers and similar data.
d. Compliance of items submitted with Contract Documents.
e. Dimensions and elevations requirements necessary to properly install product.
3. Coordinate each submittal with requirements of:
a. The Work.
b. The Contract Documents.
c. The work of other subcontractors.
4. Contractor's responsibility for errors and omissions in submittals is not relieved by Architect/Engineer's review of submittals.
5. Notify Architect in writing prior to submission and specifically on the submittal, of proposed deviations in submittals from contract requirements.
6. Contractor's responsibility for notifying Architect of deviations and for correcting deviations not properly identified in submittals is not relieved by Architect's review of improperly documented submittals.
7. Do not begin any work which requires submittals without having Architect's stamp and initials or signature indicating review.
8. After Architect's review, make response required by Architect's stamp and distribute copies. Indicate by transmittal that copy of approved data has been distributed.
9. Subcontractors:
a. Subcontractors send their submittals to the Contractor.
b. Contractor reviews and initials submittals for compliance with scope, coordination and integration with the work of all other subcontractors.
c. Contractor transmits his reviewed copies of subcontractor's submittals to Architect.
d. Contractor retains copy of submittals after review by Architect and distributes copies to submitting subcontractor and to other subcontractors for coordination and integration.
e. Contractor: Enforce resubmission requirements.

P. Architect's Duties
1. Review submittals within 10 business days.
2. Review for compliance to design concept of project.
3. Review all requests for proposed deviations. Obtain Owner's concurrence and respond to Contractor's request.

4. Review of separate item does not constitute review of an assembly in which item functions.
5. Affix stamp, date, and initials or signature certifying to review of submittal, and with instructions for contractor response.
6. Return submittals to Contractor for response or distribution.
7. Select product colors upon receipt of all shop drawings and submittals requiring color selections.

Q. Submittals not requested will not be recognized or processed.

**END OF SECTION**

**SECTION 014000**

**QUALITY REQUIREMENTS**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. References and standards.
B. Quality assurance submittals.
C. Mock-ups.
D. Control of installation.
E. Tolerances.
F. Testing and Inspection Agencies.
G. Manufacturers' field services.

### 1.2 RELATED SECTIONS

A. Section 012100 - Allowances: Allowance for payment of testing services.
B. Section 013300 - Administrative Requirements: Submittal procedures.
C. Section 016000 - Product Requirements: Requirements for material and product quality.

### 1.3 SUBMITTALS

A. Design Data: Submit for Architect's knowledge as contract administrator or for the Owner, for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.
B. Test Reports: After each test/inspection, promptly submit five copies of report to Architect and to Contractor.
    1. Include:
        a. Date issued.
        b. Project title and number.
        c. Testing laboratory name and address.
        d. Name and signature of inspector.
        e. Date and time of sampling or inspection.
        f. Record of temperature and weather.
        g. Identification of product and specifications section.
        h. Location in the Project.
        i. Type of test/inspection.
        j. Date of test/inspection.
        k. Results of test/inspection.
        l. Conformance with Contract Documents.
        m. When requested by Architect, provide interpretation of results.
    2. Test reports are submitted for Architect's knowledge as contract administrator or for the Owner, for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.
C. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.
    1. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
    2. Certificates may be recent or previous test results on material or product but must be acceptable to Architect.
D. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
E. Manufacturer's Field Reports: Submit reports for Architect's benefit as contract administrator or for Owner.
    1. Submit report in duplicate within 30 days of observation to Architect for information.
    2. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

F. Erection Drawings: Submit drawings for Architect's benefit as contract administrator or for Owner.
   1. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.
   2. Data indicating inappropriate or unacceptable Work may be subject to action by Architect or Owner.

**1.4 REFERENCES AND STANDARDS - See Section 014200**

**1.5 TESTING AND INSPECTION AGENCIES**

A. Contractor will employ and pay for services, from Testing Allowances, of an independent testing agency to perform specified testing and inspection.
B. Testing Agency of record: The Testing Agency of Record shall be identified by the Owner within 15 days of the Letter of Intent.
C. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
D. Inspection sampling and testing is required for:
   1. Section: 032000; Concrete Reinforcement.
   2. Section: 033000; Cast-in-Place Concrete.
   3. Section: 040516; Mortar and Masonry Grout.
   4. Section: 051200; Structural Steel.
   5. Section: 053100; Steel Joists
   6. Section: 312213; Grading.
   7. Section: 312316; Excavation.
   8. Section: 312323 Fill and Backfill.
E. Additional services as requested by Architect.
F. Testing Agency:
   1. Testing Agency to be selected by Owner.
   2. Testing agency: Comply with requirements of ASTM E 329, ASTM E 548, ASTM E 543, ASTM C 1021, ASTM C 1077, ASTM C 1093, and ASTM C 1021.
   3. Inspection agency: Comply with requirements of ASTM D290.
   4. Laboratory: Authorized to operate in State in which Project is located.
   5. Laboratory Staff: Maintain a full-time registered Engineer on staff to review services.
   6. Testing Equipment: Calibrated at reasonable intervals with devices of accuracy traceable to either National Bureau of Standards or accepted values of natural physical constants.

**PART 2 – PRODUCTS – NOT USED**

**PART 3 – EXECUTION**

**3.1 CONTRACTOR 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. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect 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. Have Work performed by persons qualified to produce required and specified quality.
F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

## 3.2 MOCK-UPS

A. Tests will be performed under provisions identified in this section and identified in the respective product specification sections.
B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, accessories and finishes.
C. Accepted mock-ups shall be a comparison standard for the remaining Work.
D. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, remove mock-up and clear area when directed to do so.

## 3.3 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
B. Comply with manufacturer's tolerances. Should manufacturer's tolerances conflict with Contract Documents, request clarification from Architect before proceeding.
C. Where specified tolerances within individual sections exceed those accepted by the Manufacturer, comply with the more stringent tolerances specified.
D. Adjust products to appropriate dimensions; position before securing products in place.

## 3.4 TESTING AND INSPECTION

A. See individual specification sections for testing and inspection required.
B. Testing Agency Duties:
    1. Test samples of mixes submitted by Contractor.
    2. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
    3. Acquaint Architect's personnel with testing procedures and with all special conditions encountered at the site.
    4. Perform specified inspections, sampling and testing of products in accordance with specified standards.
    5. Ascertain compliance of materials and mixes with requirements of Contract Documents.
    6. Promptly notify Architect and Contractor of observed irregularities or non-conformance of Work or products.
    7. Perform additional tests and inspections required by Architect.
    8. Attend preconstruction meetings and progress meetings as directed by Architect.
    9. Submit reports of all tests/inspections specified.
    10. Obtain written acknowledgement of each inspection, sampling and test made from subcontractor whose work is being tested.
C. Limits on Testing/Inspection Agency Authority:
    1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
    2. Agency may not approve or accept any portion of the Work.
    3. Agency may not assume any duties of Contractor.
    4. Agency has no authority to stop the Work.
D. Contractor Responsibilities:
    1. Provide to agency at designated location, adequate samples of materials proposed to be used which require testing, along with proposed mix designs.
    2. Cooperate with laboratory personnel and provide access to the Work and to manufacturers' facilities.
        a. Monitor or direct superintendent to monitor each inspection, sampling, and test.
        b. Provide laboratory with written acknowledgement of each inspection, sampling, or test.
        c. Within 24 hours notify Architect in writing of reasons for not acknowledging laboratory field procedures.
    3. Furnish copies of mill test reports.
    4. Furnish verification of compliance with contract requirements for materials and equipment

5. Provide incidental labor and facilities:
   a. To provide access to Work to be tested/inspected.
   b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
   c. To facilitate tests/inspections.
   d. To provide storage and curing of test samples.
6. Notify Architect and laboratory 48 hours prior to expected time for operations requiring testing/inspection services.
7. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
8. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
9. Correct work which is defective, or which fails to conform to the Contract Documents in accordance with the General conditions. Corrective work shall not delay the project schedule or the work of other subcontractors.
10. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Architect. Payment for retesting will be charged to the Contractor by deducting testing charges from the Contract Price.

**3.5 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 as applicable, and to initiate instructions when necessary.
B. Submit qualifications of observer to Architect 30 days in advance of required observations.
   1. Observer subject to approval of Architect.
   2. Observer subject to approval of Owner.
C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturer's written instructions.

**3.6 DEFECT ASSESSMENT**

A. Replace Work or portions of the Work not conforming to specified requirements.
B. If, in the opinion of Architect, it is not practical to remove and replace the Work, Architect will direct an appropriate remedy or adjust payment.

**END OF SECTION**

**SECTION 015000**

**TEMPORARY FACILITIES AND CONTROLS**

## PART 1 –GENERAL

### 1.1 SUMMARY

A. Utilities including lighting and electricity, heat, telephone service, and water.
B. Project identification and temporary signs.
C. Temporary sanitary facilities.
D. Cleaning.
E. Temporary Pavement Patching.
F. Dewatering
G. Temporary Erosion Control.
H. Temporary Construction Fence

### 1.2 USE CHARGES

A. General: Cost or use charges for temporary facilities are not chargeable to OWNER or ENGINEER and shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, the following:
   1. OWNER's construction forces.
   2. ENGINEER.
   3. Testing agencies.
   4. Personnel of authorities having jurisdiction.

### 1.3 PROJECT CONDITIONS

A. Conditions of Use: The following conditions apply to use of temporary services and facilities by all parties engaged in the Work:
   1. Keep temporary services and facilities clean and neat.
   2. Relocate temporary services and facilities as required by progress of the Work.

## PART 2 – PRODUCTS

### 2.1 MATERIALS

A. General: The CONTRACTOR shall provide new materials. Undamaged, previously used materials in serviceable condition may be used if approved by ENGINEER. Provide materials suitable for use intended.

### 2.2 EQUIPMENT

A. General: The CONTRACTOR shall provide equipment suitable for use intended.

### 2.3 TEMPORARY SANITARY FACILITIES

A. The CONTRACTOR shall provide sanitary facilities in compliance with laws and regulations.
   1. Service, clean and maintain facilities and enclosures.
   2. Supply toilet tissue and dispenser at each toilet.

## PART 3 – EXECUTION

### 3.1 INSTALLATION, GENERAL

A. The CONTRACTOR shall locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. The CONTRACTOR shall relocate and modify facilities as required by the OWNER or the ENGINEER.
B. The CONTRACTOR shall provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

## 3.2 TEMPORARY SIGNS

A. Temporary Signs: The CONTRACTOR shall prepare sidewalk closed signs at locations indicated on plans. Install signs where indicated to inform public and persons seeking entrance to Project. Do not permit installation of unauthorized signs.
   1. Provide temporary signs to provide directional information to construction personnel and visitors.
B. This work shall not be paid for separately but included in the cost for Traffic Control and Protection.

## 3.3 PROGRESS CLEANING

A. General: The CONTRACTOR shall clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
B. Site: The CONTRACTOR shall maintain Project site free of waste materials and debris. When construction operations take place adjacent to public roadways the CONTRACTOR shall be responsible for removal of all loose debris deposited on the pavement. The CONTRACTOR shall be responsible to provide street cleaning services as needed by the judgment of the OWNER or its representative.
C. Work Areas: The CONTRACTOR shall clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
   1. Remove liquid spills promptly.
   2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
D. Installed Work: The CONTRACTOR shall keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
E. Pavement: The CONTRACTOR shall clean pavement surfaces and protect as necessary to ensure freedom from damage and deterioration, and accumulation of dirt.
F. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
G. During handling and installation, The CONTRACTOR shall clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
H. The CONTRACTOR shall clean and provide maintenance on completed construction as frequently as necessary or as directed by the OWNER through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
I. Limiting Exposures: Supervise construction operations to assure that no part of the construction completed or in progress is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.
J. Progress Cleaning, as directed by the OWNER, shall be considered incidental to the Contract.

## 3.4 WATER FOR CONSTRUCTION AND TESTING

A. CONTRACTOR shall supply any water required for construction.
   1. Water for this project can be provide from an existing fire hydrant with the use of a Village issued meter. A Hydrant Meter Permit Application will need to be filled out and submitted to the Village. The meter requires a $2,000 deposit which is refundable. The link to the application is in item 2.
   2. https://www.hoffmanestates.org/home/showpublisheddocument/21972/638385912692970000

## 3.5 DEWATERING

A. Dewatering Performance: The CONTRACTOR shall provide design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.

1. The CONTRACTOR shall be responsible for complying with all State, local, and federal regulatory requirements.
2. Continuously monitor and maintain dewatering operations to ensure erosion control, stability of excavations and constructed slopes, that excavation does not flood, and that damage to subgrades and permanent structures is prevented.
3. Prevent surface water from entering excavations by grading, dikes, or other means.
4. Accomplish dewatering without damaging existing buildings, structures, and site improvements adjacent to excavation.
5. Remove dewatering system when no longer required for construction.

B. The CONTRACTOR shall prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

C. The CONTRACTOR shall protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

D. Filtration Devices: The CONTRACTOR shall be required to filter all water from dewatering operations in all excavated areas throughout the project. The CONTRACTOR shall use filter bags or cartridge filter devices similar to the following:
1. Rosedale Bulk Loading Filters, Ann Arbor, MI 1-800-821-5373
2. Dandy Dewatering Bags 1-888-795-0808
3. U.S. Fabrics Filter Bags 1-800-518-2290
4. GSI Sediment Bags 1-414-379-9478
5. Or Equal

E. The CONTRACTOR, after providing adequate filtering capabilities, can discharge the filtered water into nearby Village ditches, Village storm sewers or natural drainage channels.

F. Filtered water shall be reasonably free of silt when it is discharged. The CONTRACTOR will be required to stop dewatering operations should there be any evidence that the filtering system is not functioning properly or not installed. Silt fencing or other forms of silt containment devices or methods will still be required to prevent any silty water during storm events from being discharged into the Fox River or tributaries and/or other surface waters.

G. Dewatering, if necessary, shall be considered incidental to the item of work being performed.

## 3.6 TEMPORARY PAVEMENT PATCHING

A. This work shall consist of furnishing the labor, material, and equipment to provide and maintain a three (3) inch thick hot-mix asphalt pavement patch over excavations and trenches where directed by the ENGINEER or the OWNER.

B. Hot-Mix Asphalt for temporary access shall meet N50 mix design requirements as stated in the current edition of the IDOT “Standard Specifications for Road and Bridge Construction”. The width of the asphalt for temporary access shall be equal to the width of the existing excavation/trench. The ENGINEER shall approve equipment for placing and compacting the temporary asphalt.

C. During the course of the contract, the CONTRACTOR shall construct and maintain temporary access to the length and width determined by the ENGINEER. The CONTRACTOR shall remove the temporary aggregate surface to permit construction of the hot-mix asphalt pavement patch. Prior to removal, the ENGINEER shall classify the amount of temporary aggregate which is salvageable. If classified salvageable, the CONTRACTOR shall incorporate this material into an approved use. Otherwise, all unsalvageable material shall be disposed of at the CONTRACTOR’s expense.

D. In the event that the temporary pavement patch or the asphalt for temporary access is deemed deficient as noted the OWNER or authorized individual, the CONTRACTOR will be notified of the deficiency. The CONTRACTOR shall have four (4) hours to repair the pavement patch to the satisfaction of the OWNER or authorized individual. Failure to do so will result in a penalty on one hundred dollars per hour ($100.00/hr) starting four (4) hours from the time of notification.

### 3.7 TEMPORARY EROSION CONTROL

A. Erosion Control Blanket shall be used to stabilize the construction areas where the final grade has been reached but cannot be permanently stabilized due to planting season restrictions by the 7th day after construction activities have temporarily or permanently ceased. Where the initialization of stabilization measures by the 7th day after construction activities temporarily or permanently ceased is precluded by snow cover, stabilization measures shall be initiated as soon as practical.

### 3.8 TEMPORARY CONSTRUCTION FENCE

A. Temporary site fencing shall be erected by the Contractor prior to the start of Work and remain until site is substantially completed.
   1. Temporary site fencing shall be constructed with 6’ chain link panels, panel stands w/ sandbags, and panel couplers secured with carriage bolts, or Engineer approved equal.
   2. Access gates shall be located at each building’s drive apron.
   3. The site fencing shall be secured with panel couplers and the gates locked overnight, on weekends, and when the Contractor is not on site.

## PART 4– PAYMENT

### 4.1 BASIS OF PAYMENT

A. Temporary facilities and controls including but not limited to: items included in this Section and subsurface de-watering structures shall not be paid for separately but shall be considered incidental to the item of work being performed.

**END OF SECTION**

**SECTION 015100**

**TEMPORARY UTILITIES**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Temporary Utilities: Electricity, lighting, heat, ventilation, and water.

### 1.2 RELATED SECTIONS
A. Section 015000 - Temporary Facilities and Controls: Telephone service for administrative purposes.

### 1.3 TEMPORARY ELECTRICITY
A. Cost: By Contractor.
B. Provide power service required from utility source.
C. Power Service Characteristics: 120/240 volt, 15 ampere, three phase, four wire, complete with circuit breakers, disconnect switches and other devices required.
D. Provide power outlets for construction operations, with branch wiring and distribution boxes located at each floor. Provide flexible power cords as required, 50 ft. maximum.
E. Provide main service disconnect and over-current protection at convenient location and meter.
F. Permanent convenience receptacles may be utilized during construction.
G. Provide adequate distribution equipment, wiring, and outlets to provide single phase branch circuits for power and lighting.
    1. Provide 20 ampere duplex outlets, single phase circuits for power tools for every 75 feet of active work area.
    2. Provide 20 ampere, single phase branch circuits for lighting.
H. All temporary equipment and wiring for power and lighting shall be in accordance with the applicable provisions of the governing codes. Maintain in a safe manner and utilize so as not to constitute a hazard to persons or property.
I. All extension cords shall be furnished by the Contractor. Any subcontractor requiring special electrical power shall arrange for the installation and costs thereof with contractor.

### 1.4 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES
A. Provide and maintain incandescent lighting for construction operations to achieve a minimum lighting level of 2 watt/sq ft.
B. Provide and maintain 1 watt/sq ft lighting to exterior staging and storage areas after dark for security purposes.
C. Provide and maintain 0.25 watt/sq ft H.I.D. lighting to interior work areas after dark for security purposes.
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. Equip all lamps with guards.
F. Permanent building lighting may be utilized during construction.

### 1.5 TEMPORARY HEATING
A. Cost of Energy: By Contractor.
B. Provide heating devices and heat as needed to maintain specified conditions for construction operations.
    1. Temporary heating shall be smokeless portable space heaters of type approved by UL, Factory Mutual, the Fire Marshal or other governing authorities.
C. Maintain minimum ambient temperature of 45 degrees F at surfaces where construction is in progress, unless indicated otherwise in specifications.
D. Existing facilities shall not be used.

### 1.6 TEMPORARY COOLING
A. Cost of Energy: By Contractor.
B. Provide cooling devices and cooling as needed to maintain specified conditions for construction operations.

C. Maintain maximum ambient temperature of 85 degrees F at surfaces where construction is in progress, unless indicated otherwise in specifications.
D. Existing facilities shall not be used.
E. Prior to operation of permanent equipment for temporary cooling purposes, verify that installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.

**1.7 TEMPORARY VENTILATION**

A. Existing ventilation equipment may not be used.

**1.8 TEMPORARY WATER SERVICE**

A. Cost of Water Used: By Contractor.
B. Provide and maintain suitable quality water service for construction operations at time of project mobilization.
C. Connect to existing water source.
   1. Exercise measures to conserve water.
   2. Provide separate metering and reimburse Owner for cost of water used.
D. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing.
E. If required, provide a house pump complete with necessary operating controls, starters and switches, to supply adequate capacity with minimum 20 lb. pressure at each outlet.
   1. Do not use pumps specified for permanent installation.

**1.9 PERMANENT SYSTEM USED AS TEMPORARY FACILITIES**

A. When any portions of the Permanent Systems are in operating condition, that part of the system may be used as a temporary facility, provided that the Contractor:
   1. Obtains the Architect's written approval.
   2. Assumes full responsibility for the system used.
   3. Pays all costs for operation, maintenance, cleaning, and restoration of the system.
   4. Operates the system under the supervision of the subcontractors' responsible for the systems installation and ultimate performance.
   5. Operates the Air Circulating System without refrigeration or chilling and:
      a. Provides temporary approved filters within the fan enclosure to adequately filter air being distributed through the ductwork to the supply outlets.
      b. Places disposable filters in front of the exhaust registers to keep construction dirt out of exhaust ductwork.
      c. Clean all ductwork upon completion of temporary use.
   6. Pay all costs for fuel and energy consumed. Upon receipt of the Certificate of Substantial Completion arrange with utility companies to make a final reading of meters. Submit a copy of meter readings to Owner.

**PART 2 – PRODUCTS – NOT USED**

**PART 3 – EXECUTION – NOT USED**

**END OF SECTION**

**SECTION 015200**

**FIELD OFFICES**

## PART 1 - GENERAL

### 1.1 SECTION INCLUDES
A. Field Offices
B. Maintenance and removal.

### 1.2 RELATED SECTIONS
A. Section 011000 - Summary: Use of premises and responsibility for providing field offices.
B. Section 015000 - Temporary Facilities and Controls: Temporary sanitary facilities, temporary telephone service, and temporary facsimile service.

### 1.3 USE OF EXISTING FACILITIES
A. Existing facilities shall not be used for field offices.

### 1.4 USE OF PERMANENT FACILITIES
A. When permanent facilities are enclosed with operable utilities, relocate offices into building, with written agreement of Owner, and remove temporary buildings.

## PART 2 – PRODUCTS

### 2.1 MATERIALS, EQUIPMENT, FURNISHINGS
A. Materials, Equipment, Furnishings: Serviceable, new or used, adequate for required purpose.
B. Provide, maintain, field office; provide specified services, furnishings and equipment to:
   1. Architect.
   2. General Contractor
   3. Allocate three reserved parking spaces, convenient to offices, for use of Architect and Owner's representative.
   4. Allow for conference room with a table and chairs for a minimum of 25 people.

### 2.2 CONSTRUCTION
A. Portable or mobile buildings, or buildings constructed with floors raised above ground, securely fixed to foundations, with steps and landings at entrance doors. Do not use field offices for living quarters.
B. Construction: Structurally sound, secure, weather tight enclosures for office. Maintain during progress of Work; remove when no longer needed or when directed by Architect/Engineer.
C. Temperature Transmission Resistance of Floors, Walls, and Ceilings: Compatible with occupancy requirements.
D. Exterior Materials: Weather resistant, finished in one color.
E. Interior Materials in Offices: Sheet type materials for walls and ceilings, prefinished or painted; resilient floors and bases.
F. Lighting for Offices: 50 fc at desk top height, exterior lighting at entrance doors.
G. Fire Extinguishers: One standard dry chemical (ABC) type for each office.

### 2.3 ENVIRONMENTAL CONTROL
A. Heating, Cooling, and Ventilating: Automatic equipment to maintain 68 degrees F heating and 76 degrees F cooling.

### 2.4 REQUIREMENTS OF REGULATORY AGENCIES
A. Comply with Federal and State Regulations.
B. Obtain and pay for permits required by governing authorities only on Owner's prior written authorization.

## PART 3 – EXECUTION

### 3.1 PREPARATION

A. Fill and grade sites for temporary structures to provide drainage away from buildings.

### 3.2 INSTALLATION

A. Install office spaces ready for occupancy 15 days after date fixed in Notice to Proceed.
B. Orientation of office will provide view of the project through the office window.
C. Mount thermometer at convenient location but not in direct sunlight.
D. Mount fire extinguisher in prominent locations with clear access to use.

### 3.3 MAINTENANCE AND CLEANING

A. Weekly janitorial services for offices; periodic cleaning and maintenance for offices.
B. Maintain approach walks free of mud, water, and snow.

### 3.4 REMOVAL

A. At completion of Work remove buildings, foundations, utility services, and debris. Restore areas.

**END OF SECTION**

**SECTION 015500**

**VEHICULAR ACCESS AND PARKING**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Access roads, pavement, and parking.
B. Signs, signals, and devices for traffic control.

## PART 2 – PRODUCTS

### 2.1 MATERIALS
A. Temporary Construction: Contractor's option.
B. Materials for Permanent Construction: As specified in product specification sections, including earthwork, paving base, and topping.

### 2.2 SIGNS, SIGNALS, AND DEVICES
A. Post Mounted and Wall Mounted Traffic Control and Informational Signs: Specified in Section 015850
B. Automatic Traffic Control Signals: As approved by local jurisdictions.
C. Traffic Cones and Drums, Flares and Lights: As approved by local jurisdictions.
D. Flag Person Equipment: As required by local jurisdictions.

## PART 3 – EXECUTION

### 3.1 PREPARATION
A. Clear areas, provide surface and storm drainage of road, parking, area premises, and adjacent areas.

### 3.2 ACCESS ROADS
A. Use of existing on-site streets and driveways for construction traffic is not permitted.
B. Tracked vehicles not allowed on paved areas.
C. Construct new temporary all-weather access roads from public thoroughfares to serve construction area, of a width and load bearing capacity to provide unimpeded traffic for construction purposes.
D. Construct temporary bridges and culverts to span low areas and allow unimpeded drainage.
E. Extend and relocate as Work progress requires, provide detours as necessary for unimpeded traffic flow.
F. Location as indicated.
G. Provide unimpeded access for emergency vehicles. Maintain 20 foot width driveways with turning space between and around combustible materials.
H. Provide and maintain access to fire hydrants free of obstructions.
I. The Contractor shall obtain and pay for permits and inspections made necessary by the use of public streets, sidewalks, curbs and paving, post guarantees and bonds that may be required in connection therewith, and repair and make good any damages thereto acceptable to the authorities having jurisdiction.

### 3.3 PARKING
A. Use of existing parking facilities by construction personnel is not permitted.
B. Use of new parking facilities by construction personnel is not permitted.
C. Do not allow heavy vehicles or construction equipment in parking areas.
D. Arrange for temporary parking areas to accommodate use of construction personnel.
E. When site space is not adequate, provide additional off-site parking.
F. Locate as indicated.

## 3.4 NEW PERMANENT PAVEMENTS

A. Prior to Substantial Completion the base for permanent roads and parking areas may be used for construction traffic.
   1. Review conditions of base and substrate materials with Architect prior to placing top course materials. Provide for proof rolling where determined necessary by the Architect.
   2. Damage caused to the base materials or substrate by construction traffic will be repaired to meet the design standards at no additional cost to the Owner.

B. Avoid traffic loading beyond paving design capacity. Tracked vehicles not allowed.

## 3.5 CONSTRUCTION PARKING CONTROL

A. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, and Owner's operations.

B. Monitor parking of construction personnel's vehicles in existing facilities. Maintain vehicular access to and through parking areas.

C. Prevent parking on or adjacent to access roads or in non-designated areas.

## 3.6 FLAG PERSONS

A. Provide trained and equipped flag persons to regulate traffic when construction operations or traffic encroach on public traffic lanes.

## 3.7 FLARES AND LIGHTS

A. Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.

## 3.8 HAUL ROUTES

A. Consult with authority having jurisdiction, establish public thoroughfares to be used for haul routes and site access.

B. Confine construction traffic to designated haul routes.

C. Provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with public traffic.

## 3.9 TRAFFIC SIGNS AND SIGNALS

A. At approaches to site and on site, install at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.

B. Install and operate automatic traffic control signals to direct and maintain orderly flow of traffic in areas under Contractor's control, and areas affected by Contractor's operations.

C. Relocate as Work progresses, to maintain effective traffic control.

## 3.10 MAINTENANCE

A. Maintain traffic and parking areas in a sound condition free of excavated material, construction equipment, Products, mud, snow, and ice.

B. Maintain existing paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.

## 3.11 REMOVAL, REPAIR

A. Remove temporary roads before Substantial Completion.

B. Remove underground work and compacted materials to a depth of 2 feet; fill and grade site as specified.

C. Repair existing facilities damaged by use, to original condition.

D. Remove equipment and devices when no longer required.

E. Repair damage caused by installation.

F. Remove post settings to a depth of 2 feet.

### 3.12 MUD FROM SITE VEHICLES

A. Provide means of removing mud from vehicle wheels before entering streets.

**END OF SECTION**

**SECTION 015526**

**TRAFFIC CONTROL AND PROTECTION**

## PART 1 – GENERAL

### 1.1 SUMMARY

A. This Section includes warning signs and devices, temporary traffic signals, guardrails, handrails, temporary fencing, flag persons, and other equipment and materials required to protect vehicular and pedestrian traffic from construction activities.

B. The CONTRACTOR shall be responsible for the installation and maintenance of adequate signs, traffic control devices, and warning devices to inform and protect the public during all phases of construction.

### 1.2 SUBMITTALS

A. Traffic Control Schedule:

1. Schedule of lane closures and sidewalk closings, partial closings, and detours.
2. The Contractor shall make and submit for approval by the OWNER and ENGINEER a traffic plan two (2) weeks prior to work in or interfering with traffic on any streets.
3. Include procedures for pedestrian and vehicular traffic routing and protection in immediate construction area and surrounding area during working and non-working hours.
4. Update as necessary to keep OWNER, emergency services, schools and Maintaining Agency informed of traffic routing.
5. OWNERs and Maintaining Agency review and acceptance shall not be construed as confirming adequacy of protection measures proposed.
6. CONTRACTOR shall be solely responsible for full protection of public and CONTRACTOR's own forces.

### 1.3 TRAFFIC CONTROL CONDITIONS

A. Work areas may be closed to pedestrian and vehicular traffic during construction.

B. Provide minimum of 7-day notice before implementation of traffic restrictions.

C. Provide safe passage to vehicular and pedestrian traffic at all times when traffic is allowed.

D. Provide continuous access for emergency vehicles.

## PART 2 – PRODUCTS

### 2.1 MATERIALS

A. Traffic control materials shall conform to following reference documents:

1. Illinois Manual on Uniform Traffic Control Devices for Streets and Highways
2. Section 701 -TRAFFIC CONTROL AND PROTECTION of the current IDOT SSRBC

### 2.2 PERSONNEL

A. Flag persons shall be trained and have current certification in accordance with State of Illinois regulations pertaining to Traffic Control.

## PART 3 – EXECUTION

### 3.1 GENERAL VEHICULAR TRAFFIC CONTROL REQUIREMENTS

A. At a minimum, provide traffic control in following general locations:

1. Streets or highways along or in which construction is occurring.
2. Areas where construction vehicles are entering or leaving streets or highways.
3. Roadways temporarily restricted to one-way travel.
4. Unpaved trenches and other disturbed areas in pavement.
5. When work is occurring adjacent to a traveled roadway.

B. Provide traffic control devices in accordance with following general conditions:

1. Flashing light barricades, Type I or Type II, to channel traffic to undisturbed pavement. Lights with barricades shall be provided for over night traffic control and protection.

2. Flashing light barricades, Type III, to screen off disturbed areas and trenches from oncoming traffic.

C. Placement of signs and barricades shall proceed in direction of flow of traffic. Remove signs and barricades at end of construction area and proceed toward oncoming traffic.

### 3.2 SPECIFIC TRAFFIC CONTROL REQUIREMENTS

A. Streets
   1. One (1) lane open with (2) flag persons at all times.
   2. Detours must be approved by the Village prior to implementation.
   3. The CONTRACTOR shall make every effort to keep construction traffic from delaying traffic.
   4. See plans for traffic control details.

### 3.3 PEDESTRIAN TRAFFIC CONTROL

A. Protect pedestrians from construction operations and vehicular traffic traveling through construction area.
B. Stockpiled materials shall not block streets, drives, sidewalks, or crosswalks.
C. Grade backfilled trenches uniformly and install temporary surfaces as required to permit safe crossing by pedestrians.

## PART 4 – EXECUTION (Not Used)

## PART 5– PAYMENT

### 5.1 BASIS OF PAYMENT

A. This Work will be paid for at the lump sum price for TRAFFIC CONTROL AND PROTECTION.

**END OF SECTION**

**SECTION 015713**

**ENVIRONMENT PROTECTION**

## PART 1 – GENERAL

### 1.1 SUMMARY

A. General requirements pertaining to abatement and control of environmental pollution arising from activities of Contractor and Subcontractors in performance of the Work of the Contract.

B. Contractor, in executing Work, shall maintain work areas free from environmental pollution that would be in violation of federal, state or local regulations.

### 1.2 SUBMITTALS

A. Storm Water Discharge Plan.

## PART 2 – PRODUCTS (Not Used)

## PART 3 – EXECUTION

### 3.1 GENERAL

A. The land resources within boundaries of the Project, but outside the limits of permanent Work performed under this Contract shall be preserved in their present condition or be restored to a condition after completion of construction that will appear to be natural and not detract from the appearance of the Project.

B. Insofar as possible, The CONTRACTOR shall confine activities to designated areas defined on the Drawings or elsewhere in the Contract Documents.
   1. The CONTRACTOR shall return construction areas to their preconstruction elevations except where surface elevations are otherwise noted to be changed.
   2. The CONTRACTOR shall maintain natural drainage patterns.
   3. The CONTRACTOR shall conduct construction activities in such a manner that ponding of stagnant water conducive to mosquito breeding habitat will not occur at any time.

C. Land resources:
   1. The CONTRACTOR shall not remove, cut, deface, injure, or destroy trees or other vegetation outside the Work area limits.
   2. The CONTRACTOR shall not remove, cut, deface, injure, or destroy trees or other vegetation inside the Work area limits, designated to be preserved, except as permitted by ENGINEER.
   3. Land resources damaged by The CONTRACTOR shall be promptly replaced or repaired to the approval of ENGINEER at Contractor’s expense.

### 3.2 ARCHAEOLOGICAL FINDS DURING CONSTRUCTION

A. There are no known archaeological remains at the Project site.

B. Should skeletons, artifacts, or other archaeological remains be uncovered:
   1. The CONTRACTOR shall suspend operations of this Contract at the site of discovery.
   2. The CONTRACTOR shall notify ENGINEER immediately of the finding.

C. Should the discovery site require archaeological studies resulting in delays and/or additional work, The CONTRACTOR shall be compensated by an adjustment under pertinent provisions of the Contract.

### 3.3 PROTECTION OF STORM SEWERS

A. The CONTRACTOR shall prevent construction materials, concrete, earth or other debris from entering existing storm sewers or sanitary system being constructed.

## 3.4 PROTECTION OF WATERWAYS

A. The CONTRACTOR shall observe rules and regulations of State of Illinois and agencies of U.S. government prohibiting pollution of lakes, streams, rivers or wetlands by dumping of refuse, rubbish, dredge material or debris. The Contractor shall comply with the requirements of Village of Hoffman Estates Stormwater Management Ordinances and MWRD Watershed Management Ordinance.
B. The CONTRACTOR shall provide approved method to divert flows, including storm flows and flows created by construction activity, to prevent excessive silting of waterways and flooding of Site.
C. The CONTRACTOR shall comply with procedures outlined in U.S. EPA manuals entitled “Guidelines for Erosion and Sedimentation Control Planning and Implementation”, Manual EPA-72-015 and “Processes, Procedures, and Methods to Control Pollution Resulting From All Construction Activity”, Manual EPA-43019-73-007, and the SWP3.

## 3.5 STORMWATER DISCHARGE

A. The CONTRACTOR shall comply with all State of Illinois requirements.
    1. ENGINEER will inspect construction site and Contractor shall make corrections or repairs when required by the ENGINEER.
    2. The CONTRACTOR shall keep a set of job plans, marked “For Construction”, on site at all times during construction and available for review.

## 3.6 DISPOSAL OF EXCESS EXCAVATED AND OTHER WATSE MATERIALS

A. Excess excavated material not required or suitable for backfill and other waste material shall be disposed of by the CONTRACTOR in accordance with federal, state and local regulations. All expenses associated with disposal of excess material are the sole reasonability of the Contractor.
B. The CONTRACTOR shall provide watertight conveyance of liquid, semi-liquid or saturated materials which tend to bleed during transport. Liquid loss from transported materials is not permitted, whether being delivered to construction site or hauled away for disposal.

## 3.7 PROTECTION OF AIR QUALITY

A. The Contractor shall minimize air pollution by requiring the use of properly operating combustion emission control devices on construction vehicles and equipment and encourage shutdown of motorized equipment not in use
B. At no time will the burning of trash be allowed on or around the work site.
C. If temporary heating devices are necessary for protection of Work, they shall not cause air pollution.

## 3.8 USE OF CHEMICALS

A. Chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant or of other classification, shall be approved by U.S. EPA or U.S. Department of Agriculture or any other applicable regulatory agency.
B. Use and disposal of chemicals and residues shall comply with manufacture’s instructions.

## 3.9 NOISE CONTROL

A. Conduct operations to cause least annoyance to residents in vicinity of Work and comply with applicable local ordinances noted in section 01140 Work Restrictions.
B. Equip construction equipment and other apparatus with mechanical devices necessary to minimize noise.
C. Equip compressors with silencers on intake lines.
D. Equip gasoline or oil-powered equipment with silencers or mufflers on exhaust lines.
E. Line storage bins and hoppers with material that will deaden sounds.

### 3.10 DUST CONTROL

A. Take special care in providing and maintaining temporary roads, the OWNER's existing roads, and public roads used during construction operations. The Contractor will ensure that all roads used for the construction of this project are kept clean and in a dust free condition through out the duration of this project.
B. The Contractor shall comply with local regulations for dust control. If Contractor's dust control measures are considered inadequate by ENGINEER, ENGINEER may require Contractor to take additional dust control measures at the sole expense of the contractor.

### 3.11 FUELS AND LUBRICANTS

A. Comply with local, state, and federal regulations concerning transportation and storage of fuels and lubricants.
B. Fuel storage area location shall be approved by the OWNER prior to installation.
C. Report spills or leaks from fueling equipment or construction equipment to the OWNER. The CONTRACTOR shall cleanup as required.
D. The OWNER may require Contractor to remove damaged or leaking equipment from Site.

### 3.12 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to the Illinois Urban Manual.
B. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
C. Whenever, during construction operations, any loose material is deposited in the flow line or gutters, drainage structures, ditches, etc. such that the natural flow line of water is obstructed, this loose material shall be removed at the close of each working day. At the conclusion of construction operations, all drainage structures and flow lines shall be free from dirt and debris. This Work shall be considered incidental to the contract.

### 3.13 ORANGE CONSTRUCTION FENCE

A. Construction fence for the protection of existing plant materials shall be installed as specified in Section 201, Article 201.05 (a) of the IDOT SSRBC.

## PART 4 – PAYMENT

### 4.1 BASIS OF PAYMENT

A. Environment Protection, including but not limited to items included in this section, shall not be paid for separately, but shall be considered incidental to the item of work being performed.

**END OF SECTION**

**SECTION 015850**

**PROJECT SIGNS**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Project identification sign.
B. Project informational signs.

### 1.2 QUALITY ASSURANCE
A. Design sign and structure to withstand 90 miles/hr wind velocity.
B. Material Standards: those specified in respective specification sections for products used.
C. Sign Maker: Experienced as a professional sign painter for minimum three years.
D. Finishes, Painting: Adequate to withstand weathering, fading, and chipping for duration of construction.

### 1.3 SUBMITTALS
A. See Section 013300 - Administrative Requirements for submittal procedures.
B. Shop Drawing: Show content, layout, lettering, color, foundation, structure, sizes and grades of members.

## PART 2 – PRODUCTS

### 2.1 SIGN MATERIALS
A. Structure and Framing: New or used wood but must be sound and structurally adequate.
B. Preservative Treatment: For wood supports in contact with ground, as required to prevent deterioration during specified period of use.
C. Grade: As required to meet structural requirements and suitable for specified finish.
D. Sign Surfaces: Exterior grade plywood, ADA, with medium density overlay, minimum ¾" thick.
E. Rough Hardware: Galvanized, aluminum or brass.
F. Paint and Primers: A nationally recognized manufacturer, special sign paint, one coat of primer, minimum one coat of exterior enamel.
G. Lettering: Pre-cut vinyl self adhesive products, colors as selected by architect.

### 2.2 PROJECT IDENTIFICATION SIGN
A. One painted sign of construction, design, content and location as shown on Drawings.
B. Sign Size: 4 feet x 8 feet.
C. Content:
   1. Project number, title, logo and name of Owner.
   2. Names and titles of authorities.
   3. Names and titles of TRIA Architecture and consultants.
   4. Building rendering.
   5. Name of general contractor.
D. Refer to drawings for additional information to be included on the sign.
E. Graphic design, colors, style of lettering, etc. as designated by TRIA Architecture.

### 2.3 PROJECT INFORMATIONAL SIGNS
A. Painted informational signs of same colors and lettering as Project Identification sign, or standard products; size lettering to provide legibility at 100 foot distance.
B. Provide at each field office and storage shed.
C. Directional signs to direct traffic into and within site. Relocate as Work progress requires.
D. Provide municipal traffic agency directional traffic signs to and within site.

## PART 3 – EXECUTION

### 3.1 INSTALLATION

A. Install project identification sign within 30 days after date fixed by Notice to Proceed.
B. Erect at designated location.
C. Erect supports and framing on secure foundation, rigidly braced and framed to resist wind loadings.
D. Brace Framing: Drive stakes to loading requirements to secure setting minimum depth: 12 inches. Secure framing members to stakes, cut tops of stakes to even line, flush with framing members.
E. Frame members, secure to supports: to Code requirements and applicable trade standards. Space members to widths of surfacing material, maximum 24 inches on center.
F. Install sign surface plumb and level, with butt joints. Anchor securely.
G. Paint exposed surfaces of sign, supports and framing except creosoted posts.

### 3.2 MAINTENANCE

A. Maintain signs and supports clean, repair deterioration and damage.

### 3.3 REMOVAL

A. Remove signs, framing, supports and foundations at completion of Project, when approved by Architect, and restore the area.

**END OF SECTION**

**SECTION 016000**

**PRODUCT REQUIREMENTS**

## PART 1 - GENERAL

### 1.1 SECTION INCLUDES
A. General product requirements.
B. Transportation, handling, storage and protection.
C. Product option requirements.
D. Substitution limitations and procedures.
E. Procedures for Owner-supplied products.
F. Spare parts and maintenance materials.

### 1.2 RELATED SECTIONS
A. Document 002113 - Instructions to Bidders: Product options and substitution procedures prior to bid date.
B. Section 014000 - Quality Requirements: Product quality monitoring.

### 1.3 REFERENCES
A. NFPA 70 - National Electrical Code; National Fire Protection Association; 2002.

### 1.4 SUBMITTALS
A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product; submit 3 copies to Architect.
   1. Submit within 20 days after date of Letter of Intent.
   2. For products specified only by reference standards, list applicable reference standards.
B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
C. Shop Drawing Submittals: Prepared specifically for this Project.
D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
   1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.
E. Indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
F. Provide name and address of similar projects on which product was used and date of installation.
G. Provide detailed description and drawings illustrating construction methods.
H. Provide itemized comparison and accurate cost data of proposed substitution in comparison with product or method specified.
I. Provide data relating to changes in contracts, coordination issues, and construction schedules.
J. Manufacturer's Instructions: When Contract Documents specify that installation shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to all parties involved in the installation, including three copies to the Architect.

## PART 2 – PRODUCTS

### 2.1 NEW PRODUCTS
A. Provide new products unless specifically required or permitted by the Contract Documents.
B. Materials and Equipment Incorporated Into The Work
   1. NO MATERIAL OR PRODUCT SHALL BE DELIVERED TO, PROVIDED FOR OR INSTALLED ON PROJECT WHICH CONTAINS ANY ASBESTOS OR ASBESTOS-CONTAINING MATERIAL.
   2. Conform to project specifications and standards.
   3. Comply with size, make, type and quality specified.
   4. Manufactured and fabricated products:
      a. Design, fabricate and assemble in accord with best engineering and shop practices.

b. Manufacture like parts of duplicate units to standard sizes and gages, to be interchangeable.
c. Two or more items of the same kind shall be identical from the same manufacturer.
d. All parts of systems shall be from the same manufacturer to the greatest extent practicable.
e. Adhere to equipment capacities, sizes and dimensions shown or specified unless variations are specifically approved by Change Order.

**2.2 PRODUCT OPTIONS**

A. Base all bids on providing all products exactly as specified.
B. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
C. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
D. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

**2.3 SPARE PARTS AND MAINTENANCE PRODUCTS**

A. Provide spare parts, maintenance, and extra products of types and in quantities specified in individual specification sections.
B. Deliver to Project site; obtain receipt prior to final payment.

## PART 3 – EXECUTION

**3.1 SUBSTITUTION PROCEDURES**

A. Instructions to Bidders specify time restrictions for submitting requests for substitutions during the bidding period. Comply with requirements specified in this section.
B. Architect will consider requests for substitutions only within 20 days after date of Letter of Intent.
C. Substitutions may be considered at a later date only when a product becomes unavailable through no fault of the Contractor.
D. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
E. For products specified only by reference or performance standards, select any product which meets or exceeds standards, by any manufacturers, subject to the Architect's approval.
F. For products specified by naming several products or manufacturers, select any product and manufacturer named which conforms to the intent of the documents.
G. Substitutions, Bidder/Contractor Options
    1. Prior to Bid Opening: The Architect will consider written requests to amend the bidding documents to add products not specified provided such requests are received at least 10 calendar days prior to bid opening date. Requests received after that time will not be considered. When a request is approved, the Architect will issue an appropriate addendum not less than three calendar days prior to the bid opening.
    2. With Bid: A bidder may propose substitutions with his bid by completing the Substitution Sheet with the Bid Form, subject to the provisions stated thereon. Architect will review Substitution Sheet of low bidder and recommend approval or rejection by Owner prior to award of Contract.
    3. After Award of Contract: No substitutions will be considered after Notice of Award except under one or more of the following conditions:
        a. Substitutions required for compliance with final interpretations of code requirements or insurance regulations.
        b. Unavailability of specified products, through no fault of Contractor or subcontractor.
        c. Subsequent information discloses inability of all specified products to perform properly or to fit in designated space.

d. Manufacturer/fabricator refusal to certify or guarantee performance of specified product as specified.
e. When a substitution would be substantially beneficial to the Owner.

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

I. 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 the Contract Documents.

J. Substitution Submittal Procedure:
1. Submit three 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 the proposed product equivalence. Burden of proof is on proposer.
3. The Architect will notify Contractor in writing of decision to accept or reject request.
4. Complete data substantiating compliance of proposed substitution with Contract Documents.
5. For products:
a. Product identification, including manufacturer's name and address.
b. Manufacturer's literature:
1) Product description.
2) Performance and test data.
3) Reference standards.
c. Samples.
d. Name and address of similar projects on which product was used and date of installation.
6. For construction methods:
a. Detailed description of proposed method.
b. Drawings illustrating methods.
7. Itemized comparison of proposed substitutions with product or method specified.
8. Data relating to changes in construction schedules.
9. Identify:
a. Other contract affected.
b. Changes or coordination required.
10. Accurate cost data on proposed substitution in comparison with product or method specified.

K. Provide cost data that is complete and includes all related costs under Bidder/Contractor contract, but excludes:
1. Costs under separate contracts.
2. Architect's redesign.
3. Administrative costs of Architect.

## 3.2 OWNER-SUPPLIED PRODUCTS

A. See Section 011000 - Summary for identification of Owner-supplied products.

B. Owner's Responsibilities:
1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
2. Arrange and pay for product delivery to site.
3. On delivery, inspect products jointly with Contractor.
4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
5. Arrange for manufacturer's warranties, inspections, and service.

C. Contractor's Responsibilities:
   1. Review Owner reviewed shop drawings, product data, and samples.
   2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
   3. Handle, store, install and finish products.
   4. Repair or replace items damaged after receipt.

## 3.3 TRANSPORTATION AND HANDLING

A. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
B. Transport and handle products in accordance with manufacturer's instructions.
C. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
D. Arrange for transportation and deliveries of materials and equipment in accordance with approved current construction schedules and in ample time to facilitate inspection prior to installation.
E. Coordinate deliveries to avoid conflict with work and condition at site.
F. Deliver products in undamaged condition in original containers or packaging, with identifying labels intact and legible. Clearly mark partial deliveries of component parts of assemblies or equipment to permit easy identification of parts and to facilitate assembly.
G. Lift packages, equipment, or components only at designated lift points.
H. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
I. Provide equipment and personnel, including those furnished by Owner, to handle products by methods to prevent soiling, disfigurement, or damage.
J. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

## 3.4 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
B. Store and protect products in accordance with manufacturer's instructions.
C. Store with seals and labels intact and legible.
D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product. Materials may be new or used at Contractor's option, but shall be non-staining, non-hazardous, and of sufficient strength and durability for proposed use.
E. Submittals
   1. Request for allocation of storage space.
   2. List of materials and equipment to be stored.
   3. Proposed location for storage.
   4. Special storage requirements.
   5. Schedule of anticipated storage dates.
F. For exterior storage of fabricated products, place on sloped supports above ground.
G. Provide bonded off-site storage and protection when site does not permit on-site storage or protection. Off-site storage will be permitted only on Owner's prior written authorization in accordance with General Conditions.
H. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
I. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
J. Prevent contact with material that may cause corrosion, discoloration, or staining.
K. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
L. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

M. Locate storage areas where authorized by Architect, Contractor will resolve conflicts in storage requirements of all subcontractors. Do not inhibit use of:
   1. Fire exits.
   2. Fire lanes.
   3. Parking.
   4. Work of other contractors.
   5. Owner.

N. Provide separate storage for combustible and non-combustible products. Store combustible materials in accordance with Fire Protection Agency's regulations.

O. Remove all temporary storage, contents and utilities at completion of construction activities or when requested by the Architect.

**END OF SECTION**

**SECTION 017300**

**EXECUTION REQUIREMENTS**

## PART 1 - GENERAL

### 1.1 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.
B. Pre-installation meetings.
C. Cutting and patching.
D. Surveying for laying out the work.
E. Cleaning and protection.
F. Starting of systems and equipment.
G. Demonstration and instruction of Owner personnel.
H. Closeout procedures, except payment procedures.

### 1.2 RELATED SECTIONS

A. Section 013300 - Administrative Requirements: Submittals procedures.
B. Section 014000 - Quality Requirements: Testing and inspection procedures.
C. Section 015000 - Temporary Facilities and Controls: Temporary exterior enclosures.
D. Section 017700 - Closeout Submittals: Project record documents, operation and maintenance data, warranties and bonds.

### 1.3 SUBMITTALS

A. See Section 013300 - Administrative Requirements, for submittal procedures.
B. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.
    1. On request, submit documentation verifying accuracy of survey work.
    2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in conformance with Contract Documents. Include the following data:
    3. Architect may at any time require written verifications of grades, lines and levels by a licensed surveyor as work progresses.
    4. All areas found to be non-conforming to the Contract Documents shall be corrected by the responsible Contractor.
    5. Submit surveys and survey logs for the project record.
C. Cutting and Patching: Submit written request in advance of cutting or alteration which affects:
    1. Structural integrity of any element of Project.
    2. Integrity of weather exposed or moisture resistant element.
    3. Efficiency, maintenance, or safety of any operational element.
    4. Visual qualities of sight exposed elements.
    5. Work of Owner or separate Contractor.
    6. Include in request:
        a. Identification of Project.
        b. Location and description of affected work.
        c. Necessity for cutting or alteration.
        d. Contractor and crafts to execute the work.
        e. Description of proposed work and products to be used.
        f. Extent of refinishing.
        g. Alternatives to cutting and patching.
        h. Effect on work of Owner or separate Contractor.
        i. Written permission of affected separate Contractor.
        j. Date and time work will be executed.
D. Designation of party responsible for cost of cutting and patching.
E. When conditions of work, or schedule, indicate change of materials or methods, submit recommendation to Architect, including:
    1. Condition indicating change.
    2. Recommendation for alternative materials or methods.
    3. Submittals specified for substitutions.

F. Submit written notice to Architect, designating time work will be uncovered, to provide for observation.
G. Payment for Costs:
   1. Costs caused by ill-timed or defective work, or work not conforming to Contract Documents, including costs for additional services of Architect - party responsible for ill timed, rejected, or non-conforming work.
   2. Work done by change order, other than defective or non-conforming work - Owner.

## 1.4 GRADES, LINES AND LEVELS

A. Contractor lay out all of the work under this contract.
   1. Establish all working lines, levels, elevations, and measurements.
B. Owner will furnish:
   1. A certified topographic survey of existing site, giving all grades and lines of streets, alleys, pavements and adjoining property, rights-of-way, encroachments, boundaries, and contours of building site.
   2. Locations, dimensions, and data pertaining to existing:
      a. Buildings.
      b. Underground obstructions.
      c. Trees and landscaping.
      d. Other improvements.
   3. Information as to available service and utility lines, both public and private.
C. Location of survey's baseline control points.
   1. Benchmark and temporary benchmark location and elevation of each.
D. Quality Assurance
   1. All layout work which establishes site layout dimensions or elevations, or exterior building dimensions, angles or grade floor elevations shall be done by a qualified engineer or surveyor.
   2. Qualifications of Contractor's Engineer/Surveyor:
      a. Experienced in layout work of similar complexity.
      b. Licensed by State of Illinois.
E. Submittals. Architect may at any time require written verification of grades, lines, and levels by a licensed surveyor as work progresses.
F. Laying Out The Work
   1. Prior to the beginning of the actual work, perform the following:
      a. Each subcontractor shall lay out their portion of the work.
      b. Establish all required benchmarks and reference lines.
      c. Verify all building dimensions.
      d. Verify conformance of all actual general dimensions with those indicated on the Architect's plan.
      e. Notify the Architect immediately if any conflict whatsoever exists.
G. Survey Upon Completion
   1. Upon completion, Owner may provide a survey performed by a licensed surveyor indicating the location of the Work of this Contract and including the following data:
      a. Building location and dimensions of all walls.
      b. Elevations of finished floor at all exterior exits.
      c. Spot elevations, storm, sanitary and watermain manholes, and all invert elevations.
      d. Spot elevations of corners of all new pavement and on a 50' grid within paved areas.
   2. All areas found to be non-conforming to the Contract Documents shall be corrected by the responsible Contractor.

## 1.5 QUALIFICATIONS

A. For survey work, employ a land surveyor registered in the State in which the Project is located and acceptable to Architect. Submit evidence of Surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate.

B. For field engineering, employ a professional engineer of the discipline required for specific service on Project, licensed in the State in which the Project is located.

## 1.6 PROJECT CONDITIONS

A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.
C. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
D. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere.
E. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
   1. Minimize amount of bare soil exposed at one time.
   2. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
   3. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
   4. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.
F. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
G. Pest Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.
H. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.
I. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.

## 1.7 COORDINATION

A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
B. Notify affected utility companies and comply with their requirements.
C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
D. Coordinate space requirements, supports, and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
F. Coordinate completion and clean-up of work of separate sections.
G. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

# PART 2 – PRODUCTS

## 2.1 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 016000.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
B. Verify that demolition is complete in alterations areas and areas are ready for installation of new work.
C. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
D. Examine and verify specific conditions described in individual specification sections.
E. Verify in field all measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or mis-fabrication.
F. Verify that utility services are available, of the correct characteristics, and in the correct locations.
G. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

### 3.2 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.
B. Seal cracks or openings of substrate prior to applying next material or substance.
C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

### 3.3 PREINSTALLATION MEETINGS

A. When required in individual specification sections, convene a pre-installation meeting at the site prior to commencing work of the section.
B. Require attendance of parties directly affecting, or affected by, work of the specific section.
C. Notify Architect four days in advance of meeting date.
D. Prepare agenda and preside at meeting:
    1. Review conditions of examination, preparation, and installation procedures.
    2. Review coordination with related work.
E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

### 3.4 LAYING OUT THE WORK

A. Verify locations of survey control points prior to starting work.
B. Promptly notify Architect of any discrepancies discovered.
C. Contractor shall locate and protect survey control and reference points.
D. Control datum for survey is that established by Owner provided survey.
E. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
F. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
G. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.
H. Utilize recognized engineering survey practices.

I. Establish a minimum of two permanent benchmarks on site, referenced to established control points. Record locations, with horizontal and vertical data, on project record documents.
J. Establish elevations, lines, and levels. Locate and lay out by instrumentation and similar appropriate means:
   1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
   2. Grid or axis for structures.
   3. Building foundation, column locations, and ground floor elevations.
K. Periodically verify layouts by same means.
L. Maintain a complete and accurate log of control and survey work as it progresses.
M. On completion of foundation walls and major site improvements, prepare a certified survey illustrating dimensions, locations, angles, and elevations of construction and site work.

## 3.5 GENERAL INSTALLATION REQUIREMENTS

A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
E. Make neat transitions between different surfaces, maintaining texture and appearance.

## 3.6 CUTTING AND PATCHING

A. Execute cutting and patching including excavation and fill to complete the work, to uncover work in order to install improperly sequenced work, to remove and replace defective or non-conforming work, to remove samples of installed work for testing when requested, to provide openings in the work for penetration of mechanical and electrical work, to execute patching to complement adjacent work, and to fit products together to integrate with other work.
B. Execute work by methods to avoid damage to other work, and which will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
C. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
D. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
E. Restore work with new products in accordance with requirements of Contract Documents.
F. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
G. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 078413, to full thickness of the penetrated element.
H. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
I. Make neat transitions. Patch work to match adjacent work in texture and appearance. Where new work abuts or aligns with existing, perform a smooth and even transition.
J. In addition to contract requirements, upon written instructions of Architect.
   1. Uncover work to provide for observation of covered work.
   2. Remove samples of installed materials for testing.
K. Do not endanger work by cutting or altering work or any part of it.
L. Do not cut or alter work without written consent of Architect.
M. Patch or replace surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. Repair substrate prior to patching finish. Finish patches to produce uniform finish and texture over entire area. When finish cannot be matched, refinish entire surface to nearest intersections.

## 3.7 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
C. Broom and vacuum clean interior areas prior to start of surface finishing and continue cleaning to eliminate dust.
D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

## 3.8 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.
B. Provide special protection where specified in individual specification sections.
C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
G. Prohibit traffic from landscaped areas.
H. Remove protective coverings when no longer needed; reuse or recycle plastic coverings if possible.

## 3.9 STARTING SYSTEMS

A. Coordinate schedule for start-up of various equipment and systems with Architect and Owner's Representative.
B. Notify Architect and owner two days prior to start-up of each item.
C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.
D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
E. Verify that wiring and support components for equipment are complete and tested.
F. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
G. When specified in individual specification Sections, require manufacturer and/or equipment supplier to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
H. Submit a written report that equipment or system has been properly installed and is functioning correctly.

## 3.10 DEMONSTRATION AND INSTRUCTION

A. Demonstrate operation and maintenance of products to Owner's personnel two weeks prior to date of Substantial Completion.
B. Demonstrate start-up, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.
C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
D. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of owner personnel.
E. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

F. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.
G. The amount of time required for instruction on each item of equipment and system is that specified in individual sections.
H. Air and Water Testing, Adjusting, and Balancing
   1. Testing, adjusting, and balancing will be part of the mechanical contract.
   2. The mechanical subcontractor will perform services specified in Division 15.
   3. Reports will be submitted by the Mechanical subcontractor to the Architect indicating observation and results of test and indicating compliance or non-compliance with the specified requirements and with the requirements of the Contract Documents.

## 3.11 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.
B. Testing, adjusting, and balancing HVAC systems.

## 3.12 FINAL CLEANING

A. Execute final cleaning prior to final project assessment.
   1. Clean areas to be occupied by Owner prior to final completion before Owner occupancy.
B. Use cleaning materials that are non-hazardous.
C. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains, and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
D. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
E. Clean filters of operating equipment.
F. Clean debris from roofs, gutters, downspouts, and drainage systems.
G. Clean site; sweep paved areas, rake clean landscaped surfaces.
H. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.
I. Contractor to provide final cleaning at completion of work, or at such other times as directed by the Architect, remove all waste, debris, rubbish, tools, equipment, machinery, and surplus materials. Clean all sight exposed surfaces; leave work clean and ready for occupancy.
J. Safety Requirements
   1. Standards: Maintain project in accord with following safety and insurance standards:
      a. Federal and state regulations.
      b. National Fire Protection Association (NFPA).
   2. Hazards Control:
      a. Store volatile wastes in covered metal containers and remove from premises daily.
      b. Prevent accumulation of wastes which create hazardous conditions.
      c. Provide adequate ventilation during use of volatile or noxious substances.
   3. Conduct cleaning and disposal operations to comply with Federal and State anti-pollution laws.
      a. Do not burn or bury rubbish and waste materials on project site.
      b. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
      c. Do not dispose of wastes into streams or waterways.
K. Submittals
   1. Manufacturer's recommendations for cleaning specified products.
   2. Proposed cleaning products for products where manufacturer's recommendations are not specified.
L. Materials
   1. Select and use all cleaning materials and equipment with care to avoid scratching, marring, defacing, staining, or discoloring surfaces cleaned.
   2. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
   3. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

M. Final Cleaning
   1. Employ experienced workers or professional cleaners for final cleaning.
   2. Remove grease, dust, dirt, stains, labels, fingerprints, protection, and other foreign materials from sight-exposed finished surfaces.
      a. In preparation for substantial completion or occupancy, conduct final inspection of sight-exposed surfaces, and of concealed spaces to insure performance.
   3. Repair, patch and touch up marred surfaces to specified finish, to match adjacent surfaces.
   4. Soft broom clean all exposed concrete surfaces clean; other paved areas with soft or stiff broom as directed. Rake clean other surfaces on grounds.
   5. Sweep and mop clean all resilient, quarry and ceramic flooring.
   6. Vacuum all carpeting.
   7. Remove ice and snow from access to buildings.
   8. Replace air handling and conditioning filters if units were operated during construction.
   9. Clean all ductwork used for temporary heating.
   10. Clean windows and mirrors to be free from labels, dust, fingerprints and other foreign materials.
   11. Maintain finally cleaned areas until project, or designated portion thereof, is accepted by Owner.

## 3.13 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.
   1. Provide copies to Architect and Owner.
B. Contractor to determine items to be listed for completion or correction in Contractor's Notice of Substantial Completion.
C. Notify Architect when work is considered ready for Substantial Completion.
D. Submit written certification that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's review.
E. Substantial Completion Meeting will be scheduled by Architect. Architect will issue notice of meeting.
   1. Agenda will consist of the inspection, discussion of the punch list, determination of final completion dates, and the date and time the Owner will take occupancy. Architect will also review the requirements for contractor closeout in accord with the contract documents.
   2. Upon completion of this meeting, the Architect shall prepare the Certificate of Substantial Completion with the completed punch list and forward the package to the Contractor.
F. Owner will occupy all of the building as specified in Section 011000.
G. Contractor will correct items of work listed in punch list and comply with requirements for access to Owner-occupied areas.
H. Notify Architect when work is considered finally complete.
I. Accompany Architect on final inspection, if requested.
J. Complete items of work determined by Architect's final inspection.

**END OF SECTION**

**SECTION 017700**

**CLOSEOUT SUBMITTALS**

## PART 1 - GENERAL

### 1.1 SECTION INCLUDES
A. Project Record Documents.
B. Operation and Maintenance Data.
C. Warranties and bonds.

### 1.2 RELATED SECTIONS
A. Conditions of the Contract: Performance bond and labor and material payment bonds, warranty, and correction of work.
B. Section 013300 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
C. Section 017300 - Execution Requirements: Contract closeout procedures.
D. Individual Product Sections: Specific requirements for operation and maintenance data.
E. Individual Product Sections: Warranties required for specific products or Work.

### 1.3 SUBMITTALS
A. Substantial Completion
1. When Contractor considers work substantially complete, submit written declaration to Architect that work, or designated portion thereof, is substantially complete. Include list of items to be completed or corrected.
2. Architect will make a preliminary inspection within seven business days after receipt of Contractor's declaration.
3. Upon determining that work is substantially complete, Architect will:
a. Prepare a punch list of items to be completed or corrected, as determined by the inspection.
b. Prepare and process a certificate of substantial completion, containing:
1) Date of substantial completion.
2) Punch list of items to be completed or corrected.
3) The time within which punch list items shall be completed or corrected.
4) Date and time Owner will take occupancy of project or designated portion thereof.
5) Responsibilities of Owner and Contractor for:
a) Insurance
b) Utilities.
c) Operation and maintenance of mechanical, electrical and other systems.
d) Maintenance and cleaning.
e) Security
6) Signatures of:
a) Architect
b) Contractor.
c) Owner.
4. Contractor:
a. Complete all work listed for completion or correction within designated time.
b. Perform final cleaning in accordance with 017300.
5. At time of inspection, should substantial completion not be certified, complete the work and resubmit declaration in accord with Paragraph A.1 above.
B. Final Completion
1. Contractor:
a. Submit written declaration to Architect that:
1) Work complies with all aspects of Contract Documents.
2) All items on substantial completion punch list have been completed or corrected.
3) All tools, construction equipment and surplus materials have been removed from site.
4) Required surveys have been completed and verified.
2. Architect will make final inspection with Contractor to ensure completion of all contract requirements.

3. When Architect considers that all work is finally complete in accordance with contract document requirements, he will prepare and process closeout documents.

C. Application for Final Payment
   1. Contractor submit duly executed:
      a. Final Affidavit and Sworn Statement.
      b. Contractor's Final Waiver of Lien.
      c. Separate releases of waivers of liens for all subcontractors, suppliers and others with lien rights against property of Owner, together with complete list of those parties.
      d. Final accounting statement, reflecting all adjustments to contract sum.
         1) Original contract sum.
         2) Additions and deductions resulting from:
            a) All change orders.
            b) Deductions for uncorrected work.
            c) Deductions for liquidated damages.
      e. Total contract sum, as adjusted.
      f. Previous payments.
      g. Sum remaining due.
   2. Architect will process final statement in accordance with Conditions of the Contract.

D. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.
   1. Accompany submittal with transmittal letter, in duplicate, containing:
      a. Date.
      b. Project title and number.
      c. Contractor's name and address.
      d. Title and number of each record document.
   2. Certification that each document submitted is complete and accurate.
      a. Signature of contractor, or his authorized representative.
   3. Submit 1 copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
   4. Submit one hard copy set and two Jump Drives containing electronic copies (in PDF file format) of revised final documents in final form within 10 days after final inspection.

E. Operation and Maintenance Data:
   1. The contractor shall cause each mechanical and electrical subcontractor to provide the Contractor with three hard copies and one electronic copy of all operating manuals at the time of delivery of each major piece of equipment.
   2. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.
   3. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
   4. Submit 1 copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
   5. Submit two hard copy sets and two Jump Drives containing electronic copies (in PDF file format) of revised final documents in final form within 10 days after final inspection.

F. Warranties and Bonds:
   1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within ten days after acceptance.
   2. Make other submittals within ten days after Date of Substantial Completion, prior to final Application for Payment.
   3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing the date of acceptance as the beginning of the warranty period.

4. Because the warranty period begins with the issuance of the final payment from The Village to the general contractor, all warranties should include the verbiage "…for a period of (X) year(s) after the date The Village issues the final payment to the General Contractor…"

## PART 2 – PRODUCTS – NOT USED

## PART 3 – EXECUTION

### 3.1 PROJECT RECORD DOCUMENTS

A. Contractor and all subcontractors shall maintain an accurate record of deviations and changes from the Contract Documents which occur in the work.
B. Indicate all such deviations and changes on a record set of the Contract Documents and turn same over to the Architect and Owner upon completion of the Work all such documents and information such as final shop drawings and sketches, marked prints and similar data indicating the as-built conditions.
C. Create an electronic copy of all approved Project Record Documents in PDF file format and deliver to Architect and Owner on Jump Drive.
D. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Project Manual.
   3. Interpretations and supplemental instructions.
   4. Specifications.
   5. Addenda.
   6. Change Orders and other modifications to the Contract.
   7. Reviewed shop drawings, product data, and samples.
   8. Manufacturer's instruction for assembly, installation, and adjusting.
   9. Other modifications to contract.
   10. Field test records.
   11. All schedules.
   12. Correspondence file.
E. Ensure entries are complete and accurate, enabling future reference by Owner.
F. Store record documents separate from documents used for construction.
G. Record information concurrent with construction progress.
H. File documents in format in accord with Project Manual Table of Contents.
I. Do not use record documents for field construction purposes.
J. Make documents available at all times for inspection by Architect and Owner.
K. Plans and sections of all concealed work, particularly concealed piping and conduit, and deviations from conditions shown on the contract drawings, shall be shown and dimensioned on the "as-built" drawings.
L. Contractor shall develop layout drawings for all concealed work that is schematically indicated on contract drawings.
M. Provide red colored pencils or felt marking pens for marking devices.
N. Do not permanently conceal any work until specified information has been recorded.
O. 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 Change Order or Field Order.
   4. Other matters not originally specified.
P. Label each record document "PROJECT RECORD DOCUMENTS" in large print. Keep record documents current.
Q. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:

1. Measured depths of foundations in relation to finish first floor datum.
2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
4. Field changes of dimension and detail.
5. Changes made by change order.
6. Details not on original Contract drawings.

R. Shop Drawings: Maintain as record documents; legibly annotate drawings to record changes made after review.

S. Completed Work Survey: Requirements specified in Section 017300 - Execution Requirements.

## 3.2 OPERATION AND MAINTENANCE DATA

A. Compile product data and related information appropriate for Owner's maintenance and operation of products and equipment provided under the Contract.

B. For Each Product or System: List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

C. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

D. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Coordinate drawings with information in Product Record Documents to assure correct illustration of completed installation. Do not use Project Record Documents as maintenance drawings.

E. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

F. Warranty, Bond, and Service Contract: Provide information sheet for Owner's personnel with proper procedures in event of failure and instances which might affect validity of warranties of bonds.

## 3.3 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. Submit three hard copies and two Jump Drives with electronic copies (in PDF file format) of complete manual in final form.

B. For Each Product, Applied Material, and Finish:
   1. Product data, with catalog number, size, composition, and color and texture designations.
   2. Information for re-ordering custom manufactured products.

C. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

D. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.

E. Additional information as specified in individual product specification sections.

F. Provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

## 3.4 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. Submit three hard copies and two Jump Drives with electronic copies (in PDF file format) of complete manual in final form.

B. For Each Item of Equipment and Each System:
   1. Description of unit or system, and component parts.
   2. Identify function, normal operating characteristics, and limiting conditions.
   3. Include performance curves, with engineering data and tests.
   4. Complete nomenclature and model number of replaceable parts.

C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.

D. Include color coded wiring diagrams as installed.
E. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
F. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
G. Provide servicing and lubrication schedule, and list of lubricants required.
H. Include manufacturer's printed operation and maintenance instructions.
I. Include sequence of operation by controls manufacturer.
J. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
K. Provide control diagrams by controls manufacturer as installed.
L. Provide Contractor's coordination drawings, with color coded piping diagrams as installed.
M. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
N. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
O. Include test and balancing reports.
P. Additional Requirements: As specified in individual product specification sections.

**3.5 OPERATION AND MAINTENANCE MANUALS**

A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.
B. Prepare data in the form of an instructional manual.
C. Submit one copy of completed instruction manual 15 business days prior to final inspection or acceptance.
    1. Copy will be returned after final inspection or acceptance, with comments.
D. Binders: Commercial quality, 8-1/2 x 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
E. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
F. Provide tabbed dividers for each separate product and system, with typed description of product and major component parts of equipment.
G. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.
H. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
I. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.
J. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:
    1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect, Contractor, Subcontractors, and major equipment suppliers.
    2. Part 2: Operation and maintenance instructions arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
        a. Significant design criteria.
        b. List of equipment.
        c. Parts list for each component.
        d. Operating instructions.
        e. Maintenance instructions for equipment and systems.
        f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
    3. Part 3: Project documents and certificates, including the following:

a. Shop drawings and product data.
b. Air and water balance reports.
c. Certificates.
d. Photocopies of warranties and bonds.

K. Provide a listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.
L. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of Architect, Consultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.

**3.6 WARRANTIES AND BONDS**

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial completion is determined.
B. Verify that documents are in proper form, contain full information, and are notarized.
C. Co-execute submittals when required.
D. Retain warranties and bonds until time specified for submittal.
E. Manual: Bind in commercial quality 8-1/2 x 11 inch three D side ring binders with durable plastic covers and provide electronic copies of all warranties and bonds in PDF file format on two Jump Drives.
F. Binder Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.
G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.
H. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

**END OF SECTION**

**SECTION 031000**

**CONCRETE FORMING AND ACCESSORIES**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Formwork for cast-in place concrete, with shoring, bracing and anchorage.
B. Openings for other work.
C. Form accessories.
D. Form stripping.

### 1.2 RELATED DECTIONS
A. Section 032000 - Concrete Reinforcement.
B. Section 033000 - Cast-In-Place Concrete.
C. Section 053100 - Steel Decking

### 1.3 REFERENCES
A. Unless otherwise noted the most current issue of the reference shall be used.
B. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
C. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International.
D. ACI 318 - Building Code Requirements for Reinforced Concrete and Commentary; American Concrete Institute International.
E. ACI 347R - Guide to Formwork for Concrete; American Concrete Institute International.
F. ASME A17.1 - Safety Code for Elevators and Escalators; The American Society of Mechanical Engineers.
G. PS 1 - Construction and Industrial Plywood; National Institute of Standards and Technology (Department of Commerce).

### 1.4 DESIGN REQUIREMENTS
A. Design, engineer and construct formwork, shoring and bracing to conform to design and code requirements; resultant concrete to conform to required shape, line and dimension.

### 1.5 SUBMITTALS
A. See Section 013300 - Administrative Requirements for submittal procedures.
B. Product Data: Provide data on void form materials and installation requirements.
C. Shop Drawings: Indicate pertinent dimensions, materials, bracing, and arrangement of joints and ties.
D. Provide data on form liner installation and provide min. 6" x 6" sample.

### 1.6 QUALITY ASSURANCE
A. Perform work of this section in accordance with ACI 347R, ACI 301, and ACI 318. Maintain one copy of standards on project site.
B. Design formwork under direct supervision of a Professional Structural Engineer experienced in design of concrete formwork and licensed in the State in which the Project is located.

### 1.7 REGULATORY REQUIREMENTS
A. Conform to applicable code for design, fabrication, erection and removal of formwork.

### 1.8 DELIVERY, STORAGE, AND PROTECTION
A. Section 01600 - Product Requirements: Transport, handle, store and protect products.
B. Deliver void forms and installation instructions in manufacturer's packaging.
C. Store void forms off ground in ventilated and protected manner to prevent deterioration from moisture.

## PART 2 – PRODUCTS

### 2.1 SECTION INCLUDES

A. Standard Structural Concrete Formwork is at the Contractor's discretion, but must meet minimum requirements specified below.

### 2.2 WOOD FORM MATERIALS

A. Typical Forms: Plyform, Class I, exterior minimum thickness 3/4" inch; in accordance with American Plywood Association Standards.
B. Keyways: 2 inch lumber.

### 2.3 PREFABRICATED FORMS

A. Manufacturers:
   1. American Polysteel Forms, Albuquerque, NM 87107
   2. Amico Stay-Form, Birmingham, IL 35208
   3. Molded Fiber Glass Concrete Forms Co., Union City, PA 16438.
   4. Sonoco Products Co., Hartsville, SC
   5. Symons Corp., Des Plaines, IL 60017
   6. Substitutions: See Section 016000 - Product requirements.
B. Preformed Steel Forms: Minimum 16 gauge matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
C. Preformed Plastic Forms: Thermoplastic polystyrene form liner, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
D. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.
E. Pan Type: Steel, of size and profile indicated.
F. Tubular Column Type: Round, spirally wound laminated fiber material, surface treated with release agent, non-reusable, of sizes indicated.
G. Void Forms: Moisture resistant treated paper faces, biodegradable, structurally sufficient to support weight of wet concrete mix until initial set.

### 2.4 FORMWORK ACCESSORIES

A. Form Ties: Removable or Snap-off type, galvanized metal, adjustable length, 1 inch back break dimension, free of defects that could leave holes larger than 1 inch in concrete surface; form ties designed to resist lateral pressure of fresh concrete on forms.
B. Form Release Agent: Colorless mineral oil that will not stain concrete, absorb moisture, impair natural bonding of concrete finish coatings, or affect color characteristics of concrete finish coatings.
C. Form Liners: Units of face designs, texture arrangement, and configuration indicated. Furnish with manufacturer's recommended liquid release agent that will not bond, stain or adversely affect concrete surfaces and will not impair subsequent surface treatments of concrete.
D. Rustication Strips: Metal, rigid plastic, or dressed wood with sides beveled and back kerfed; nonstaining.
E. Corners: Chamfered, wood strip or rigid plastic type; 3/4x 3/4 inch minimum size; maximum possible lengths.
F. Dovetail Anchor Slot: Galvanized steel, 22 gauge thick, foam filled, release tape sealed slots, anchors for securing to concrete formwork.
G. Flashing Reglets: Galvanized steel, 22 gauge thick, longest possible lengths, with alignment splines for joints, foam filled, release tape sealed slots, anchors for securing to concrete formwork.
H. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

I. Waterstops: Polyvinyl chloride, minimum 1,750 psi tensile strength, minimum 50 degrees F to plus 175 degrees F working temperature range, 4 inch wide, maximum possible lengths, ribbed profile, preformed corner sections, heat welded jointing.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

### 3.2 EARTH FORMS

A. Earth forms are not permitted.

### 3.3 ERECTION – FORMWORK

A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301, ACI 347 and ACI 318.
B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
D. Align joints and make watertight. Keep form joints to a minimum.
E. Obtain approval before framing openings in structural members that are not indicated on drawings.
F. Provide chamfer strips on external corners of beams, joists, and columns.
G. Install void forms in accordance with manufacturer's recommendations. Protect forms from moisture or crushing.
H. Coordinate this section with other sections of work that require attachment of components to formwork.
I. If formwork is placed after reinforcement, resulting in insufficient concrete cover over reinforcement, request instructions from Architect before proceeding.

### 3.4 APPLICATION – FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

### 3.5 INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Provide formed openings where required for items to be embedded in or passing through concrete work.
B. Locate and set in place items that will be cast directly into concrete.
C. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other work.
D. Position recessed anchor slots for brick veneer masonry anchors to spacing and intervals specified in Section 042000.
E. Install accessories in accordance with manufacturer's instructions, so they are straight, level, and plumb. Ensure items are not disturbed during concrete placement.
F. Install PVC waterstops in accordance with manufacturer's instructions, so they are continuous without displacing reinforcement. Heat seal joints so they are watertight.
G. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
H. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

## 3.6 FORM CLEANING

A. Clean forms as erection proceeds, to remove foreign matter within forms.
B. Clean formed cavities of debris prior to placing concrete.
   1. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
   2. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

## 3.7 FORMWORK TOLERANCES

A. Construct formwork to maintain tolerances required by ACI 117-90 and ACI 301. Where conflicts occur, the more stringent requirement shall apply.
B. Construct and align formwork for elevator hoistway in accordance with ASME A17.1.
C. Camber slabs and beams in accordance with ACI 301.

## 3.8 FIELD QUALITY CONTROL

A. An independent Testing Agency will perform field quality control tests, as specified in Section 01400.
B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and to verify that supports, fastenings, wedges, ties, and items are secure.
C. Do not reuse wood formwork more than 4 times for concrete surfaces to be exposed to view. Do not patch formwork.
D. When forms are reused, clean surfaces, remove laitance, and tighten to close joints. Align and secure joints to avoid offsets.

## 3.9 FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
C. Store removed forms to prevent damage to form materials or to fresh concrete. Discard damaged forms.
D. Wall Forms:
   1. If curing compound is not used, leave the forms in place for 7 days and keep continuously wet.
   2. If curing compound is used, remove forms 24 hours after concrete has been placed providing concrete has developed sufficient strength to sustain its own weight. Do not use curing compound on vertical concrete surfaces that will be painted or otherwise finished.
   3. During cold weather concreting, leave forms in place for 7 days in addition to placement of other cold weather protection.

**END OF SECTION**

**SECTION 032000**

**CONCRETE REINFORCING**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Reinforcing steel for cast-in-place concrete.
B. Supports and accessories for steel reinforcement.

### 1.2 RELATED SECTIONS
A. Section 031000 - Concrete Forms and Accessories.
B. Section 033000 - Cast-In-Place Concrete.
C. Section 042000 - Unit Masonry Assemblies: Reinforcement for masonry.

### 1.3 REFERENCES
A. Unless otherwise noted the most current issue of the reference shall be used.
B. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International.
C. ACI 318 - Building Code Requirements For Reinforced Concrete and Commentary; American Concrete Institute International.
D. ACI SP-66 - ACI Detailing Manual; American Concrete Institute International.
E. ASTM A 82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
F. ASTM A 184/A 184M - Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement.
G. ASTM A 185 - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
H. ASTM A 497 - Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.
I. ASTM A 615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
J. ASTM A 704/A 704M - Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement.
K. ASTM A 767/A 767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
L. AWS D1.4 - Structural Welding Code - Reinforcing Steel; American Welding Society.
M. CRSI (DA4) - Manual of Standard Practice; Concrete Reinforcing Steel Institute.
N. CRSI (P1) - Placing Reinforcing Bars; Concrete Reinforcing Steel Institute.

### 1.4 SUBMITTALS
A. See Section 013300 - Administrative Requirements for submittal procedures.
B. Shop Drawings: Comply with requirements of ACI SP-66. Include bar schedules, shapes of bent bars, spacing of bars, and location of splices.
   1. Prepare shop drawings under seal of a Professional Structural Engineer experienced in design of work of this type and licensed in the State in which the Project is located.
C. Manufacturer's Certificate: Certify that reinforcing steel and accessories supplied for this project meet or exceed specified requirements.
D. Reports: Submit certified copies of mill test report of reinforcement materials analysis.

### 1.5 QUALITY ASSURANCE
A. Perform work of this section in accordance with CRSI (DA4), CRSI (P1), ACI 301, and ACI 318.
   1. Maintain one copy of each document on project site.
B. Welders' Certificates: Submit certifications for welders employed on the project, verifying AWS qualification within the previous 12 months.
C. Prepare shop drawings under seal of a Professional Structural Engineer experienced in design of work of this type and licensed in the state where the project is located.

## PART 2 – PRODUCTS

### 2.1 REINFORCEMENT

A. Reinforcing Steel: ASTM A 615/A 615M Grade 60 (420).
   1. Deformed billet-steel bars.
   2. Galvanized in accordance with ASTM A 767/A 767M, Class I.
B. Reinforcing Steel Mat: ASTM A 704/A 704M, using ASTM A 615/A 615M, Grade 60 (420) steel bars or rods, unfinished.
C. Stirrup Steel: ASTM A 82 steel wire, unfinished.
D. Welded Steel Wire Reinforcing (W.W.R.): ASTM A 185, plain type. Provide in sizes as shown on Drawings and in flat sheets. Roll stock is not permitted.
E. Reinforcement Accessories:
   1. Tie Wire: Annealed, minimum 16 gage.
   2. Bar Supports: Bolsters for spacing, supporting, and fastening reinforcing bars in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire precast concrete or fiber-reinforced concrete of greater compressive strength than concrete unless exceeded herein. Provide continuous length wire type bolsters with continuous sand plates for all slabs on grade. All support items in contact with vapor barrier system must have continuous plates so as to avoid puncture of the system during installation and over total life of structure.
   3. W.W.R. Supports: Chairs, for spacing, supporting, and fastening welded wire reinforcing in place. Provide continuous length wire type chairs with continuous sand plates for all welded wire reinforcing, placed in continuous rows maximum 4 feet on center or spaced sufficiently to support W.W.R. to intended position within concrete--plastic supports are not permitted for W.W.R. All support items in contact with vapor barrier system must have continuous plates so as to avoid puncture of the system during installation and over total life of structure.
   4. Bar and reinforcing Support Manufacturers:
      a. Dayton Richmond Concrete Accessories, Miamiburg, OH.
      b. Meadow Burke Products, Chicago, IL.
      c. Universal Form Clamp Co., Bellwood, IL.
      d. Substitutions: See Section 016000 - Product Requirements.
   5. Provide stainless steel, galvanized, or plastic coated steel components for placement within 1-1/2 inches of weathering surfaces.
   6. Joint Dowel Bars: Plain-steel bars, ASTM A615/A615M, Grade 60 (420). Cut bars true to length with ends square and free of burrs.
F. Reinforcing for concrete topping of precast concrete hollow core plank
   1. Woven wire fabric: 2 inch x 2 inch X 14 gauge, plain type, in flat sheets.

### 2.2 DELIVERY, STORAGE, AND PROTECTION

A. Properly label all bars with weatherproof tags to facilitate identification.
B. Store reinforcing steel on supports above ground level. Keep covered with tarpaulins.
C. Protect coated bars from damage to coating.

### 2.3 FABRICATION

A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice.
B. Welding of reinforcement is not permitted unless indicated on drawings. If and when explicitly indicated, perform welding in accordance with AWS D1.4.
C. Locate reinforcing splices not indicated on drawings at point of minimum stress.
   1. Review locations of splices with Engineer.
   2. Minimize reinforcement splices.

## PART 3 – EXECUTION

### 3.1 PLACEMENT

A. Place, support and secure reinforcement against displacement in accordance with CRSI. Do not deviate from required position.
B. Do not displace or damage vapor barrier for slabs on grade.
C. Accommodate placement of formed openings.
D. Lap welded wire fabric one full mesh at side and end laps and wire together.
E. Tie bars at all points where bars cross or as required by CRSI (P1).
F. Provide welded wire fabric in all interior concrete slabs on grade unless noted otherwise on plans.
G. Provide keys and dowels where the walls and other items are shown to be built integrally but are placed as separate pours. Use dowels of the same size and spacing as reinforcing but not less than 48 bar diameters embedment.
H. Splice reinforcing bars as required. Lap continuous reinforcing 48 diameters but not less than 18 inches.
I. Minimum Wall Reinforcing: Two No. 5 bars, continuous top and bottom, unless other sizes or quantities are indicated. Reinforcing bars shall be continuous around corners or corner bars shall be provided of the same size and spacing of reinforcing bars.
J. Prior to pouring concrete, check all reinforcing for contamination and clean as required.
K. Conform to applicable code and requirements of contract documents for concrete cover over reinforcement.
L. Tie bars at all points where crossed or as required by CRSI.
M. Provide welded wire fabric in all interior concrete slabs on grade unless noted otherwise on plans.

### 3.2 FIELD QUALITY CONTROL

A. An independent testing agency, as specified in Section 014000, will inspect installed reinforcement for conformance to contract documents before concrete placement.

**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. Foundation walls.
   3. Slabs-on-grade.

B. Related Sections:
   1. Division 31 Section "Earth Moving" for drainage fill under slabs-on-grade.
   2. Division 32 Section "Concrete Paving" for concrete pavement and walks.

### 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 SUBMITTALS

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

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
   1. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

D. Material Certificates: For each of the following, signed by manufacturers:
   1. Cementitious materials.
   2. Admixtures.
   3. Form materials and form-release agents.
   4. Steel reinforcement and accessories.
   5. Fiber reinforcement.
   6. Curing compounds.
   7. Vapor retarders.
   8. Joint-filler strips.
   9. Repair materials.

E. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

F. Field quality-control reports.

### 1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

C. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

D. 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.

E. 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."

F. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

### 1.6 DELIVERY, STORAGE, AND HANDLING

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

## 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. Plywood, metal, or other approved panel materials.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.

D. 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.

E. 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 (25 mm) to the plane of exposed concrete surface.

### 2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

B. Plain-Steel Wire: ASTM A 82/A 82M, as drawn.

C. Plain-Steel Welded Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets.

### 2.3 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), 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. May supplement with the following:
      a. Fly Ash: ASTM C 618, Class F or C.
      b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
   2. Blended Hydraulic Cement: ASTM C 595 Type IL, portland-limestone cement.

B. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.
   1. Maximum Coarse-Aggregate Size: 1-1/2 inches (38 mm) nominal in slabs on grade, 3/4 inch (19 mm)] nominal in other concrete work.
   2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94/C 94M 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/C 494M, Type A.
   2. Retarding Admixture: ASTM C 494/C 494M, Type B.
   3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
   4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
   5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
   6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

## 2.6 FIBER REINFORCEMENT

A. Synthetic Macro-Fiber: Polyolefin macro-fibers engineered and designed for use in concrete, complying with ASTM C 1116/C 1116M, Type III, 1 to 2-1/4 inches (25 to 57 mm) long.
   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. 3M; Scotchcast Polyolefin Fibers 2".
      b. Euclid Chemical Company (The), an RPM company; Tuf-Strand SF.
      c. FORTA Corporation; FORTA FERRO.
      d. Grace Construction Products, W. R. Grace & Co.; Strux 90/40.
      e. Sika Corporation; Fibermesh 650.

## 2.7 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.
   1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. Fortifiber Building Systems Group; Moistop Ultra 15.
      b. Grace Construction Products, W. R. Grace & Co.; Florprufe 120.
      c. Meadows, W. R., Inc.; Perminator 15 mil.
      d. Raven Industries Inc.; Vapor Block [15] [10].
      e. Reef Industries, Inc.; Griffolyn 15 mil Green.
      f. Stego Industries, LLC; Stego Wrap 15 mil Class A.

## 2.8 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
   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. BASF Construction Chemicals - Building Systems; Confilm.
      b. Dayton Superior; Aquafilm Concentrate J74.
      c. Euclid Chemical Company (The), an RPM company; Eucobar.
      d. Kaufman Products, Inc.; Vapor-Aid.
      e. Meadows, W. R., Inc.; EVAPRE.
      f. Sika Corporation; SikaFilm.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) 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, dissipating.
   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. BASF -Master Builders Solutions; MasterKure 200WB.
      b. Dayton Superior; Clear Cure VOC J7WB.
      c. Euclid Chemical Company (The), an RPM company; Kurez W VOX; TAMMSCURE WB 30C.
      d. Kaufman Products, Inc.; Thinfilm 420.
      e. Lambert Corporation; AQUA KURE - CLEAR.
      f. L&M Construction Chemicals, Inc.; L&M Cure R.
      g. Meadows, W. R., Inc.; 1100-CLEAR.
      h. Nox-Crete Products Group; Clear-Cure DH 100

## 2.9 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

B. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

## 2.10 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) 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 (3.2 to 6 mm) or coarse sand as recommended by underlayment manufacturer.
   4. Compressive Strength: Not less than 5000 psi (34.5 MPa) at 28 days when tested according to ASTM C 109/C 109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch (6.4 mm) 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 (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi (34.5 MPa) at 28 days when tested according to ASTM C 109/C 109M.

## 2.11 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
   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: 15 percent.
   2. Ground Granulated Blast-Furnace Slag: 20 percent.
   3. Combined Fly Ash and Ground Granulated Blast-Furnace Slag: 70 percent portland cement minimum, with fly ash not exceeding 15 percent.
C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
D. Admixtures: Use admixtures according to manufacturer's written instructions.
   1. Use water-reducing, high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
   2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
   3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

## 2.12 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings and Foundation Walls: Proportion normal-weight concrete mixture as follows:
   1. Minimum Compressive Strength: 4000 psi (20.7 MPa) at 28 days.
   2. Maximum Water-Cementitious Materials Ratio: 0.55.
   3. Slump Limit: 3 inches (100 mm), plus or minus 1 inch (25 mm).
   4. Air Content for Foundation Walls: 3 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch (19-mm) nominal maximum aggregate size.
B. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:
   1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
   2. Minimum Cementitious Materials Content: 520 lb/cu. yd. (309 kg/cu. m).
   3. Slump Limit: 3 inches (100 mm), plus or minus 1 inch (25 mm).
   4. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
   5. Synthetic Macro-Fiber: Where indicated uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than 4 lb/cu. yd. (2.4 kg/cu. m).

## 2.13 FABRICATING REINFORCEMENT

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

## 2.14 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
   1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), 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 (3.2 mm) for smooth-formed finished surfaces.
   2. Class C, 1/2 inch (13 mm) 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."

### 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 (10 deg C) 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.
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 VAPOR RETARDERS

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
   1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.

## 3.5 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
   1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
   1. Weld reinforcing bars according to AWS D1.4/D 1.4M, 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 (38 mm) into concrete.
   3. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
   4. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
   5. 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 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 (3.2 mm). 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- (3.2-mm-) 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 (13 mm) or more than 1 inch (25 mm) below finished concrete surface where joint sealants, specified in Division 07 Section "Joint Sealants," are indicated.
   3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

## 3.7 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
C. 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 (150 mm) 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.
D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
    1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
    2. Maintain reinforcement in position on chairs during concrete placement.
    3. Screed slab surfaces with a straightedge and strike off to correct elevations.
    4. Slope surfaces uniformly to drains where required.
    5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
E. 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 (4.4 deg C) 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.
F. Hot-Weather Placement: Comply with ACI 301 and as follows:
    1. Maintain concrete temperature below 90 deg F (32 deg C) 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.

## 3.8 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 view in the final structure.

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 view in the finished structure, to be covered with a coating or covering material applied directly to concrete.
C. 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.

## 3.9 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. 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.
C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
   1. Apply a trowel finish to surfaces 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 (ASTM E 1155M), for a randomly trafficked floor surface:
      a. Specified overall values of flatness, F(F) 25; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and of levelness, F(L) 15.
D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.
   1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.
E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, 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.

## 3.10 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.

## 3.11 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 (1 kg/sq. m 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. Continuous water-fog spray.
    b. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) 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 (300 mm), 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. 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.

## 3.12 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 (1.18-mm) 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 (13 mm) in any dimension to solid concrete. Limit cut depth to 3/4 inch (19 mm). 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 (0.25 mm) 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 (6 mm) 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 (25 mm) 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 (19-mm) 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 (25 mm) 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.

## 3.13 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Inspections:
1. Steel reinforcement placement.
2. Verification of use of required design mixture.

3. Concrete placement, including conveying and depositing.
4. Curing procedures and maintenance of curing temperature.

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. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
      a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
   2. Slump: ASTM C 143/C 143M; 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/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
   5. Compression Test Specimens: ASTM C 31/C 31M.
      a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
   6. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
      a. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
   7. 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 (3.4 MPa).
   8. Test results shall be reported in writing to Architect, Structural Engineer, 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/C 42M 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 (ASTM E 1155M) within 48 hours of finishing.

**END OF SECTION**

**SECTION 033500**

**CONCRETE FLOOR FINISHING**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Finishing slabs on grade and monolithic floor slabs.
B. Surface treatment with concrete hardener, sealer, and slip resistant coatings.

### 1.2 RELATED SECTIONS
A. Section 033000 - Cast-In-Place Concrete: Prepared concrete floors ready to receive finish.

### 1.3 REFERENCES
A. Unless otherwise noted the most current issue of the reference shall be used.
B. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International.
C. ACI 302.1R - Guide for Concrete Floor and Slab Construction; American Concrete Institute International.

### 1.4 SUBMITTALS
A. See Section 01300 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data on concrete hardener, sealer, and slip resistant treatment, including information on compatibility of different products and limitations.
C. Maintenance Data: Provide data on maintenance renewal of applied coatings.

### 1.5 QUALITY ASSURANCE
A. Perform Work in accordance with ACI 301.

### 1.6 DELIVERY, STORAGE, AND HAULING
A. Deliver materials in manufacturer's sealed packaging, including application instructions.

### 1.7 PROJECT CONDITIONS
A. Coordinate the work with concrete floor placement and concrete floor curing.

### 1.8 ENVIRONMENTAL REQUIREMENTS
A. Temporary Lighting: Minimum 200 W light source, placed 8 feet above the floor surface, for each 425 sq ft of floor being finished.
B. Do not finish floors until interior heating system is operational.
C. Temporary Heat: Ambient temperature of 50 degrees F minimum at concrete surface.
D. Ventilation: Sufficient to prevent injurious gases from temporary heat or other sources affecting concrete.

## PART 2 – PRODUCTS

### 2.1 MANUFACTURERS
A. Acceptable Manufacturer: Curecrete Distribution, Inc; 1203 West Spring Creek Place, Springville, UT 84663. ASD. Tel: (800) 998-5664. Fax: (801) 489-3307. Email: techsupport@ashfordformula.com. www.ashfordformula.com
B. Substitutions: See Section 016000 - Product Requirements.

### 2.2 MATERIALS
A. Cure-Seal-Hardener: Ashford Formula; water-based chemically-reactive penetrating sealer and hardener, that seals by densifying concrete so that water molecules cannot pass through but air and water vapor can, while allowing concrete to achieve full compressive strength, minimizing surface crazing, and eliminating dusting.
   1. Colorless, transparent, odorless, non-toxic, non-flammable.
   2. Containing no solvents or volatile organic compounds.

3. USDA approved for food handling facilities.
4. Allowing traffic on floors within 2 to 3 hours, with chemical process complete within 3 months.
5. No change to surface appearance except a sheen developed due to traffic and cleaning.

B. Water: Clean, potable.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. Verify that floor surfaces are acceptable to receive the work of this section.

### 3.2 FLOOR FINISHING

A. Finish concrete floor surfaces in accordance with ACI 301 and ACI 302.1R.
B. Wood float surfaces that will receive quarry tile, ceramic tile, or cementitious terrazzo with full bed setting system.
C. Steel trowel surfaces that will receive carpeting or resilient flooring.
D. Steel trowel surfaces that are scheduled to be exposed.
E. In areas with floor drains, maintain design floor elevation at walls; slope surfaces uniformly to drains at 1/8 inch per foot nominal.

**END OF SECTION**

**SECTION 033900**

**CURING, SEALING, AND HARDENING CONCRETE FLOORS**

## PART 1 – PRODUCTS

### 1.1 MANUFACTURERS

A. Acceptable Manufacturer: Curecrete Distribution, Inc; 1203 West Spring Creek Place, Springville, UT 84663. ASD. Tel: (800) 998-5664. Fax: (801) 489-3307. Email: techsupport@ashfordformula.com. www.ashfordformula.com

B. Substitutions: See Section 01600 - Product Requirements.

### 1.2 MATERIALS

A. Cure-Seal-Hardener: Ashford Formula; water-based chemically-reactive penetrating sealer and hardener, that seals by densifying concrete so that water molecules cannot pass through but air and water vapor can, while allowing concrete to achieve full compressive strength, minimizing surface crazing, and eliminating dusting.
   1. Colorless, transparent, odorless, non-toxic, non-flammable.
   2. Containing no solvents or volatile organic compounds.
   3. USDA approved for food handling facilities.
   4. Allowing traffic on floors within 2 to 3 hours, with chemical process complete within 3 months.
   5. No change to surface appearance except a sheen developed due to traffic and cleaning.

B. Water: Clean, potable.

**END OF SECTION**

**SECTION 035410**

**SELF-LEVELING UNDERLAYMENT**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Liquid applied cementitious self-leveling floor underlayment.

### 1.2 REFERENCES
A. Unless otherwise noted the most current issue of the reference shall be used.
B. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.

### 1.3 SUBMITTALS
A. See Section 013300 – Administrative Requirements, for submittal procedures.
B. Product Data: Provide physical characteristics, product limitations
C. Manufacturer's Instructions: Indicate mix instructions.

### 1.4 QUALITY ASSURANCE
A. Applicator Qualifications: Company specializing in performing the work of this section and approved by the manufacturer.

### 1.5 REGULATORY REQUIREMENTS
A. Conform to applicable code for combustibility or flame spread requirements.

### 1.6 ENVIRONMENTAL REQUIREMENTS
A. Do not install underlayment until floor penetrations and peripheral work are complete.
B. Maintain ambient temperatures of 50 degrees for 24 hours before, during and 72 hours after installation of underlayment.
C. During the curing process, ventilate spaces to remove excess moisture.

## PART 2 – PRODUCTS

### 2.1 MANUFACTURERS
A. Cementitious Underlayment:
   1. Ardex Engineered Cements. Inc.: www.ardex.com.
   2. Dayton Superior Corporation: www.daytonsuperior.com
   3. Dependable Chemical Co., Inc.: www.floorprep.com.
   4. Substitutions: See Section 016000 - Product Requirements.

### 2.2 ACCESSORIES
A. Provide all primers, cleaners, bonding agents or any other accessory materials recommended by the manufacturer for the intended installation.

### 2.3 MIXING
A. Site mix materials in accordance with manufacturer's instructions.
B. Mix to achieve following characteristics:
   1. Density: 100 lb/cu ft minimum dry density.
   2. Compressive strength: 1,000 psi minimum.
   3. Surface burning characteristics: Flame spread/smoke developed index of 0/0 in accordance with ASTM E 84.
C. Mix to self-leveling consistency.

## PART 3 – EXECUTION

### 3.1 EXAMINATION
A. Verify that substrate surfaces are clean, dry, unfrozen, do not contain petroleum bi-products or other compounds detrimental to underlayment material bond to substrate.

### 3.2 PREPARATION
A. Remove substrate surface irregularities. Fill voids and deck joints with latex based filler. Finish smooth.
B. Vacuum clean surfaces.
C. Prime substrate in accordance with manufacturer's instructions. Allow to dry.

### 3.3 APPLICATION
A. Install underlayment in accordance with manufacturer's instructions.
B. Install underlayment as required, or as directed by the Architect, to correct any imperfections or irregularities which have caused the floor to be out of level.

### 3.4 CURING
A. Air cure in accordance with manufacturer's instructions.

### 3.5 APPLICATION TOLERANCE
A. Top Surface: Level to 1/8 inch in 5 feet.

### 3.6 PROTECTION OF FINISHED WORK
A. Do not permit traffic over unprotected floor underlayment surfaces.

### 3.7 SCHEDULES
A. Level all floor surfaces which will receive new flooring materials.

**END OF SECTION**

**SECTION 040516**

**MORTAR AND MASONRY GROUT**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Mortar for masonry.
B. Grout for masonry.

### 1.2 RELATED SECTIONS
A. Section 014000 - Quality Requirements: Testing laboratory services.
B. Section 042000 - Unit Masonry Assemblies: Installation of mortar and grout.
C. Section 081113 – Steel Doors and Frames: Grouting steel door frames installed in masonry.
D. Section 081113 – Steel Doors and Frames: Grouting steel door frames.

### 1.3 REFERENCES
A. Unless otherwise noted the most current issue of the reference shall be used.
B. ACI 530/ASCE 5/TMS 402 - Building Code Requirements For Masonry Structures; American Concrete Institute International;
C. ACI 530.1/ASCE 6/TMS 602 - Specification for Masonry Structures; American Concrete Institute International.
D. ASTM C 5 - Standard Specification for Quicklime for Structural Purposes.
E. ASTM C 199 - Test Method for Pier Test for Refractory Masonry.
F. ASTM C 207 - Standard Specification for Hydrated Lime for Masonry Purposes.
G. ASTM C 387 - Standard Specification for Packaged, Dry, Combined Materials for Mortar and Concrete.
H. ASTM C 404 - Standard Specification for Aggregates for Masonry Grout.
I. ASTM E514 -90 - Standard Test Method for Water Penetration and Leakage Through Masonry
J. ASTM C 1384 - Standard Specification for Modifiers for Masonry Mortars.
K. ASTM C 1388 - Standard Test Method for Compressive Strength of Laboratory Constructed Masonry Prisms.
L. Contractor to verify that specified cleaning is done during progress of work and at the completion of each subcontractor's work.

### 1.4 SUBMITTALS
A. See Section 013300 - Administrative Requirements, for submittal procedures.
B. Product Data: Include design mix and indicate whether the Proportion or Property specification of ASTM C 270 is to be used. Also include required environmental conditions and admixture limitations.
C. Samples: Submit two samples of mortar, illustrating mortar color and color range.
D. Contractor shall retain the services of an independent testing laboratory to test, evaluate and report on the following:
    1. Submit reports on mortar indicating compliance with component mortar materials to requirements of ASTM C 270 and test and evaluation reports per ASTM C 780.
    2. Reports: Submit reports on grout indicating compliance with component grout materials to requirements of ASTM C 476 and test and evaluation reports to requirements of ASTM C
E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
F. Manufacturer's Instructions: Submit packaged dry mortar manufacturer's installation instructions.

### 1.5 QUALITY ASSURANCE
A. Comply with provisions of ACI 530/ASCE 5/TMS 402 and ACI 530.1/ASCE 6/TMS 602, except where exceeded by requirements of the contract documents.
    1. Maintain one copy of each document on project site.

### 1.6 DELIVERY, STORAGE, AND HANDLING
A. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

## 1.7 ENVIRONMENTAL REQUIREMENTS

A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.
B. Cold Weather Requirements: Comply with recommendations of ACI 530.1
C. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.
D. Hot Weather Requirements: Comply with recommendations of ACI 530.1

# PART 2 – PRODUCTS

## 2.1 MATERIALS

A. Masonry Cement: ASTM C 91, Type S.
   1. Colored Mortar: Premixed cement as required to match Architect's sample.
B. Portland Cement: ASTM C 150, Type I – Normal, or Type II - Moderate; standard gray color.
C. Blended Cement: ASTM C 595, Type IP or i(PM) for type I or II cement..
D. Packaged Dry Mortar: ASTM C 387, using gray color cement.
E. Hydrated Lime: ASTM C 207, Type S or M.
F. Mortar Aggregate: ASTM C 144, standard masonry type.
G. Grout Aggregate: ASTM C 404.
H. Pigments for Colored Mortar: Iron or chromium oxides with demonstrated stability and colorfastness. Do not use carbon black.
   1. ASTM C 979: Pigment shall not exceed 10% of the weight of portland cement.
   2. Colors: As required to match Architect's color samples.
   3. Acceptable products:
      a. Soloman Colors: www.solomoncolors.com
      b. Davis Colors: www.concretestains.com
      c. Color Solutions, Inc.: www.dynamiccolorsolutions.com
      d. Prism Pigments: www.prismpigments.com
      e. Western Lime and Cement Co.
   4. Substitutions: See Section 016000 - Product Requirements.
I. Water: Clean and potable.
J. Accelerating Admixture: Not Permitted.
K. Moisture-Resistant Admixture: Water repellent compound designed to reduce capillarity; Integral liquid polymeric admixture for mortar added during mixing, capable of achieving a Class E Rating when evaluated using ASTM E 514 with the test extended to 72 hours, using the rating criteria specified in ASTM E 514.
L. Bonding Agent: Latex type.

## 2.2 MORTAR MIXES

A. Mortar for Unit Masonry: ASTM C 270, Property Specification.
   1. Engineered Masonry: Type S.
   2. Masonry below grade and in contact with earth: Type S.
   3. Exterior, loadbearing masonry: Type M or S.
   4. Exterior, non-loadbearing masonry: Type M or S.
   5. Interior, loadbearing masonry: Type M or S.
   6. Interior, non-loadbearing masonry: Type N.
   7. Pointing mortar: Prehydrated Type N with maximum 2 percent ammonium stearate or calcium stearate per cement weight.
B. Stain Resistant Pointing Mortar: One part Portland cement, 1/8 part hydrated lime, and two parts graded (80 mesh) aggregate, proportioned by volume. Add aluminum tristearate, calcium stearate, or ammonium stearate equal to 2 percent of Portland cement by weight.
C. Mortar for Stone: ASTM C 270, Property Specification.
   1. Setting mortar:
      a. Granite: Type S mortar.

b. Limestone: Type N mortar.
c. Marble: Type S mortar.
d. Travertine: Type S mortar.
e. Quartz-based stone: Type N mortar.
f. Slate: Type S mortar.

2. Pointing mortar:
a. Granite: Type S mortar.
b. Limestone: Type N mortar.
c. Marble: Type N mortar.
d. Travertine: Type N mortar.
e. Quartz-based stone: Type N mortar.
f. Slate: Type N mortar.

D. Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio.

**2.3 MORTAR MIXING**

A. Thoroughly mix mortar ingredients using mechanical batch mixer, in accordance with ASTM C 270 and in quantities needed for immediate use.
B. Maintain sand uniformly damp immediately before the mixing process.
C. Add mortar color in accordance with manufacturer's instructions. Provide uniformity of mix and coloration.
D. Do not use anti-freeze compounds to lower the freezing point of mortar. Do not use set accelerators unless approved in writing by The Brick Institute of America (BIA), National Concrete Masonry Association (NCMA), ASTM C 270, the Architect of Record and the Engineer of Record. The use of admixtures does not relax cold weather protection requirements.
E. If water is lost by evaporation, re-temper only within two hours of mixing.
F. Use mortar within two hours after mixing at temperatures of 90 degrees F, or two-and-one-half hours at temperatures under 40 degrees F.

**2.4 GROUT MIXES**

A. Bond Beams and Lintels: 3,000 psi strength at 28 days; 8-10 inches slump; provide grout in accordance with ASTM C 476. Use or fine grout in accordance with ACI 530 and 530.1.
B. Engineered Masonry: Unless otherwise noted provide grout with 3,000 psi strength at 28 days; 7-8 inches slump; mix in accordance with ASTM C 476.
1. Coarse grout for spaces with smallest horizontal dimension greater than 2 inches.

**2.5 GROUT MIXING**

A. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C 476
B. Add admixtures in accordance with manufacturer's instructions; mix uniformly.
C. Do not use anti-freeze compounds to lower the freezing point of grout. Do not use set accelerators unless approved in writing by The Brick Institute of America (BIA), National Concrete Masonry Association (NCMA), ASTM C 270, the Architect of Record and the Engineer of Record. The use of admixtures does not relax cold weather protection requirements.

**2.6 PRECONSTRUCTION TESTING**

A. Testing will be conducted by an independent test agency, in accordance with provisions of Section 014000.
B. Mortar Mixes: Test mortars pre-batched by weight in accordance with ASTM C 270 or ASTM C 780 recommendations for preconstruction testing for compressive strength, consistency, mortar aggregate ratio, water content, air content and splitting tensile strength.
1. Test results will be used to establish optimum mortar proportions and establish quality control values for construction testing.
C. Grout Mixes: Test grout batches in accordance with ASTM C 1019 procedures for compressive strength and slump.

1. Test results will be used to establish optimum grout proportions and establish quality control values for construction testing.

## PART 3 – EXECUTION

### 3.1 PREPARATION

A. Apply bonding agent to existing smooth finish concrete surfaces.
   1. Plug clean-out holes for masonry with brick or masonry units to match adjacent surfaces. Brace masonry for wet grout pressure.
B. Request inspection of spaces to be grouted.

### 3.2 INSTALLATION

A. Install mortar and grout to requirements of Section 042000; and in accordance with ACI 530.1/ASCE 6.
B. Work grout into masonry cores and cavities to eliminate voids.
C. Do not install grout in lifts greater than 16 inches without consolidating grout by rodding.
D. Do not displace reinforcement while placing grout.
E. Remove excess mortar from grout spaces.

### 3.3 GROUTING

A. Use either high-lift or low-lift grouting techniques, at Contractor's option, in accordance with ACI 530.1.
B. Consolidate grout with a mechanical vibrator on any grout pours greater than 12 inches in height; and in accordance with ACI 530.1. Grout pours 12 inches or less in height shall be mechanically vibrated or puddled. Do not over consolidate.
C. When grouting is stopped for 1 hour or longer, stop the grout pour 1 1/2 inches below the top of the masonry to create a shear key.
D. Pour grout only after reinforcing is in place. Prevent displacement of bars as grout is poured.
E. Place grout for each pour continuously and consolidate immediately; do not interrupt pours for more than 1-1/2 hours.
F. Place grout for spanning elements in single, continuous pour.

### 3.4 FIELD QUALITY CONTROL

A. An independent testing agency will perform field tests, in accordance with provisions of Section 014000.
   1. Tests and evaluation listed in this Article will be performed during construction for each 5000 square feet of wall area or fraction thereof.
B. Test and evaluate mortar in accordance with ASTM C 780 procedures.
   1. Test with same frequency as specified for masonry units.
C. Test and evaluate grout in accordance with ASTM C 1019 procedures.
   1. Test with same frequency as specified for masonry units.
D. Prism Tests: Test masonry and mortar panels for compressive strength in accordance with ASTM C 1388, and for flexural bond strength in accordance with ASTM C 1072 or ASTM E 518; perform tests and evaluate results as specified in individual masonry sections
   1. Prepare set of prisms for testing at 7 days and 1 set for testing at 28 day

**END OF SECTION**

**SECTION 042000**

**UNIT MASONRY ASSEMBLIES**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Concrete Masonry Units.
B. Facing Brick.
C. Reinforcement and Anchorage.
D. Flashings.
E. Accessories.

### 1.2 RELATED SECTIONS

A. Section 032000 - Concrete Reinforcement: Reinforcing steel for grouted masonry.
B. Section 040516 - Mortar and Masonry Grout.
C. Section 051200 - Structural Steel: accessories for masonry construction.
D. Section 061000 - Rough Carpentry: Nailing strips built into masonry.
E. Section 072113 - Board and Batt Insulation: Insulation for cavity spaces.
F. Section 076200 - Sheet Metal Flashing and Trim: Rigid Through-wall masonry flashings.
G. Section 079200 - Joint Sealers: Backing rod and sealant at control and expansion joints.

### 1.3 REFERENCES

A. Unless otherwise noted the most current issue of the reference shall be used.
B. ACI 530/ASCE 5/TMS 402 - Building Code Requirements for Masonry Structures; American Concrete Institute International.
C. ACI 530.1/ASCE 6/TMS 602 - Specification For Masonry Structures; American Concrete Institute International.
D. ASTM A 82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
E. ASTM D 1667 - Standard Specification for Flexible Cellular Materials—Vinyl Chloride Polymers and Copolymers (Closed-Cell Foam)
F. ASTM - D2240 - Standard Test Method for Rubber Property-Durometer Hardness
G. ASTM D 2287 - Standard Specification for Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds
H. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
I. ASTM A 615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
J. ASTM A 641/A 641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
K. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
L. ASTM A 666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
M. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement; 2016, with Editorial Revision (2018).
N. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2018a
O. ASTM B 370 - Standard Specification for Copper Sheet and Strip for Building Construction.
P. ASTM C 27 - Standard Classification of Fireclay and High-Alumina Refractory Brick.
Q. ASTM C 34 - Standard Specification for Structural Clay Load Bearing-Wall Tile.
R. ASTM C 55 - Standard Specification for Concrete Brick; 2001a.
S. ASTM C 56 - Standard Specification for Structural Clay Non-Load-Bearing Tile.
T. ASTM C 62 - Standard Specification for Building Brick (Solid Masonry Units Made From Clay or Shale).
U. ASTM C 67 - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.
V. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2016a.
W. ASTM C91/C91M - Standard Specification for Masonry Cement; 2018.

X. ASTM C 126 - Standard Specification for Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units.
Y. ASTM C 129 - Standard Specification for Nonloadbearing Concrete Masonry Units.
Z. ASTM C140/C140M - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units; 2020.
AA. ASTM C 144 - Standard Specification for Aggregate for Masonry Mortar.
BB. ASTM C 150 - Standard Specification for Portland Cement.
CC. ASTM C 207 - Standard Specification for Hydrated Lime for Masonry Purposes.
DD. ASTM C 212 - Standard Specification for Structural Clay Facing Tile.
EE. ASTM C 270 - Standard Specification for Mortar for Unit Masonry.
FF. ASTM C 315 - Standard Specification for Clay Flue Linings.
GG. ASTM C 404 - Standard Specification for Aggregates for Masonry Grout.
HH. ASTM C 476 - Standard Specification for Grout for Masonry.
II. ASTM C 530 - Standard Specification for Structural Clay Nonloadbearing Screen Tile.
JJ. ASTM C 652 - Standard Specification for Hollow Brick (Hollow Masonry Units Made From Clay or Shale).
KK. ASTM C 744 - Standard Specification for Prefaced Concrete and Calcium Silicate Masonry Units.
LL. ASTM C 780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
MM. ASTM C1634 - Standard Specification for Concrete Facing Brick; 2017.
NN. ASTM D 226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
OO. ASTM E 514-90 - Standard Test Method for Water Penetration and Leakage Through Masonry.
PP. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing; 2017.
QQ. BIA Technical Notes No. 13 - Ceramic Glazed Brick Exterior Walls; 2017.
RR. BIA Technical Notes No. 28B - Brick Veneer/Steel Stud Walls; 2005
SS. BIA Technical Notes No. 46 - Maintenance of Brick Masonry; 2017.
TT. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2016.

## 1.4 SUBMITTALS

A. See Section 013300 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and all flashings including accessories and primer.
C. Samples; submit three of each for review:
   1. Inside, outside corners self-adhering rubberized flashing end dams and outside corners.
   2. 2 inch x 6 inches wide x .015 inch thick stainless steel drip with hemmed edge.
   3. Sealant.
   4. 12 inch long section of Termination bar.
   5. Joint filler: full width x 6 inches long.
   6. Preformed Control Joints: 6 inches long.
   7. Weep/Cavity Vents: Manufacturer's full color range.
   8. Anchors: submit each type of anchor required.
   9. Facing Brick: submit bound units to illustrate color, texture, and extremes of color range and sizes.
D. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.
E. Manufacturer's Qualification Statement.
F. Installer's Qualification Statement.
G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.

## 1.5 QUALITY ASSURANCE

A. Comply with provisions of ACI 530/ASCE 5/TMS 402 and ACI 530.1/ASCE 6/TMS 602, except where exceeded by requirements of the contract documents.
   1. Maintain one copy of each document on project site.
B. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.
C. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum three years of documented experience.
D. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

## 1.6 MOCK-UP

A. Construct a masonry wall as a mock-up panel sized 6 feet long by 4 feet high, which includes an exterior wall corner, flashing end dams and lap joints, window sill condition, cavity insulation with adhesive, mortar and accessories, all typical accessories, control joints with sealant, and structural backup.
B. Locate where directed.
C. Rebuild mock-up or non-conforming work within mock-up to meet intent of all specified components at the direction of the Architect.
D. Mock up will be used as the standard of quality for all masonry installation on the project.
E. All work shall conform to the specifications and quality established in the mock-up panel.
F. Mock-up may remain as part of the finished work.

## 1.7 PRE-INSTALLATION MEETING

A. Convene minimum one week before starting work of this section.
B. Construct Mock-up wall prior to pre-installation meeting.
C. Attendance:
   1. Contractor
   2. Mason contractor.
   3. Mason foreman.
   4. Architect.

## 1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.
B. Handle and store ceramic glazed masonry units and pre-faced concrete block units in protective cartons or trays. Do not remove from protective packaging until ready for installation.
C. Stack masonry units, anchors, ties and miscellaneous accessories on wood pallets or blocking above ground and protect from exposure to weather at all times.
D. Cover brick, all masonry units and all reinforcing and accessories with covers that permit air circulation and prevent moisture infiltration.
E. Any materials not protected at all times will be marked rejected and shall be removed from the site by the contractor within 24 hours. All transportation and replacement costs and delays in the schedule will be the sole responsibility of the contractor and at no additional cost to the owner.
F. Clean all materials of dirt, mud, ice, rust, or other foreign substances immediately prior to using.

## 1.9 ENVIRONMENTAL REQUIREMENTS

A. Cold Weather Requirements: Comply with ACI 530.1.
B. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.
C. Do not build on frozen work.
D. Remove and replace all masonry work damaged by freezing.

E. Hot Weather Requirements: Comply with ACI 530.1.
F. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

### 1.10 EXTRA MATERIALS

A. See Section 016000 - Product Requirements, for additional provisions.
B. Provide 50 of each size, color, and type of glazed units for Owner's use in maintenance of project.

## PART 2 – PRODUCTS

### 2.1 CONCRETE MASONRY UNITS

A. Acceptable Manufacturers:
   1. Best Block Co.; www.bestblock.net.
   2. Chicago Block and Brick; www.chicagoblock.com
   3. Northfield Block; www.northfieldblock.com
   4. Trenwyth Industries; www.trenwyth.com
   5. Valley Block & Supply Co., Inc., Elgin, IL 60123.

B. 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 bullnose units for outside corners unless otherwise indicated.
   3. Special Shapes: Provide non-standard blocks configured for corners.

C. Load Bearing Concrete Masonry units: Comply with referenced standards and as follows:
   1. Size: Unless otherwise noted provide standard units with nominal face dimensions of 16 x 8 inches and nominal depths as indicated on the drawings for specific locations.
   2. Load-Bearing Units: ASTM C 90, normal weight.
      a. Hollow block with nominal 1 3/8 inches shell thickness unless indicated otherwise on contract drawings.
      b. Exposed faces: Manufacturer's standard color and texture where indicated.

D. Non-Load Bearing Units: Comply with referenced standards and as follows:
   1. Hollow block, as indicated unless otherwise noted.
   2. Size: Unless otherwise noted provide standard units with nominal face dimensions of 16 x 8 inches and nominal depths as indicated on the drawings for specific locations.
   3. Load-Bearing Units: ASTM C 129, medium weight.
      a. Hollow block with nominal 1 3/8 inches shell thickness unless indicated otherwise on contract drawings.
      b. Exposed faces: Manufacturer's standard color and texture where indicated.

### 2.2 BRICK UNITS

A. Manufacturers:
   1. Interstate Brick; https://interstatebrick.com.
   2. Substitutions: Not permitted.

B. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units:
   1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished
   2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
   3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.

4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

C. Facing Brick: ASTM C 216, Type FBS, Grade SW.
1. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
2. Color and texture: Midnight Black Matte.
3. Modular Size (Actual Dimensions): 3-5/8 inches wide by 2-1/4 inches high by 7-5/8 inches long.
4. Special shapes: Molded units as required by conditions indicated, unless standard units can be sawn to produce equivalent effect.
5. Compressive strength: As indicated on drawings, measured in accordance with ASTM C 67.

## 2.3 MORTAR AND GROUT MATERIALS

A. Mortar and grout: As specified in Section 040516.

## 2.4 REINFORCEMENT AND ANCHORAGE

A. Manufacturers of Joint Reinforcement and Anchors:
1. Blok-Lok Limited: www.blok-lok.com/#sle.
2. Dur-O-Wal: www.dur-o-wal.com.
3. Heckmann Building Products, Inc: www.heckmannbuildingprods.com.
4. Hohmann & Barnard, Inc: www.h-b.com.
5. Masonry Reinforcing Corporation of America: www.wirebond.com.
6. Substitutions: See Section 016000 - Product Requirements.

B. Reinforcing Steel: ASTM A 615/A 615M Grade 60 deformed billet bars.

C. Vertical Structural Reinforcing Steel: type as specified in Section 032000; size as indicated on drawings; uncoated finish.

D. Single Wythe Joint Reinforcement: ASTM A951/A951M.
1. Type: Truss or ladder.
2. Material: ASTM A1064/A1064M steel wire, mill galvanized to ASTM A641/A641M, Class 3.
3. Size: 0.1483 inch (3.8 mm) side rods with 0.1483 inch (3.8 mm) cross rods; width as required to provide not less than 5/8 inch (16 mm) of mortar coverage on each exposure.

E. Multiple Wythe Joint Reinforcement: ASTM A951/A951M.
1. Type: Truss.
2. Material: ASTM A1064/A1064M steel wire, mill galvanized to ASTM A641/A641M, Class 3.
3. Size: 0.1483 inch (3.8 mm) side rods with 0.1483 inch (3.8 mm) cross rods; width as required to provide not less than 5/8 inch (16 mm) of mortar coverage on each exposure.

F. Exterior Adjustable Multiple Wythe Joint Reinforcement: Ladder type with adjustable ties or tabs spaced at 16 in on center ASTM A 82 steel wire, hot dip galvanized after fabrication to ASTM A 153/153M, Class B; 0.1483 inch side rods with 0.1483 inch cross rods and adjustable components of 0.1875 inch wire in compliance with ACI 530; width of components as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from each masonry face.
1. Vertical adjustment: Not more than 2 inches.
2. Insulation Clips: Provide clips at tabs or ties designed to secure insulation against outer face of inner wythe of masonry.

G. Exterior Cavity Wall Multiple Wythe reinforcement: Contractor choice of Exterior Multiple Wythe joint reinforcing or Exterior Adjustable Multiple Wythe Joint Reinforcing placed at 16 inches on center and in compliance with ACI 530.1. Where a two piece (eye and pintle) adjustable system is used in the backup wythe, an additional ladder reinforcement is to be added to the face wythe one course above or below the 2 piece system and at 16 inches on center vertically and conforming to the characteristics of single wythe reinforcing.

H. Flexible Anchors: 2-piece anchors that permit differential movement between masonry and building frame, sized to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from masonry face.
   1. Concrete frame: Dovetail anchors of bent steel strap, nominal 1 inch width x 0.06 in thick, with trapezoidal wire ties 0.1875 inch thick, hot dip galvanized to ASTM A 153/A 153M, Class B.
   2. Steel frame: Crimped wire anchors for welding to frame, minimum 0.25 inch thick, with triangular wire ties 0.1875 inch thick, hot dip galvanized to ASTM A 153/A 153M, Class B.

I. Wall Ties: Corrugated formed sheet metal, minimum 7/8 inches x 7 inches x 0.065 inches thick, adjustable hot dip galvanized to ASTM A 153/A 153M, Class B.

J. Masonry Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and structural backup, hot dip galvanized to ASTM A 153/A 153M, Class B.
   1. Anchor plates: Not less than 0.075 inch thick, designed for fastening to structural backup through sheathing by two fasteners; provide design with legs that penetrate sheathing and insulation to provide positive anchorage.
   2. Wire ties: Triangular shape, 0.1875 inch thick.
   3. Vertical adjustment: Not less than 3-1/2 inches.

K. Additional Anchors for Masonry to Structural Steel.
   1. Vertical wide flange column - Flanges parallel to wall:
      a. STRAP-TYPE COLUMN & WALL ANCHOR with CORRUGATED COLUMN ANCHOR WALL TIE: 1/8 inch x 7 inches long x 2 inches wide x 1-1/2 inch fold back with a 5/8 inch wide x 1 inch deep slot starting 1 inch from end. Wall tie 22 gage x 1 inch (25.4 mm) wide x 24 inches (610 mm) long. All components hot dip galvanized to ASTM A 153/A 153M, Class B-2.
   2. Vertical wide flange column - Flanges perpendicular to wall:
      a. TWISTED L-TYPE COLUMN & WALL ANCHOR (left and right) and 190-WT CORRUGATED COLUMN ANCHOR WALL TIE 1/8 inch x 1-1/4 inch wide x length with a 1-1/2 inch fold back with a twist to start length from inside of hook. Wall tie 22 gage x 1 inch wide x 24 inches long. All components shall be hot dip galvanized to ASTM A 153/A 153M, Class B-2.

## 2.5 FLASHINGS

A. Metal Flashing and receivers: As specified in Section 076200.

B. Flexible Flashing and accessories:
   1. Acceptable Products and Manufacturers (Obtain all flashing materials and accessories from a single manufacturer):
      a. Illinois Products Corp: IPCO Flashing; www.illinoisproducts.com.
      b. Dur-O-Wal, Inc.: Dur-O-Barrier-44 Wall Flashing; www.dur-o-wal.com.
      c. Grace Construction Products: Perm-A-Barrier Wall Flashing; www.na.graceconstruction.com
      d. Hyload Inc.; www.hyload.com
      e. Substitutions not permitted.
   2. Wall Flashing: Consisting of minimum 26 mils of self-adhering rubberized asphalt waterproofing laminated to a 4 mil high density, cross-laminated polyethylene film. Provide a release paper to protect rubberized asphalt surface prior to installation.
   3. Flashing End Dams: Preformed unit consisting of minimum 36 mils of self-adhering rubberized asphalt waterproofing laminated to a 4-mil high density, cross-laminated polyethylene film with 8-inch high legs (16 inch high legs if mortar net is used). Provide a release paper to protect rubberized asphalt surface prior to installation.

4. Inside and Outside Flashing Corners: Preformed unit consisting of minimum 36 mils of self-adhering rubberized asphalt waterproofing laminated to a 4-mil high density, cross laminated polyethylene film with 8-inch high legs (16 inch high legs if mortar net is used). Provide a release paper to protect rubberized asphalt prior to installation.
5. Level Change: Preformed unit consisting of minimum 36 mils of self-adhering rubberized asphalt waterproofing laminated to a 4-mil high density, cross laminated polyethylene film with 8-inch high legs (16 inch high legs if mortar net is used). Provide a release paper to protect rubberized asphalt prior to installation.
6. Flashing Primer / Substrate cleaner: Liquid; brush or roller applied; by same manufacturer as flashing.
7. Metal Drip Edge: 2-inch wide x 0.015-inch thick stainless steel strip with preformed drip and hemmed edge (1/4-inch drip at 45 degree angle) for all supported conditions.
8. Metal Drip edge preformed corners for 2-inch wide drip: same material as drip edge and as provided by drip edge manufacturer.
9. Metal Drip Edge: 6-inch wide x 0.015-inch thick stainless steel strip with preformed drip and hemmed edge (1/4-inch drip at 45 degree angle) for wherever flashing is unsupported across air space.
10. Metal Drip edge preformed corners for 6-inch wide drip: same material as drip edge and as provided by drip edge manufacturer.
11. Sealant for bedding drip edge: One component gun grade polyurethane sealant as specified in 07900.
12. Sealant for flashing edges corners and seams: mastic sealant as recommended by flashing Manufacturer and Compatible with flashing material.
13. Termination Bar 1/8 inches x 1 inch stainless steel with sealant ledge and predrilled pilot holes at 12 inches o.c
    a. Expansion anchors for termination bar: Material compatible with termination bar that will not cause galvanic action.

## 2.6 LINTELS

A. Brickwork Support System: Offset steel relief angles or lintels with hanger brackets for support of brickwork above horizontal masonry joints and openings to allow insulation to span continuously behind brick and eliminate continuous thermal bridges associated with support systems that interrupt continuous insulation.

## 2.7 BOARD INSULATION

A. Rigid Insulation for Cavity Walls: As specified in Section 072113.

## 2.8 ACCESSORIES

A. Rigid insulation adhesive: as specified in section 072113.
B. Preformed Control Joints: Polyvinyl chloride material meeting ASTM D 2287 with a durometer hardness minimum of 80 when tested in conformance with ASTM D-2240. Provide with corner and tee accessories, fused joints.
    1. Manufacturers:
        a. Illinois Products Corp.; www.illinoisproducts.com.
        b. Dur-O-Wal Inc.;www.dur-o-wal.com.
        c. Heckmann Building Products, Inc; www.heckmannbuildingprods.com.
        d. Hohmann & Barnard, Inc; www.h-b.com.
        e. Substitutions: See Section 016000 - Product Requirements.
C. Frame installation contractor to provide bitumastic coating for all exterior door frames for the entire length of the frame prior to frame installation.
D. Joint Filler: Closed cell polyvinyl chloride; meeting ASTM D 1667 Type VE-41; oversized 50 percent to joint width; self expanding; 3 and 6 inch wide x maximum lengths available.
    1. Manufacturers:
        a. Illinois Products Corp.; www.illinoisproducts.com.
        b. Dur-O-Wal Inc.;www.dur-o-wal.com.

c. Heckmann Building Products, Inc; www.heckmannbuildingprods.com.
d. Hohmann & Barnard, Inc; www.h-b.com.
e. Substitutions: See Section 016000 - Product Requirements.

E. Weep/Cavity/Cell Vents: Molded PVC grilles, insect resistant.
1. Manufacturers:
a. Illinois Products Corp.; www.illinoisproducts.com.
b. Dur-O-Wal Inc.;www.dur-o-wal.com.
c. Heckmann Building Products, Inc; www.heckmannbuildingprods.com.
d. Hohmann & Barnard, Inc; www.h-b.com.
e. Substitutions: See Section 016000 - Product Requirements.

F. Cavity Drip/Insulation Retaining Ring: Molded PVC grilles, insect resistant. PVC clip-type retainer for rigid board insulation; attaches to loop wires on horizontal joint reinforcement
1. Manufacturers:
a. Illinois Products Corp.; www.illinoisproducts.com.
b. Dur-O-Wal Inc.;www.dur-o-wal.com.
c. Heckmann Building Products, Inc; www.heckmannbuildingprods.com.
d. Hohmann & Barnard, Inc; www.h-b.com.
e. Substitutions: See Section 016000 - Product Requirements.

G. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

H. Beam and Column Isolation Wrap: Contractor choice of closed cell Expanded Polyethylene, closed cell Neoprene or closed cell PVC. Minimum of ½ inch thick, continuous wrap provided in largest sheets available.
1. Expanded Polyethylene:
a. Structure: Closed cell
b. Density: 1.5
c. Compression Deflection (Force to compress 75% of original) (PSI at 25%): 6
d. Water Absorption (% by Volume): 0.5
e. Applicable Standard: ASTM D 1056 / D 624 / C 272
2. Neoprene:
a. Structure: Closed cell
b. Density: 8 to 12
c. Compression Deflection (Force to compress 75% of original)(PSI at 25%):2-5
d. Applicable Standard: ASTM D 1056
3. PVC:
a. Structure: Closed cell
b. Density: 3 to 5
c. Compression Deflection (Force to compress 75% of original)(PSI at 25%): 12.5
d. Applicable Standard: ASTM D 1667

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive masonry.
B. Verify that related items provided under other sections are properly sized and located.
C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

### 3.2 PREPARATION

A. Wetting of Brick: Wet brick prior to laying if the initial rate of absorption exceeds 30 g/30 sq. in. (g/194 sq. cm) per minute when tested per ASTM C 67. Allow units to absorb the water so they are damp but not wet at the time of laying.
B. Determine any adjustments in mortar mix to accommodate brick absorption and weather conditions necessary to produce appropriate bond to brick and to insure water-resistive wall construction.

C. Install and coordinate placement of metal anchors supplied for securing materials of other sections type, size, finish and spacing as indicated in the drawings and as required by ACI 530.
D. Determine requirements for temporary bracing of walls which require bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.
E. Consult and coordinate masonry work with other crafts to avoid future cutting and patching.
F. Provide column isolation wrap at all intersections of steel and masonry unless otherwise noted.

## 3.3 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.
B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
C. Concrete Masonry Units:
   1. Bond: Running.
   2. Coursing: One unit and one mortar joint to equal 8 inches.
   3. Mortar Joints: Concave at all locations unless otherwise noted.
D. Brick Units:
   1. Bond: Running.
   2. Coursing: Three units and three mortar joints to equal 8 inches for standard and modular size brick.
   3. Mortar Joints: Concave.

## 3.4 PLACING AND BONDING

A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
B. Provide cleanouts minimum 8 inches long and 1 brick high, 24 inches on center in the course immediately above any flashing.
C. Lay hollow masonry units with full face shell bedding on head and bed joints.
D. Lay first course of all masonry above steel and concrete surfaces in full bed of mortar.
E. Lay all concrete masonry units dry.
F. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
G. Remove excess mortar as work progresses.
H. Interlock intersections and external corners, except for units laid in stack bond.
I. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
J. Do not use broken, chipped or cracked units where exposed to view.
K. Where necessary to stop off a horizontal run of masonry, rack back one-half block length or one half brick length in each course. Toothing is not permitted,
L. Where fresh masonry joints partially or totally set masonry, clean exposed surface of set material and remove loose mortar and foreign material prior to laying fresh masonry.
M. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
N. Fill mortar joints flush where wall tile or resilient base is scheduled. All other joints shall be tooled as scheduled above in coursing.
O. Isolate interior masonry partitions from vertical structural framing members and exterior walls with open one-half inch joint with joint filler. Maintain continuous joint reinforcement through installation.
P. Isolate masonry partitions from vertical structural framing members with a control joint.
Q. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible filler.
R. Extend and anchor all masonry walls to underside of floors, beams or roof structure, unless otherwise indicated.
S. Brick up solid wherever beams bear on masonry, except where otherwise indicated.

T. Provide soft joints at all dissimilar materials. Rake back mortar at dissimilar materials to provide sufficient width to depth ratio for soft joint. Provide backer rod or bond breaker tape and sealant as specified in Section 079200 - Joint Sealers

**3.5 CLEANOUTS**

A. Provide cleanouts in exterior masonry wythes in every course immediately above through wall flashings.
   1. Cleanouts are to occur every third brick horizontally for exterior brick wythes.
   2. Cleanouts are to occur every second block horizontally for exterior CMU wythes.

**3.6 WEEPS (CELL VENTS)**

A. Install weeps in cavity walls at 24 inches on center horizontally immediately above through-wall flashings for brick.
B. Install weeps in cavity walls at 32 inches on center horizontally immediately above through-wall flashings for CMU.
C. Install cell vents at head joints per manufacturer recommendations.

**3.7 CAVITY WALL**

A. Do not permit mortar to accumulate in cavity, at lintel locations, or at the bottom of cavity air space.
   1. Maintain cavity free from mortar droppings and other obstructions by utilizing one of the following:
      a. Provide daily monitoring of cleanouts and remove excess material to eliminate mortar dropping buildup.
      b. Provide pull up board in cavity to prevent mortar droppings in cavity when workmanship alone does not prevent mortar droppings.
      c. Provide cavity drainage board complying with no interior water intrusion when tested in accordance with ASTM E514.
B. Build inner wythe ahead of outer wythe to receive cavity insulation and air/vapor barrier materials.
C. Install rigid insulation in accordance with Section 072113.
   1. Assure continuous positive bonding with backup wall. Do not allow insulation to reduce cavity space.
D. Fill in cleanouts and install weeps at brick and/or CMU units at cleanout locations when approved by Architect. Mortar color shall match surrounding units to the satisfaction of the Architect. Repoint as required to obtain proper color.

**3.8 REINFORCEMENT AND ANCHORAGE – GENERAL**

A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.
B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
C. Place continuous joint reinforcement in first and second joint below top of walls.
D. Lap joint reinforcement ends minimum 6 inches.
E. Reinforce stack bonded unit joint corners and intersections with strap anchors 16 inches on center.
F. For exterior multiple wythe systems, reinforce stack bonded brick and concrete masonry units of any configuration with an additional layer of horizontal reinforcing within the outer wythe. Install at 16 inches on center vertically and alternate with cross wythe reinforcing.
G. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Unless otherwise indicated on drawings or closer spacing is indicated under specific wall type, space anchors at maximum of 36 inches horizontally and 24 inches vertically.

### 3.9 REINFORCEMENT AND ANCHORAGE - SINGLE WYTHE MASONRY

A. Install horizontal joint reinforcement 16 inches on center.
B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
C. Place continuous joint reinforcement in first and second joint below top of walls.
D. Lap joint reinforcement ends minimum 6 inches.
E. Do not continue horizontal joint reinforcement through control and expansion joints.
F. Reinforce stack bonded unit joint corners and intersections with strap anchors 16 inches on center.
G. Secure wall to decking above as shown on drawings to guard against lateral movement.

### 3.10 REINFORCEMENT AND ANCHORAGES - CAVITY WALL MASONRY

A. Install horizontal joint reinforcement 16 inches on center.
B. Place masonry joint reinforcement in first and second horizontal joints above openings and the second horizontal joint below openings unless otherwise indicated on drawings. Extend minimum 16 inches each side of openings.
C. Place continuous joint reinforcement in first and second joint below top of walls.
D. All masonry wythes are to have continuous horizontal joint reinforcing at 16 inches on center vertically. Where a two piece (eye and pintle) system is used in the backup wythe an additional ladder reinforcement is to be added to the face wythe one course above or below the 2 piece system 16 inches on center vertically.
E. For exterior multiple wythe systems, reinforce stack bonded brick and concrete masonry units of any configuration with an additional layer of horizontal reinforcing within the outer wythe. Install at 16 inches on center vertically and alternate with cross wythe reinforcing.
F. Provide continuity at corners and wall intersections by using prefabricated "L" and "T" sections. Cut and bend reinforcement units as directed by the manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures and other similar special conditions where continuity of reinforcement is interrupted.
G. Lap joint reinforcement ends minimum 6 inches.
H. Do not continue horizontal joint reinforcement through control and expansion joints.
I. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Space anchors at maximum of 24 inches horizontally and 24 inches vertically.
J. Reinforce stack bonded unit joint corners and intersections with strap anchors 16 inches on center.
K. Provide adjustable wall ties for exterior masonry over steel stud framing, corrugated wall ties are not permitted.
L. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Unless otherwise indicated on drawings or closer spacing is indicated under specific wall type, space anchors at maximum of 24 inches horizontally and 24 inches vertically.
M. Masonry Back-Up: Embed anchors in masonry back-up to bond veneer at maximum 1.77 sq ft of wall surface per anchor. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 16 on center.
N. Stud back-Up: Secure adjustable veneer anchors to stud framed back-up and embed into masonry veneer at maximum 1.77 sq ft of wall surface per anchor. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 16 on center.
O. Reinforce concrete masonry units of walls and partitions with deformed steel bars as indicated on the drawings.
P. Support and secure reinforcing bars from displacement. Maintain position within tolerances specified by ACI 530.1.
Q. Lap reinforcing bars splices minimum 48 bar diameters.

## 3.11 REINFORCEMENT AND ANCHORAGES – MULTIPLE WYTHE UNIT MASONRY

A. Install horizontal joint reinforcement 16 inches on center.
B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
C. Place continuous joint reinforcement in first and second joint below top of walls.
D. Lap joint reinforcement ends minimum 6 inches.
E. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Space anchors at maximum of 24 inches horizontally and 24 inches vertically.
F. Reinforce stack bonded unit joint corners and intersections with strap anchors 16 inches on center.

## 3.12 MASONRY FLASHINGS

A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
    1. Extend flashings full width at such interruptions and at least 4 inches into adjacent masonry and turn up at least 8 inches to form watertight pan at non-masonry construction. Turn flashing up 16 inches where mortar net is used.
    2. Provide prefabricated end dams at the extremities of all flashings at, above and below all openings except at changes in foundation or brick ledge level.
    3. Provide prefabricated flashing corners and elevation changes at all corners and changes in elevation where flashing is shown or required by this Specification.
    4. Provide stainless steel drip edge for all flashing and extend 1/4-inch beyond the vertical face of the masonry and lap 2 inches at flashing joints. Crimp or hem all exposed edges of drip edge to eliminate sharp edge prior to installation.
    5. Install all rigid flashing receivers as specified in Section 076200.
    6. Remove or cover protrusions or sharp edges that could puncture flashings.
B. Installation of Flexible Flashing:
    1. Extend flashing a minimum of 8 inches vertically and return into mortar joint for full width of face shell.
    2. Clean surface of the wall which is to receive the adhesive side of the flexible flashing material. Maintain surface free of dust, dirt, protrusions, and all foreign materials that would impair the bonding of the flexible flashing to the masonry. Allow surface of the wall to dry. Apply the specified flashing primer to all contact surfaces to receive wall flashing. Ensure that flashing material adheres directly to the surface of the wall and the drip edge and is free of void pockets.
    3. Install metal drip edge with a gun-grade sealant on the edges of the masonry foundation wall or structural steel. Extend the bent portion of the drip 1/4-inch beyond the face of the masonry. Maintain straight even length projections.
    4. Install flashing boots and end dams by removing the release paper and setting the items in place. Field trim ends as required to work with face wythe materials.
    5. Install the flashing over the metal drip edge and recess 1/4-inch from the vertical face of the masonry wall. Overlap the flashing segments and any flashing boots and end dams a minimum of 4 inches and install in a manner to direct the flow of water to the exterior and weepholes. Place a bead of sealant along the edge of all overlaps.
    6. Do not apply flexible flashing materials when the ambient temperature is below 25 degrees F. Do not allow flexible flashing materials to be exposed to direct sunlight for more than 30 days.
    7. Provide wide drip edge flashing wherever membrane flashing is unsupported across air space.
    8. Where counter-flashing receiver is required per drawings, install material provided by others.
    9. Provide termination bar with continuous sealant cap wherever top of flashing is not anchored in mortar joint. Provide a bead of sealant along the underside top edge of the flashing to ensure it does not start to peel away from the backup wall.

10. Protect flashing from UV exposure: Provide Manufacturer approved protection for all flashing that may be exposed to UV radiation for a period of 30 days or more. For materials that have been exposed to UV radiation for more than 30 days, provide Manufacturer's written inspection report and approval that the materials in place will perform as intended. All materials not passing this inspection shall be removed and replaced at no additional cost to the Owner.
11. Seal lapped ends and penetrations of flashing a minimum of 6 inches and seal watertight with mastic before covering with mortar.
12. Extend flexible flashings to within 1/4 inch of exterior face of masonry

**3.13 LINTELS**

A. Install loose steel lintels over openings.
   1. Connect lintel to bearing plate where indicated.
   2. Build masonry tight to all encased surfaces of lintels.
B. Install reinforced unit masonry lintels over openings where steel or pre-cast concrete lintels are not scheduled.
   1. Openings to 42 inches: Place two, No. 5 reinforcing bars 1 inch from bottom web.
   2. Do not splice reinforcing bars.
   3. Allow masonry lintels to attain specified strength before removing temporary supports.
C. Maintain minimum 8 inch bearing on each side of opening.
D. Install thermal brick support system in accordance with manufacturer’s instructions at locations indicated on drawings.

**3.14 GROUTED COMPONENTS**

A. Reinforce bond beams with 2, No. 5 bars, 1 inch from bottom web, unless indicated otherwise.
B. Lap splices minimum 48 bar diameters. No lap splices are permitted in bond beams over masonry openings.
C. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
D. Place and consolidate grout fill without displacing reinforcing.
E. At bearing locations, fill masonry cores with grout for a minimum 2 courses below and 24 inches horizontally for lintels and 3 courses below and 24 inches horizontally for beams unless noted otherwise on drawings.

**3.15 CONTROL AND EXPANSION JOINTS**

A. Do not continue horizontal joint reinforcement through control and expansion joints.
B. Form all Control Joints with Jamb blocks.
C. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
D. Control joints shall align with wall discontinuities such as window and door jambs.
E. Size control joint in accordance with Section 079200 for sealant performance.
F. Control and Expansion joints are to be spaced no more than 20 feet apart; and must be within 2 feet of one side of exterior building corners; AS INDICATED ON DRAWINGS. In the absence of indications on drawings, the Contractor shall contact the Architect in writing for direction as to where to place the joints prior to proceeding with the work of this section. Any masonry engaged by the contractor without such notification shall be repaired by the Contractor at no cost to the Owner and as directed by the Architect.

## 3.16 BUILT-IN WORK

A. As work progresses, install built-in metal door frames, glazed frames, window frames, and anchor bolts and other items to be built into the work and furnished under other sections. Frame installing contractor shall coat inside of frames to be installed in masonry or to be grouted, with bituminous coating prior to installation as noted. Apply wet to 18.0 mils (450 microns) in one or two coats. Total dry film thickness of not less than 12 mils (300 microns) or in excess of 30 mils.
B. Install built-in items plumb, level, and true to line.
C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame jamb voids solid with grout.
   1. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.
D. Grout all spaces around built-in items solid
E. Do not build into masonry construction organic materials that are subject to deterioration.

## 3.17 TOLERANCES

A. Construct unit masonry assemblies in strict accordance with ACI 530.1, but not less than tolerances below.
B. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.
C. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.
D. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
E. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
F. Maximum Variation of Joint Thickness: 1/8 inch in 3 ft.
G. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.
H. Install masonry within the site tolerances found in TMS 402/602.

## 3.18 CUTTING AND FITTING

A. Cut and fit for chases. Coordinate with other sections of work to provide correct size, shape, and location.
B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

## 3.19 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 014000.
B. Concrete Masonry Unit Tests: Test each variety of concrete unit masonry in accordance with ASTM C140/C140M for compliance with requirements of this specification.
C. Mortar Tests: Test each type of mortar in accordance with ASTM C780, testing with same frequency as masonry samples.

## 3.20 CLEANING

A. Remove excess mortar and mortar smears as work progresses.
B. Replace defective or discolored mortar. Match adjacent work.
C. Clean soiled surfaces with cleaning solution.
D. Replace chipped or broken units where exposed to view.
E. Use non-metallic tools in cleaning operations.

## 3.21 PROTECTION OF FINISHED WORK

A. Without damaging completed work, provide protective boards at exposed external corners, which are subject to damage by construction activities and maintain until substantial completion of masonry.

**END OF SECTION**

**SECTION 047200**

**ARCHITECTURAL CAST STONE**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Architectural cast stone.
B. Units required are indicated on the drawings as “cast stone”.

### 1.2 RELATED SECTIONS
A. Section 042000 - Unit Masonry Assemblies: Installation of cast stone in conjunction with masonry.
B. Section 079200 - Joint Sealers: Materials and execution methods for sealing soft joints in cast stone work.

### 1.3 REFERENCES
A. Unless otherwise noted the most current issue of the reference shall be used.
B. ACI 318 - Building Code Requirements for Reinforced Concrete.
C. ASTM A 185 - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
D. ASTM A 615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
E. ASTM C 33 – Standard Specification for Concrete Aggregates.
F. ASTM C 150 – Standard Specification for Portland Cement.
G. ASTM C 270 – Standard Specification for Mortar for Unit Masonry.
H. ASTM C 494/C 494M - Standard Specification for Chemical Admixtures for Concrete.
I. ASTM C 642 – Standard Test Method for Density, Absorption, and Voids in Hardened Concrete.
J. ASTM C 979 - Standard Specification for Pigments for Integrally Colored Concrete.
K. ASTM C 1364 – Standard Specification for Architectural Cast Stone.

### 1.4 SUBMITTALS
A. See Section 013300 - Administrative Requirements, for submittal procedures.
B. Manufacturer's Qualification Data: Documentation showing compliance with specified requirements.
C. Product Data: Test results of cast stone components made previously by the manufacturer.
   1. Include one copy of ASTM C 1364 for Architect’s use.
D. Shop Drawings: Include building elevations and plans showing the exact location of each cast stone piece. Drawings shall show the exposed faces, sections, dimensions, arrangement of joints, anchoring methods, type of anchors, and piece numbers and location of anchors, section cuts, joint, and finish details.
   1. Manufacturer is responsible for design of all connections.
E. Verification Samples: Pieces of actual cast stone components not less than 12 inches square, illustrating range of color and texture to be anticipated in components furnished for the project.
F. Provide Mortar Color Selection Samples.

### 1.5 QUALITY ASSURANCE
A. Design anchors and supports under direct supervision of a Professional Structural Engineer, registered in the State in which the Project is located.
   1. Design anchors to resist positive and negative wind pressures and other loads as required by applicable code.
   2. Design anchor attachment to stone with a factor of safety of 5:1.
   3. Design each individual anchor with a factor of safety in the vertical dead-load-bearing direction of 4:1 and in the horizontal lateral-load-bearing direction of 2:1.
B. Manufacturer Qualifications: A current producer member of the Cast Stone Institute with a minimum of 5 years of experience in producing cast stone of the types required for project and:
   1. Adequate plant capacity to furnish quality, sizes, and quantity of cast stone required without delaying progress of the work.
   2. Products previously produced by plant and exposed to weather that exhibit satisfactory appearance.

C. Mock-Up: Provide full size cast stone components for installation in mock-up of exterior wall.
   1. Approved mock-up will become standard for appearance and workmanship.
   2. Mock-up may not remain as part of the completed work.
   3. Remove mock-up not incorporated into the work and dispose of debris.

### 1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver cast stone components secured to shipping pallets and protected from damage and discoloration. Protect corners from damage.
B. Number each piece individually to match shop drawings and schedule.
C. Store cast stone components and installation materials in accordance with manufacturer's instructions.
D. Store cast stone components on pallets with nonstaining, waterproof covers. Ventilate under covers to prevent condensation. Prevent contact with dirt.
E. Protect cast stone components during handling and installation to prevent chipping, cracking, or other damage.
F. Store mortar materials where contamination can be avoided.
G. Schedule and coordinate production and delivery of cast stone components with unit masonry work to optimize on-site inventory and to avoid delaying the work.

## PART 2 – PRODUCTS

### 2.1 MANUFACTURERS

A. Architectural Cast Stone:
   1. Any current producer member of the Cast Stone Institute.
   2. American Artstone Co., Inc., New Ulm, MN.
   3. Architectural Ornaments, Inc., Kansas City, MO.
   4. Edwards Cast Stone Company, Dubuque, IA.

### 2.2 ARCHITECTURAL CAST STONE

A. Cast Stone: Architectural concrete product manufactured to simulate appearance of natural limestone, complying with ASTM C 1364.
   1. Compressive Strength: As specified in ASTM C 1364; calculate strength of pieces to be field cut at 80 percent of uncut piece.
   2. Freeze-Thaw Resistance: Demonstrated by laboratory testing in accordance with ASTM C 1364.
   3. Absorption: ASTM C 1195 or ASTM C 642: 6 % maximum for products at 28 days.
   4. Surface Texture: Medium grained texture, with no bugholes, air voids, or other surface blemishes visible from distance of 20 feet.
   5. Color: Match sample on file at Architect's office.
   6. Remove cement film from exposed surfaces before packaging for shipment.
B. Shapes: Provide shapes indicated on drawings.
   1. Variation from Any Dimension, Including Bow, Camber, and Twist: Maximum of plus/minus 1/8 inch or length divided by 360, whichever is greater, but not more than 1/4 inch.
   2. Unless otherwise indicated on drawings, provide:
      a. Wash or slope of 1:12 on exterior horizontal surfaces.
      b. Drips on projecting components, wherever possible.
      c. Raised fillets at back of sills and at ends to be built in.
C. Reinforcement: Provide reinforcement as required to withstand handling and structural stresses; comply with ACI 318.

### 2.3 MATERIALS

A. Portland Cement: ASTM C 150.
   1. For Units: Type I, white or gray as required to match Architect 's sample.
   2. For Mortar: Type I or II, except Type III may be used in cold weather.

B. Coarse Aggregate: ASTM C 33, except for gradation; granite, quartz, or limestone.
C. Fine Aggregate: ASTM C 33, except for gradation; natural or manufactured sands.
D. Pigments: ASTM C 979, inorganic iron oxides; do not use carbon black.
E. Admixtures: ASTM C 494/C 494M.
F. Water: Potable.
G. Reinforcing Bars: ASTM A 615/A 615M deformed bars, galvanized.
H. Steel Welded Wire Reinforcement: ASTM A 185, galvanized.
I. Embedded Anchors, Dowels, and Inserts: Type 304 stainless steel, of type and size as required for conditions.
J. Mortar: Portland cement-lime, ASTM C 270, Type N; do not use masonry cement.
K. Sealant: As specified in Section 079200.
L. Cleaner: General-purpose cleaner designed for removing mortar and grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces; approved for intended use by cast stone manufacturer and by cleaner manufacturer for use on cast stone and adjacent masonry materials.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. Examine construction to receive cast stone components. Notify Architect if construction is not acceptable.
B. Do not begin installation until unacceptable conditions have been corrected.

### 3.2 INSTALLATION

A. Install cast stone components in conjunction with masonry, complying with requirements of Section 042000.
B. Mechanically anchor cast stone units indicated; set remainder in mortar.
C. Setting:
    1. Drench cast stone components with clear, running water immediately before installation.
    2. Set units in a full bed of mortar unless otherwise detailed.
    3. Fill vertical joints with mortar.
    4. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.
D. Joints: Make all joints 3/8 inch, except as otherwise detailed.
    1. Rake mortar joints 3/4 inch for pointing. Scrub face of each stone to remove excess mortar before it sets.
    2. Point joints with mortar in layers 3/8 inch thick and tool to a slight concave profile.
    3. Rake the following mortar joints for sealant. Scrub face of each stone to remove excess mortar before it sets.
        a. Head joints in top courses, including copings, parapets, cornices, sills, and steps.
        b. Joints in projecting units.
        c. Joints between rigidly anchored units, including soffits, panels, and column covers.
        d. Joints below lugged sills and stair treads.
        e. Joints below ledge and relieving angles.
        f. Joints labeled "expansion joint".
E. Sealant Joints: Install backer rods and sealants as specified in Section 079200.
    1. Prime cast stone in areas to receive sealant and backer rod; in accordance with sealant manufacturer's and cast stone manufacturer's recommendations.
F. Installation Tolerances:
    1. Variation from Plumb: Not more than 1/8 inch in 10 feet or 1/4 inch in 20 feet or more.
    2. Variation from Level: Not more than 1/8 inch in 10 feet or 1/4 inch in 20 feet, or 3/8 inch maximum.
    3. Variation in Joint Width: Not more than 1/8 inch in 36 inches or 1/4 of nominal joint width, whichever is less.

4. Variation in Plane Between Adjacent Surfaces (Lipping): Not more than 1/16 inch difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.

## 3.3 CLEANING AND PROTECTION

A. Repair chips and other surface damage noticeable when viewed in direct daylight at 10 feet.
   1. Repair with matching touchup material provided by the manufacturer and in accordance with manufacturer's instructions.
   2. Repair methods and results subject to Architect's approval.
B. Clean cast stone components as work progresses; remove mortar fins and smears before tooling joints.
C. Clean exposed cast stone after mortar is thoroughly set and cured.
   1. Wet surfaces with water before applying cleaner.
   2. Apply cleaner to cast stone in accordance with manufacturer’s instructions.
   3. Remove cleaner promptly by rinsing thoroughly with clear water.
   4. Do not use acidic cleaners.
D. Protect from splashing by mortar and other damage.

**END OF SECTION**

**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. Section Includes:
   1. Structural steel.
   2. Grout.
B. Related Sections:
   1. Division 01 Section "Quality Requirements" for independent testing agency procedures and administrative requirements.
   2. Division 05 Section "Metal Fabrications" for steel lintels and shelf angles not attached to structural-steel frame, miscellaneous steel fabrications and other metal items not defined as structural steel.

### 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."

### 1.4 PERFORMANCE REQUIREMENTS

A. Connections: Provide details of simple shear 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 AISC 360.
   2. Use ASD; data are given at service-load level.
B. Construction: Combined system of moment frame and shear walls.

### 1.5 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.
C. Mill test reports for structural steel, including chemical and physical properties.
D. Product Test Reports: For the following:
   1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
   2. Tension-control, high-strength bolt-nut-washer assemblies.
   3. Shop primers.
   4. Nonshrink grout.
E. Source quality-control reports.

### 1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator with at least five years of documented experience in structural steel projects of a similar size and complexity.
B. Installer Qualifications: A qualified installer with at least five years of documented experience in structural steel projects of a similar size and complexity.
C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
D. 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 High Strength Bolts."

### 1.7 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 F3125, Grade F1852 fasteners and for retesting fasteners after lubrication.

### 1.8 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. W-Shapes: ASTM A 992/A 992M.

B. Plate and Bar: ASTM A 36/A 36M or ASTM A 572/A 572M, Grade 50 (345) if noted as 50 ksi material.

C. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade C, structural tubing.

D. Welding Electrodes: Comply with AWS requirements.

### 2.2 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM F3125, Grade A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers; all with plain finish.

B. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F3125, Grade F 1852, Type 1, round head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
   1. Finish: Plain.

C. Unheaded Anchor Rods: ASTM F 1554, Grade 36
   1. Configuration: Straight.
   2. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.
   3. Plate Washers: ASTM A 36/A 36M carbon steel.
   4. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.
   5. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

D. Threaded Rods: ASTM A 36/A 36M.
   1. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.
   2. Washers: ASTM A 36/A 36M carbon steel.
   3. Finish: Mechanically deposited zinc coating, ASTM B 695, Class 50.

## 2.3 PRIMER

A. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

## 2.4 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and non-staining, 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, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. 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 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 High Strength Bolts" for type of bolt and type of joint specified.
   1. Joint Type: Snug tightened unless noted otherwise.

B. Weld Connections: Comply with AWS D1.1/D1.1M 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 (50 mm).
   2. Surfaces to be field welded.
   3. 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 3, "Power Tool Cleaning."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). 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.

## 2.8 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 High Strength 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.

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

## 3.2 PREPARATION

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

## 3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 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.

## 3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using High Strength Bolts" for type of bolt and type of joint specified.
   1. Joint Type: Snug tightened unless otherwise noted.
B. Weld Connections: Comply with AWS D1.1/D1.1M 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 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.
B. Bolted Connections: Bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using High Strength 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. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

## 3.6 REPAIRS AND PROTECTION

A. Touchup Painting: 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.

**END OF SECTION**

**SECTION 053100**

**STEEL DECKING**

## 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 the following:
   1. Roof deck.
B. Related Sections include the following:
   1. Division 05 Section "Structural Steel Framing" for framing deck openings with miscellaneous steel shapes.

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

### 1.4 QUALITY ASSURANCE
A. Testing Agency Qualifications: An independent agency qualified according to ASTM E 329 for testing indicated.
B. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."
C. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

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

## PART 2 – PRODUCTS

### 2.1 MANUFACTURERS
A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Steel Deck:
      a. Canam Steel Corp.;The Canam Manac Group.
      b. New Millennium Building Systems, LLC.
      c. Nucor Corp.; Vulcraft Division.
      d. United Steel Deck, Inc.

### 2.2 ROOF DECK
A. Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 30, and with the following:
   1. Galvanized and Shop-Primed Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33, G60 zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.

a. Color: Manufacturer's standard.
2. Deck Profile: As indicated.
3. Profile Depth: As indicated.
4. Design Uncoated-Steel Thickness: As indicated.
5. Span Condition: Triple span or more.
6. Side Laps: Overlapped.

## 2.3 ACCESSORIES

A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.
D. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
E. Flat Sump Plate: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field.
F. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight.
G. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

# PART 3 – EXECUTION

## 3.1 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

## 3.2 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 30, manufacturer's written instructions, and requirements in this Section.
B. Locate deck bundles to prevent overloading of supporting members.
C. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
D. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
E. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
F. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
G. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
H. Mechanical fasteners may be used in lieu of welding to fasten deck with written approval of Architect and Structural Engineer. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

## 3.3 ROOF-DECK INSTALLATION

A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches long, and as follows:
1. Weld Diameter: 5/8 inch, nominal.
2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support. Space welds as indicated.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of 1/2 of the span or 36 inches, and as follows:
   1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
   1. End Joints: Lapped 2 inches minimum.
D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and mechanically fasten flanges to top of deck. Space mechanical fasteners not more than 12 inches apart with at least one fastener at each corner.

## 3.4 FIELD QUALITY CONTROL

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

## 3.5 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.
   1. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.
C. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

**END OF SECTION**

**SECTION 054000**

**COLD-FORMED METAL 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 the following:
   1. Exterior load-bearing wall framing.
   2. Interior load-bearing wall framing.
   3. Exterior non-load-bearing wall framing.
   4. Roof rafter framing.

B. Related Sections include the following:
   1. Division 05 Section "Metal Fabrications" for masonry shelf angles and connections.
   2. Division 09 Section "Non-Structural Metal Framing" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.
   3. Division 09 Section "Gypsum Board Shaft Wall Assemblies" for interior non-load-bearing, metal-stud-framed, shaft-wall assemblies.

### 1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.
   1. Design Loads: As indicated.
   2. Deflection Limits: As indicated.
   3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F (67 deg C).
   4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
      a. As indicated.

B. Cold-Formed Steel Framing, General: Design according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions."
   1. Headers: Design according to AISI's "Standard for Cold-Formed Steel Framing - Header Design."
   2. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

### 1.4 SUBMITTALS

A. Product Data: For each type of cold-formed metal framing product and accessory indicated.

B. Shop Drawings: Show layout, spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
   1. For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Welding certificates.

D. Qualification Data: For professional engineer and testing agency.

E. Product Test Reports: From a qualified testing agency, unless otherwise stated, indicating that each of the following complies with requirements, based on evaluation of comprehensive tests for current products:
   1. Steel sheet.
   2. Expansion anchors.

3. Power-actuated anchors.
4. Mechanical fasteners.
5. Vertical deflection clips.
6. Horizontal drift deflection clips
7. Miscellaneous structural clips and accessories.

F. Research/Evaluation Reports: For cold-formed metal framing.

## 1.5 QUALITY ASSURANCE

A. Engineering Responsibility: Preparation of Shop Drawings, design calculations, and other structural data by a qualified professional engineer.
B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent.
C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated.
D. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, ductility, and metallic-coating thickness.
E. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."
F. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."
   1. Comply with AISI's "Standard for Cold-Formed Steel Framing - Truss Design."
   2. Comply with AISI's "Standard for Cold-Formed Steel Framing - Header Design."

## 1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.
B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

# PART 2 – PRODUCTS

## 2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering cold-formed metal framing that may be incorporated into the Work include, but are not limited to, the following:
B. Manufacturers: Subject to compliance with requirements, provide cold-formed metal framing by one of the following:
   1. Allied Studco.
   2. AllSteel Products, Inc.
   3. California Expanded Metal Products Company.
   4. Clark Steel Framing.
   5. Consolidated Fabricators Corp.; Building Products Division.
   6. Craco Metals Manufacturing, LLC.
   7. Custom Stud, Inc.
   8. Dale/Incor.
   9. Design Shapes in Steel.
   10. Dietrich Metal Framing; a Worthington Industries Company.
   11. Formetal Co. Inc. (The).
   12. Innovative Steel Systems.

13. MarinoWare; a division of Ware Industries.
14. Quail Run Building Materials, Inc.
15. SCAFCO Corporation.
16. Southeastern Stud & Components, Inc.
17. Steel Construction Systems.
18. Steeler, Inc.
19. Super Stud Building Products, Inc.
20. United Metal Products, Inc.
21. Substitutions: Refer to section 016000 for product requirements.

## 2.2 MATERIALS

A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
   1. Grade: As required by structural performance.
   2. Coating: As indicated on the structural drawings.
B. Steel Sheet for Vertical Deflection and Drift Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:
   1. Grade: As required by structural performance.
   2. Coating: G90 (Z275).

## 2.3 LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
   1. Minimum Base-Metal Thickness: As indicated on the structural drawings.
   2. Flange Width: As indicated on the structural drawings.
   3. Section Properties: As required by structural performance.
B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and as follows:
   1. Minimum Base-Metal Thickness: As indicated on the structural drawings.
   2. Flange Width: As indicated on the structural drawings.
C. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, punched, with stiffened flanges, and as follows:
   1. Minimum Base-Metal Thickness: As indicated on the structural drawings.
   2. Flange Width: As indicated on the structural drawings.
   3. Section Properties: As required by structural performance.

## 2.4 EXTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
   1. Minimum Base-Metal Thickness: As indicated on the structural drawings.
   2. Flange Width: As indicated on the structural drawings.
   3. Section Properties: As required by structural performance.
B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
   1. Minimum Base-Metal Thickness: As indicated on the structural drawings.
   2. Flange Width: As indicated on the structural drawings.
C. Vertical Deflection Clips: Manufacturer's standard bypass and head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Dietrich Metal Framing; a Worthington Industries Company.

b. MarinoWare, a division of Ware Industries.
c. SCAFCO Corporation
d. The Steel Network, Inc.

D. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure.

## 2.5 ROOF-RAFTER FRAMING

A. Steel Rafters: Manufacturer's standard C-shaped steel sections, of web depths indicated, unpunched, with stiffened flanges, and as follows:
   1. Minimum Base-Metal Thickness: As indicated on the structural drawings.
   2. Flange Width: As indicated on the structural drawings.
   3. Section Properties: As required by structural performance.

B. Built-up Members: Built-up members of manufacturer's standard C-shaped steel section, with stiffened flanges, nested into a U-shaped steel section joist track, with unstiffened flanges; unpunched; of web depths indicated; and as follows:
   1. Minimum Base-Metal Thickness: As indicated on the structural drawings.
   2. Flange Width: As indicated on the structural drawings.

## 2.6 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
   1. Supplementary framing.
   2. Bracing, bridging, and solid blocking.
   3. Web stiffeners.
   4. Anchor clips.
   5. End clips.
   6. Foundation clips.
   7. Gusset plates.
   8. Stud kickers, knee braces, and girts.
   9. Joist hangers and end closures.
   10. Hole reinforcing plates.
   11. Backer plates.

## 2.7 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C mechanically deposition according to ASTM B 695, Class 50.

C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.

E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.
   1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

F. Welding Electrodes: Comply with AWS standards.

## 2.8 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035 ASTM A 780.
B. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
C. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107, with fluid consistency and 30-minute working time.
D. Shims: Load bearing, high-density multimonomer plastic, nonleaching.
E. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

## 2.9 FABRICATION

A. Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
    1. Fabricate framing assemblies using jigs or templates.
    2. Cut framing members by sawing or shearing; do not torch cut.
    3. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
        a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
        b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.
    4. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to Shop Drawings.
B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
    1. Spacing: Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
    2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch (3 mm).

# PART 3 – EXECUTION

## 3.1 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.
    1. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 PREPARATION

A. Install load bearing shims or grout between the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations to ensure a uniform bearing surface on supporting concrete or masonry construction.
B. Install sealer gaskets to isolate the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations.

## 3.3 INSTALLATION, GENERAL

A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.
B. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.
C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
   1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch (1.6 mm).
D. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.
   1. Cut framing members by sawing or shearing; do not torch cut.
   2. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
      a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
      b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.
E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
G. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.
H. Install insulation, specified in Division 07 Section "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
I. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.
J. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
   1. Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

## 3.4 LOAD-BEARING WALL INSTALLATION

A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:
   1. Anchor Spacing: As indicated on structural drawings.
B. Squarely seat studs against top and bottom tracks with gap not exceeding of 1/8 inch (3 mm) between the end of wall framing member and the web of track. Fasten both flanges of studs to top and bottom tracks. Space studs as follows:
   1. Stud Spacing: As indicated.
   2. Stud Spacing: As indicated.
C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar configurations.
D. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.
E. Align floor and roof framing over studs. Where framing cannot be aligned, continuously reinforce track to transfer loads.

F. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.
G. Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.
   1. Frame wall openings with not less than a double stud at each jamb of frame as indicated on Shop Drawings. Fasten jamb members together to uniformly distribute loads.
   2. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.
H. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.
   1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.
I. Install horizontal bridging in stud system, spaced 48 inches (1220 mm). Fasten at each stud intersection.
   1. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of 2 screws into each flange of the clip angle for framing members up to 6 inches (150 mm) deep.
   2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
   3. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
J. Install steel sheet diagonal bracing straps to both stud flanges, terminate at and fasten to reinforced top and bottom tracks. Fasten clip-angle connectors to multiple studs at ends of bracing and anchor to structure.
K. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

## 3.5 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
B. Fasten both flanges of studs to top and bottom track, unless otherwise indicated. Space studs as follows:
   1. Stud Spacing: As indicated.
   2. Stud Spacing: As indicated.
C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
   1. Install single-leg deflection tracks and anchor to building structure.
   2. Install double deep-leg deflection tracks and anchor outer track to building structure.
   3. Connect vertical deflection clips to bypassing infill studs and anchor to building structure.
   4. Connect drift clips to cold formed metal framing and anchor to building structure.
E. Install horizontal bridging in wall studs, spaced in rows indicated on Shop Drawings but not more than 48 inches (1220 mm) apart. Fasten at each stud intersection.
   1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches (305 mm) of single deflection track. Install a combination of flat, taut, steel sheet straps of width and thickness indicated and stud or stud-track solid blocking of width and thickness matching studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
      a. Install solid blocking at centers indicated on Shop Drawings.

2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
3. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
4. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable wall-framing system.

## 3.6 JOIST INSTALLATION

A. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on Shop Drawings.
B. Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.
   1. Install joists over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm).
   2. Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel-stud sections as indicated on Shop Drawings.
C. Space joists not more than 2 inches (51 mm) from abutting walls, and as follows:
   1. Joist Spacing: As indicated.
   2. Joist Spacing: As indicated.
D. Frame openings with built-up joist headers consisting of joist and joist track, nesting joists, or another combination of connected joists if indicated.
E. Install joist reinforcement at interior supports with single, short length of joist section located directly over interior support, with lapped joists of equal length to joist reinforcement, or as indicated on Shop Drawings.
   1. Install web stiffeners to transfer axial loads of walls above.
F. Install bridging at intervals indicated on Shop Drawings. Fasten bridging at each joist intersection as follows:
   1. Bridging: Joist-track solid blocking of width and thickness indicated, secured to joist webs.
   2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and joist-track solid blocking of width and thickness indicated. Fasten flat straps to bottom flange of joists and secure solid blocking to joist webs.
G. Secure joists to load-bearing interior walls to prevent lateral movement of bottom flange.
H. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

## 3.7 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
B. Field and shop welds will be subject to testing and inspecting.
C. Testing agency will report test results promptly and in writing to Contractor and Architect.
D. Remove and replace work where test results indicate that it does not comply with specified requirements.
E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

## 3.8 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

**END OF SECTION**

**SECTION 055000**

**METAL FABRICATIONS**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Shop fabricated steel and aluminum items.
B. Fasteners

### 1.2 RELATED SECTIONS
A. Section 033000 - Cast-In-Place Concrete: Placement of metal fabrications in concrete.
B. Section 042000 - Unit Masonry Assemblies: Placement of metal fabrications in masonry.
C. Section 055133.13 - Metal Stairs and Ladders.
D. Section 099100 - Paints and Coatings: Paint finish.

### 1.3 REFERENCES
A. Unless otherwise noted the most current issue of the reference shall be used.
B. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel.
C. ASTM A 500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
D. ASTM A 563- Standard Specification for Carbon and Alloy Steel Nuts.
E. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws and Studs.
F. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society.
G. AWS D1.1 - Structural Welding Code - Steel; American Welding Society.
H. SSPC-Paint 15 - Steel Joist Shop Primer; Society for Protective Coatings.
I. SSPC-SP 2 - Hand Tool Cleaning; Society for Protective Coatings.

### 1.4 SUBMITTALS
A. See Section 013300 - Administrative Requirements, for submittal procedures.
B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
   1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
C. Welders' Certificates: Submit certification for welders employed on the project, verifying AWS qualification within the previous 12 months.

### 1.5 QUALITY ASSURANCE
A. Design all work under the direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in Illinois.

## PART 2 – PRODUCTS

### 2.1 MATERIALS - STEEL
A. Steel Sections: ASTM A 36/A 36M.
B. Steel Tubing: ASTM A 500, Grade B cold-formed structural tubing.
C. Plates: ASTM 36 / A 36M.
D. Floor plate: ASTM A283 / A 283M
E. Pipe: ASTM A 53/A 53M, Grade B Schedule 40, black finish.
F. Fasteners:
   1. General: Provide type 304 or 316 stainless steel fasteners for exterior use and zinc plated fasteners with coating compliant to ASTM B 633, Class Fe/Zn 5, where built into exterior walls.
   2. Bolts and Nuts: Unless otherwise noted, provide regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 and flat washers where indicated.

3. Anchor Bolts: ASTM F 1554, Grade 36
4. Machine Screws: ASME B18.2.3.8M
5. Lag Bolts: ASME B18.2.1
6. Plain Washers: Round, carbon steel ASME B18.22.1
7. Lock Washers: Helical, spring type, carbon steel, ASME B 18.21.1
8. Expansion Anchors: Alloy group I stainless steel bolts complying with ASTM F 593 and nuts complying with ASTM F 594

G. Bolts, Nuts, and Washers: ASTM A307 grade A with ASTM A563 hex nuts Provide galvanizing to ASTM A 152/A 153M for galvanized components.
H. Welding Materials: AWS D1.1; type required for materials being welded.
I. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
J. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

**2.2 MATERIALS - ALUMINUM**

A. Extruded Aluminum: ASTM B 221 (ASTM B 221M), 6063 alloy, T6 temper.
B. Sheet Aluminum: ASTM B 209 (ASTM B 209M), 5052 alloy, H32 or H22 temper.
C. Aluminum-Alloy Drawn Seamless Tubes: ASTM B 210 (ASTM B 210M), 6063 alloy, T6 temper.
D. Aluminum-Alloy Bars: ASTM B 211 (ASTM B 211M), 6061 alloy, T6 temper.
E. Aluminum-Alloy Sand Castings: ASTM B 26.
F. Aluminum-Alloy Die Castings: ASTM B 85.
G. Bolts, Nuts, and Washers: Stainless steel alloy 304 or 316.
H. Welding Materials: AWS D1.1; type required for materials being welded.

**2.3 FABRICATION**

A. Fit and shop assemble items in largest practical sections, for delivery to site.
B. Fabricate items with joints tightly fitted and secured.
C. Continuously seal joined members by intermittent welds and plastic filler.
D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

**2.4 FABRICATED ITEMS**

A. Ledge Angles, Shelf Angles, Channels, and Plates Not Attached to Structural Steel Framing: For support of metal decking; prime paint finish.
B. Lintels: As detailed; prime paint finish.
C. Bearing and Leveling Plates: As Detailed; Unfinished.
D. Door Frames for Overhead Door Openings, Wall Openings: Channel sections; prime paint finish.
E. Toilet Partition Suspension Members: Steel channel sections; prime paint finish.

**2.5 FINISHES - STEEL**

A. Prime paint all interior steel items. Galvanize and paint all steel exposed to the exterior.
   1. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.
B. Prepare surfaces to be primed in accordance with SSPC-SP2.
C. Clean surfaces of rust, scale, grease, mud and foreign matter prior to finishing.
D. Prime Painting: Two coats.
E. Galvanizing of Steel Members: Galvanize after fabrication to ASTM A 123/A 123M. Provide minimum 1.7 oz/sq ft galvanized coating.
F. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A 123/A 123M requirements.

**2.6 FINISHES - ALUMINUM**

A. Exterior Aluminum Surfaces: Class I color anodized.
B. Interior Aluminum Surfaces: Class I color anodized.
C. Comply with AA DAF-45 for aluminum finishes required.

**2.7 FABRICATION TOLERANCES**

A. Squareness: 1/8 inch maximum difference in diagonal measurements.
B. Maximum Offset Between Faces: 1/16 inch.
C. Maximum Misalignment of Adjacent Members: 1/16 inch.
D. Maximum Bow: 1/8 inch in 48 inches.
E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

## PART 3 – EXECUTION

**3.1 EXAMINATION**

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

**3.2 PREPARATION**

A. Clean and strip primed steel items to bare metal where site welding is required.
B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.
C. Coordinate the installation of all items in this section with other trades as required.

**3.3 INSTALLATION**

A. Install items plumb and level, accurately fitted, free from distortion or defects.
B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
C. Field weld components indicated on drawings.
D. Perform field welding in accordance with AWS D1.1.
E. Obtain approval prior to site cutting or making adjustments not scheduled.
F. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

**3.4 ERECTION TOLERANCES**

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
B. Maximum Offset From True Alignment: 1/4 inch.
C. Maximum Out-of-Position: 1/4 inch.

**END OF SECTION**

**SECTION 055133.13**

**METAL STAIRS AND LADDERS**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Aluminum Fixed Vertical Ladders.

### 1.2 RELATED SECTIONS
A. Section 051200 - Structural Steel: Roof structure and opening support.
B. Section 055500 - Metal Fabrications: Miscellaneous metal supports.
C. Section 061000 - Rough Carpentry: Roof framing and opening support.
D. Section 075323 – Single Ply Roofing – Fully Adhered EPDM.

### 1.3 REFERENCES
A. ANSI A14.3 : Ladders - Fixed - Safety Requirements.
B. OSHA 1910.23: Ladders.
C. OSHA 1910.28: Duty to have fall protection and falling object protection.
D. OSHA 1910.29: Fall protection systems and falling object protection-criteria and practices.

### 1.4 SUBMITTALS
A. Submit under provisions of Section 016000.
B. Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
C. Shop Drawings for Ladders:
   1. Plan and section of ladder installation.

### 1.5 DELIVERY, STORAGE, AND HANDLING
A. Store products in manufacturer's unopened packaging until ready for installation.
B. Store products until installation inside under cover. If stored outside, under a tarp or suitable cover.

### 1.6 WARRANTY
A. Limited Warranty: Five years against defective material and workmanship, covering parts only, no labor or freight. Defective parts, if deemed so by the manufacturer, will be replaced at no charge, freight excluded, upon inspection at manufacturer's plant which warrants same.

## PART 2 – PRODUCTS

### 2.1 MANUFACTURERS
A. Manufacturer: Precision Ladders, LLC, which is located at: P. O. Box 2279 ; Morristown, TN 37816-2279; Toll Free Tel: 800-225-7814; Tel: 423-586-2265; Email: info@PrecisionLadders.com; Web: www.PrecisionLadders.com
B. Requests for substitutions will be considered in accordance with provisions of Section 016000.

### 2.2 ALUMINUM FIXED VERTICAL LADDER
A. Aluminum Fixed Vertical Ladder and Components: Ladder, walk-thru, side rails, rest platforms, floor mounting brackets, security doors, security gates and finishes.
   1. Model: Model FL -*** (***= vertical height in inches) Aluminum Fixed Vertical Ladder as manufactured by Precision Ladders LLC.
   2. Capacity: Unit shall support a 1,500 lb (680 kg) loading without failure.
   3. Performance Standard: Units designed and manufactured to meet or exceed ANSI A14.3, OSHA 1910.23, OSHA 1910.28 and OSHA 1910.29.
B. Components:
   1. Ladder Stringer: 2-1/2 inch by 1-1/16 inch by 1/8 inch (64 mm by 27 mm by 3 mm) extruded 6005-T5 aluminum channel. Pitch: 90 degrees.

2. Ladder Tread: 2-1/4 inch by 3/4 inch by 1/4 inch (57 mm by 19 mm by 6 mm) extruded 6005-T5 aluminum with deeply serrated top surface.
3. Ladder Mounting Bracket: 8-1/2 inch by 2 inch by 3 inch by 1/4 inch thick (216 mm by 51 mm by 76 mm by 6 mm) aluminum angle.
4. Walk-Thru:
   a. Hand Rails: 1-1/4 inch (32 mm) aluminum square tube with rounded edges.
   b. Mounting Brackets: 4 inch by 4 inch by 1/4 inch (102 mm by 102 mm by 6 mm) aluminum.
   c. Side Rails: 42 inch (1067 mm) side rail extension for through ladder exits.
5. Rest Platform:
   a. Bar grating.
   b. Platform Size: 30” inches by 48 inches (762 mm by 1219 mm) standard.
   c. Toe Boards. 6005 T-5 aluminum.
   d. Handrails: 1-1/4 inch (32 mm) aluminum square tube 42 inches (1067 mm) high.
6. Security Door: 0.125 inch (3 mm) 3003-H14 aluminum panel 84 inches (2134 mm) tall with padlock provision.
7. Floor Brackets: Floor bracket at foot of each stringer, 3 by 2 by 1/4 inch (76 by 51 by 6 mm).
8. Finishes: Clear Anodized on aluminum ladder components.

### 2.3 FABRICATION

A. Completely fabricate ladder ready for installation before shipment to the site.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
B. Examine materials upon arrival at site. Notify the carrier and manufacturer of any damage.

### 3.2 INSTALLATION

A. Install in accordance with approved submittals.

### 3.3 PROTECTION

A. Protect installed products until completion of project.
B. Touch-up, repair or replace damaged products before Substantial Completion.

**END OF SECTION**

**SECTION 061000**

**ROUGH CARPENTRY**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Structural floor, wall, and roof framing.
B. Floor, wall, and roof sheathing.
C. Preservative treatment of wood.
D. Fire retardant treatment of wood.
E. Miscellaneous framing and sheathing.
F. Telephone and electrical panel boards.
G. Wood nailers and curbs for roofing and items installed on roof.
H. Concealed wood blocking for support of toilet and bath accessories, wall cabinets, and wood trim.
I. Miscellaneous wood nailers and furring strips.

### 1.2 RELATED SECTIONS
A. Section 061053 - Wood Blocking and Curbing
B. Section 076200 - Sheet Metal Flashing and Trim
C. Section 092900 - Gypsum Board Assemblies

### 1.3 REFERENCES
A. Unless otherwise noted the most current issue of the reference shall be used.
B. AFPA T10 - Wood Frame Construction Manual; American Forest and Paper Association.
C. AWPA C2 - Lumber, Timber, Bridge Ties and Mine Ties -- Preservative Treatment by Pressure Processes; American Wood-Preservers' Association.
D. AWPA C20 - Structural Lumber -- Fire Retardant Treatment by Pressure Processes; American Wood-Preservers' Association.
E. PS 1 - Construction and Industrial Plywood; National Institute of Standards and Technology (Department of Commerce).
F. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology (Department of Commerce).
G. PRI - 400 - Performance for APA EWS I-Joists; The Engineered Wood Association.
H. PRL-501 - Performance Standard for APA EWS Laminated Veneer Lumber; The Engineered Wood Association.
I. F405 - APA Performance Rated Panels; The Engineered Wood Association.
J. WWPA G-5 - Western Lumber Grading Rules; Western Wood Products Association.

### 1.4 SUBMITTALS
A. See Section 013300 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide technical data on wood preservative materials and application instructions.
C. Samples: For rough carpentry members that will be exposed to view, submit two samples 12 inches in size illustrating wood grain, color, and general appearance.
D. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

### 1.5 QUALITY ASSURANCE
A. Lumber: Comply with PS 20 and approved grading rules and inspection agencies.
B. Do not use split, warped, twisted or otherwise damaged or unacceptable members. All such members shall be removed from the site at the discretion of the Architect.
C. Do not use moisture damaged materials. All such materials shall be removed from the site at the discretion of the Architect.

### 1.6 QUALIFICATIONS
A. Design structural site fabricated trusses under direct supervision of a Professional Structural Engineer experienced in design of such trusses and licensed in the State in which the Project is located.

## 1.7 DELIVERY, STORAGE, AND HANDLING

A. Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

## PART 2 – PRODUCTS

## 2.1 SECTION INCLUDES

A. Grading Agency: Western Wood Products Association (WWPA).
B. Sizes: Nominal sizes as indicated on drawings, S4S.
C. Moisture Content: S-dry or MC19.
D. Stud Framing (2 x 2 through 2 x 6 ):
   1. Species: Douglas Fir-Larch.
   2. Grade: Select Structural.
E. Joist, Rafter, and Small Beam Framing (2 x 6 through 4 x 16 ):
   1. Machine stress-rated (MSR) as follows:
      a. Fb-single (minimum extreme fiber stress in bending): 1350 psi.
      b. E (minimum modulus of elasticity): 1,300,000 psi.
   2. Species: Douglas Fir-Larch.
F. Miscellaneous Blocking, Furring, and Nailers:
   1. Lumber: S4S, No. 2 or Standard Grade.

## 2.2 EXPOSED DIMENSION LUMBER

A. Grading Agency: Western Wood Products Association (WWPA).
B. Sizes: Nominal sizes as indicated on drawings, S4S.
C. Moisture Content: S-dry or MC19.
D. Stud Framing (2 x 2 through 2 x 6 ):
   1. Species: Douglas Fir covered as shown in drawings.
   2. Grade: Select Structural.
E. Joist, Rafter, and Small Beam Framing (2 x 6 through 4 x 16 ):
   1. Species: Douglas Fir.
   2. Grade: Select Structural covered as shown in drawings.

## 2.3 TIMBERS

A. Grading Agency: Western Wood Products Association (WWPA).
B. Sizes: Nominal sizes as indicated on drawings, S4S.
C. Moisture Content: S-dry (19 percent maximum).
D. Beams and Posts 5 inches and over in thickness:
   1. Species: Douglas Fir.
   2. Grade: Select Structural.

## 2.4 EXPOSED BOARDS

A. Moisture Content: Kiln-dry (15 percent maximum).
B. Surfacing: S4S.
C. Species: Douglas Fir.
D. Grade: No. 2, 2 Common, or Construction.

## 2.5 CONSTRUCTION PANELS

A. Sub-floor/Underlayment Combination: APA Rated OSB Stud-I-Floor.
   1. Exposure Class: Exposure 1.
   2. Span Rating: 16 inches.
   3. Thickness: 3/4 inches, nominal.
B. APA Rated OSB Sub-flooring:
   1. Exposure Class: 1.
   2. Span Rating: 32/16 inches.

C. Plywood Sub-flooring: PS 1, Grade C-D, Exposure I.
   1. Size: Nominal 3/4 inch in 4 foot by 8 foot sheets.
D. APA Rated OSB Roof Sheathing: Exposure 1, and as follows:
   1. Structural I.
   2. Span Rating: 24/16.
E. Plywood Roof Sheathing: PS 1, Grade C-D, Exposure I.
   1. Size: 3/4 inch nominal thickness in 4 foot by 8 foot sheets.
F. FAPA Rated OSB Wall Sheathing: Exposure 1, and as follows:
   1. Structural I.
   2. Span Rating: 24/16.
G. Plywood Wall Sheathing: PS 1, Grade C-D, Exposure I.
   1. Size: Nominal 1/2 inch in 4 foot by 8 foot sheets.
H. Miscellaneous Panels:
   1. Concealed Plywood: PS 1, C-C Plugged, exterior grade.
   2. Exposed Plywood: PS 1, A-D, interior grade.
   3. Electrical Component Mounting: APA rated sheathing, fire retardant treated.

## 2.6 ACCESSORIES

A. Fasteners and Anchors:
   1. Fasteners: Hot-dipped galvanized steel for high humidity and treated wood locations, unfinished steel elsewhere.
   2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.
   3. Anchors: Expansion shield and lag bolt type for anchorage to solid masonry or concrete.
B. Joist Hangers: Hot dipped galvanized steel, sized to suit framing conditions.
C. Sill Gasket on Top of Foundation Wall: 1/4 inch thick, plate width, closed cell plastic foam from continuous rolls.
D. Sill Flashing: As specified in Section 076200.
E. Subfloor Glue: Waterproof, water base, air cure type, cartridge dispensed.
F. Building Paper: No. 30 asphalt felt.
G. Termite Shield: copper.

## 2.7 FACTORY WOOD TREATMENT

A. Fire Retardant Treatment: AWPA Treatment C20, Interior Type A Low Temperature (low hygroscopic), chemical treatment pressure impregnated; capable of providing a maximum flame spread/smoke development rating of 25 / 450.
B. Pressure Treatment of Lumber Above Grade: AWPA Treatment C2 using waterborne preservative to 0.25 lb/cu ft retention.
   1. Kiln dry after treatment to maximum moisture content of 19 percent.
   2. Treat wood in contact with roofing, flashing, or waterproofing.
   3. Treat wood in contact with masonry or concrete.
   4. Treat wood less than 18 inches above grade.
C. Pressure Treatment of Lumber in Contact with Soil: AWPA Treatment C2 using waterborne preservative designated in AWPA C2 as suitable for ground contact use to 0.4 lb/cu ft retention.

# PART 3 – EXECUTION

## 3.1 FRAMING INSTALLATION

A. All framing shall be Platform type as put forth in AFPA T10- Balloon Framing is not permissible.
B. Unless otherwise noted, all framing members shall be spaced at 16 inch on center intervals and secured with a minimum of five 10d toenails or screws at the end of each member.
C. Install all framing members in compliance with detailing presented in AFPA T10 - Wood Frame Construction Manual- unless exceeded herein.

D. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.
E. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.
F. Install structural members full length without splices unless otherwise specifically detailed.
G. Install horizontal spanning members with crown edge up and not less than 1-1/2 inches of bearing at each end.
H. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise detailed and comply with fasteners listed above.
I. Provide solid blocking at all joists and other framing in excess of 8 feet span. Provide solid blocking at 8 feet on center across all floor joists. Fit solid blocking at ends of joists over all supporting members.
J. Provide continuous double 2 inch by 4 inch stiffeners over all ceiling joists at 8 foot centers or at mid span for members less than 16 feet. Stiffeners shall by constructed of one flat 2 inch by 4 inch member, with one 2 inch by 4 inch member on edge and nailed to flat member and joists on 16 inch centers.
K. Provide solid blocking at framing in excess of 8 feet span and as detailed. Fit solid blocking at ends of members.
L. Fire blocking: install solid fire blocking of identical sized material to studs or joists between floors where balloon framing is encountered and over all supporting girders or beams.
M. Frame openings with two studs at each jamb for openings not exceeding 4 foot; Frame openings with three studs at each jamb for openings from 4 foot to 8 foot; Frame openings with 5 studs at each jamb for openings exceeding 8 foot; support headers on cripple studs at each end and at center to center spacing.
N. Provide miscellaneous members as indicated or as required to support finishes, fixtures, specialty items, and trim.

## 3.2 INSTALLATION OF ACCESSORIES AND MISCELLANEOUS WOOD

A. Place full width continuous sill flashings or termite shield under framed walls over sill gasket. Lap flashing joints 4 inches and seal.
B. Place sill gasket directly on cementitious foundation. Puncture gasket cleanly and fit tightly to protruding foundation anchor bolts.
C. Coordinate installation of LVL beams, wood decking, wood chord metal joists, glue laminated structural units, prefabricated wood trusses, and plywood web joists.
D. Install I-joists in compliance with manufacturer's recommended procedures unless exceeded herein. Provide continuous rim joists at outer edges of all joists both parallel and perpendicular to joists.
E. Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members.
F. Coordinate curb installation with installation of decking and support of deck openings.
G. See Section 061053 for installation of wood blocking and curbing for roof applications.

## 3.3 INSTALLATION OF CONSTRUCTION PANELS

A. Install telephone and electrical panel back boards made of plywood or other acceptable structural panels at locations indicated. Size back boards to be minimum 6 inches beyond size of telephone and electrical panels.
B. Sub-flooring/Underlayment Combination: Glue and nail to framing using minimum 2 1/2 inch long nails; staples are not permitted.
C. Sub-flooring: Glue and nail to framing using minimum 2 1/2 inch long nails; staples are not permitted.
D. Underlayment: Secure to sub-flooring with nails and glue.
    1. At locations where resilient flooring will be installed, fill and sand splits, gaps, and rough areas.

2. Place building paper between floor underlayment and sub-flooring.

E. Roof Sheathing: Secure panels perpendicular to framing members, with ends staggered and sheet ends over firm bearing.
   1. Use sheathing clips between roof framing members.
   2. Provide solid edge blocking between sheets.
   3. Screw panels to framing with galvanized screws; staples are not permitted.

F. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails or screws of minimum 2 inch length.
   1. Use plywood at building corners, for not less than 96 inches, measured horizontally.
   2. Place building paper horizontally over wall sheathing, weather lapping edges and ends.

## 3.4 SITE APPLIED WOOD TREATMENT

A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.

B. Allow preservative to dry prior to erecting members.

## 3.5 TOLERANCES

A. Framing Members: 1/4 inch from true position, maximum.

B. Surface Flatness of Floor: 1/8 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

C. Variation from Plane (Other than Floors): 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

**END OF SECTION**

**SECTION 061053**

**WOOD BLOCKING AND CURBING**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Roof nailers and curbs.
B. Blocking in wall and roof openings.
C. Preservative treatment of wood.
D. Concealed wood blocking for support of toilet and bath accessories, wall cabinets, wood trim, and all wall mounted items.

### 1.2 RELATED SECTIONS
A. Section 054000: Cold Formed Metal Framing
B. Section 061000: Rough Carpentry.
C. Section 075323: Single Ply Roofing - Fully Adhered EPDM.
D. Section 076200: Sheet metal flashing and trim.
E. Section 092900: Gypsum Board Assemblies.

### 1.3 REFERENCES
A. Unless otherwise noted the most current issue of the reference shall be used.
B. AWPA C2 - Lumber, Timber, Bridge Ties and Mine Ties -- Preservative Treatment by Pressure Processes; American Wood-Preservers' Association.
C. AWPA C20 - Structural Lumber -- Fire Retardant Treatment by Pressure Processes; American Wood-Preservers' Association.
D. PS 1 - Construction and Industrial Plywood; National Institute of Standards and Technology (Department of Commerce).
E. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology (Department of Commerce).
F. RIS (GR) - Standard Specifications for Grades of California Redwood Lumber; Redwood Inspection Service.
G. SPIB (GR) - Grading Rules; Southern Pine Inspection Bureau, Inc..
H. WCLB (GR) - Standard Grading Rules for West Coast Lumber No. 17; West Coast Lumber Inspection Bureau.
I. WWPA G-5 - Western Lumber Grading Rules; Western Wood Products Association.

### 1.4 SUBMITTALS
A. See Section 013300 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide technical data on wood preservative materials.

### 1.5 QUALITY ASSURANCE
A. Lumber: Comply with PS 20 and approved grading rules and inspection agencies.
   1. Acceptable Lumber Inspection Agencies: RIS, SPIB, WCLB, and WWPA.
   2. Lumber of other species or grades, or graded by other agencies, is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.
B. Plywood: Comply with PS 1.

## PART 2 – PRODUCTS

### 2.1 DIMENSION LUMBER
A. Grading Agency: Western Wood Products Association (WWPA).
B. Sizes: Nominal sizes as indicated on drawings, S4S. Wood blocking for all wall mounted items shall be 2 x 6 inch nominal unless otherwise noted.
C. Moisture Content: S-dry or MC19.
D. Miscellaneous Blocking, Furring, and Nailers:
   1. Structural grade 1200fb Douglas Fir as defined in Section 061000.

## 2.2 CONSTRUCTION PANELS

A. Plywood Sheathing: PS 1, Grade C-D, Exposure I. Panels shall be treated as listed in the Factory Wood Treatment article of this section and as listed in the schedule.
B. All other panels as listed in Section 061000.

## 2.3 ACCESSORIES

A. Fasteners and Anchors:
   1. Fasteners: Hot-dipped galvanized steel for high humidity and treated wood locations, unfinished steel elsewhere.
   2. Anchors: Expansion shield and lag bolt type for anchorage to solid masonry or concrete. Anchor bolt for anchorage into cavity walls.

## 2.4 FACTORY WOOD TREATMENT

A. Wood preservative pressure treatment: ACQ Type D preservative; retention level .25
   1. Kiln dry after treatment to maximum moisture content of 19 percent.
   2. Treat wood in contact with roofing, flashing, or waterproofing.
   3. Treat wood in contact with masonry or concrete.
   4. Treat wood less than 18 inches above grade.
B. Fire Retardant Treatment: AWPA Treatment C20, Interior Type, Class A, Low Hygroscopic, Chemically treated and pressure impregnated; capable of providing a maximum flame spread/smoke development rating of 25 / 450.

# PART 3 – EXECUTION

## 3.1 PREPARATION

A. Examine all surfaces to receive parts of the work specified herein. Application or installation of materials constitutes acceptance of the substrate.
B. Verify all dimensions of in-place and subsequent construction and that it accurately fit this part of the work to other construction.
C. Protect lumber and keep under cover both in transit and at job site. Protect from dampness.

## 3.2 FRAMING

A. Set members level and plumb, in correct position.
B. Place horizontal members with crown side up.
C. Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members.
D. Coordinate curb installation with installation of decking and support of deck openings.
E. All wood blocking that is installed is to be temporarily protected form moisture utilizing 15 lb. roofing felt.
F. All wood blocking joints to be mitered @ 45 degrees, staggered, and screw fastened together.
G. Provide miscellaneous members as indicated or as required to support finishes, fixtures, specialty items, and trim.

## 3.3 INSTALLATION OF CONSTRUCTION PANELS

A. Sheathing: Secure with long dimension perpendicular to framing members, with ends over firm bearing and staggered, using screws.

## 3.4 SCHEDULES

A. Roof Blocking: S/P/F species, 19 percent maximum moisture content, pressure preservative treatment. Roof edge and roof related wood blocking.
B. Treated plywood: Roof edge and roof related conditions.
C. Miscellaneous wood blocking exterior: S/P/F species, 19 percent maximum moisture content, pressure preservative treatment.

D. Miscellaneous wood blocking interior: Provide wood blocking for support of toilet and bath accessories, wall cabinets, wood trim, mechanical and electrical equipment, and all other wall mounted items. Utilize material as listed in this section and in Section 061000. Wood blocking for wall mounted items shall be minimum of 2 x 6 inch nominal dimensional lumber. Fasten wood blocking with minimum 2 screws each side into framing. Where conflicts occur, the more stringent requirement shall prevail.

**END OF SECTION**

**SECTION 061400**

**PRESSURE-TREATED WOOD PRODUCTS**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Preservative treatment of lumber and plywood.
B. Fire-retardant treatment of lumber and plywood.

### 1.2 RELATED SECTIONS
A. Section 061000 - Rough Carpentry.

### 1.3 REFERENCES
A. Unless otherwise noted the most current issue of the reference shall be used.
B. AFPA T06 - Permanent Wood Foundation System: Design, Fabrication, Installation Manual; American Forest and Paper Association.
C. AFPA T. R. No. 7 - Permanent Wood Foundation System; American Forest and Paper Association.
D. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron And Steel Hardware.
E. AWPA C2 - Lumber, Timber, Bridge Ties and Mine Ties -- Preservative Treatment by Pressure Processes; American Wood-Preservers' Association.
F. AWPA C20 - Structural Lumber -- Fire-Retardant Treatment by Pressure Processes; American Wood-Preservers' Association.
G. AWPA C22 - Lumber and Plywood for Permanent Wood Foundations -- Preservative Treatment by Pressure Processes; American Wood-Preservers' Association.
H. AWPA C27 - Plywood -- Fire-Retardant Treatment by Pressure Processes; American Wood-Preservers' Association.

### 1.4 SUBMITTALS
A. See Section 013300 - Administrative Requirements, for submittal procedures.
B. Product Data: Treating plant's instructions for use, including requirements for storage, cutting, and finishing.
C. Preservative Treatment Certification: Treating plant's certification of compliance with specified standards, process employed, and preservative retention values.
D. Fire-Retardant Treatment Certification: Treating plant's certification of compliance with specified requirements.

### 1.5 QUALITY ASSURANCE
A. Fire-Retardant Treatment: Mark each piece of plywood and lumber to show compliance with specified standards.

### 1.6 DELIVERY, STORAGE, AND HANDLING
A. Protect wood products against moisture and dimensional changes, in accordance with instructions from treating plant.

### 1.7 WARRANTY
A. See Section 017700 - Closeout Submittals, for additional warranty requirements.
B. Fire-Retardant Treated Wood: Provide manufacturer's standard 20-year limited warranty.
C. Preservative-Treated Wood: Provide manufacturer's standard 50-year limited warranty.
D. Preservative-Treated Wood: Provide manufacturer's standard lifetime warranty.

## PART 2 – PRODUCTS

### 2.1 MANUFACTURERS

A. Provide wood treatment by or under license from Chemical Specialties, Inc., One Woodlawn Green, Suite 250, 200 E. Woodlawn Road, Charlotte, NC 28217. ASD. Tel: (800) 421-8661.
B. Substitutions: See Section 016000 - Product Requirements.

### 2.2 MATERIALS

A. Dimension Lumber: As specified in Section 061000.
B. Structural Plywood: As specified in Section 061000.
C. Fasteners: For treated wood and where wood is in ground contact, subject to high relative humidity, or exposed to weather, provide steel fasteners with hot-dip zinc coating per ASTM A 153/A 153M.

### 2.3 PRESSURE TREATMENT OF WOOD

A. Preservative Treatment for Above Ground Use:
   1. Treatment: ACQ(R) Preserve(R).
   2. Use 0.25 lb/cu ft retention.
   3. Kiln dry after treatment to 19 percent maximum moisture content for lumber and 18 percent for plywood.
   4. Treat wood in the following locations:
      a. In contact with roofing, flashing, or waterproofing.
      b. In contact with masonry or concrete.
      c. Within 18 inches of grade.
      d. Exposed to weather.
      e. Other locations indicated.
B. Preservative Treatment for Ground and Fresh Water Contact:
   1. Treatment: ACQ(R) Preserve(R).
   2. Use 0.40 lb/cu ft retention, unless otherwise indicated.
   3. Utility Poles: Use 0.60lb/cu ft retention.
   4. Pilings: Use 0.80 to 1.0 lb/cu ft retention, per AWPA Standards.
   5. Salt Water Marine Pilings: Use 2.50 lbs/cu ft retention.
   6. Kiln dry after treatment to 19 percent maximum moisture content for lumber and 18 percent for plywood.
   7. Treat wood in the following locations:
      a. In contact with ground.
      b. In contact with fresh water.
      c. Used as posts, landscaping timbers, retaining walls, piers, or docks.
C. Preservative Treatment for Wood Foundation Systems:
   1. Pressure-treat softwood lumber, timber, and plywood for wood foundation systems with waterborne preservatives to comply with AWPA C22.
   2. Treatment: ACQ(R) Preserve(R).
   3. Use 0.60 lb/cu ft retention.
D. Fire-Retardant Treatment:
   1. Lumber: Comply with AWPA C20.
   2. Plywood: Comply with AWPA C27, Type A.
   3. Surface Burning Characteristics: UL FRS rating; flame spread and smoke developed ratings of 25 or less in a test of 30 minutes' duration.
   4. Treatment: D-Blaze(R).
   5. Treat wood used for the following applications:
      a. Roof and floor trusses.
      b. Roof decks and sheathing.
      c. Subflooring.
      d. Beams and purlins.
      e. Millwork and trim.

## PART 3 – EXECUTION

### 3.1 INSTALLATION

A. Framing and Sheathing: Comply with installation requirements in Section 061000.
B. Fire-Retardant Treated Wood: End cuts and drilling are permitted. Do not rip or mill lumber or plywood after fire-retardant treatment.
C. Wood Foundation System: Install in accordance with the following:
   1. AFPA Technical Report No. 7.
   2. APA Form A400.

**END OF SECTION**

**SECTION 071113**

**BITUMINOUS DAMPPROOFING**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Bituminous dampproofing.

### 1.2 RELATED SECTIONS
A. Section 312323 - Fill and Backfill.

### 1.3 REFERENCES
A. ASTM D 41 - Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing; 1994 (reapproved 2000).
B. ASTM D 1227 - Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing; 1995 (Reapproved 2000).
C. ASTM D 2822 - Standard Specification for Asphalt Roof Cement; 1991 (Reapproved 1997).
D. NRCA ML104 - The NRCA Roofing and Waterproofing; National Roofing Contractors Association; Fifth Edition.

### 1.4 SUBMITTALS
A. See Section 013300 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide properties of primer, bitumen, and mastics.

### 1.5 QUALITY ASSURANCE
A. Perform work in accordance with NRCA Roofing and Waterproofing Manual.
B. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years experience.

### 1.6 ENVIRONMENTAL REQUIREMENTS
A. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application until dampproofing has cured.

## PART 2 – PRODUCTS

### 2.1 MANUFACTURERS
A. Acceptable Manufacturers:
   1. Karnak Chemical Corp: www.karnakcorp.com.
   2. Mar-Flex Systems, Inc: www.mar-flex.com.
   3. W.R. Meadows, Inc: www.wrmeadows.com.
   4. Substitutions: See Section 016000 - Product Requirements.

### 2.2 COLD ASPHALTIC MATERIALS
A. Bitumen: Emulsified asphalt, ASTM D 1227; with fiber reinforcement (Type I or II).
B. Asphalt Primer: ASTM D 41, compatible with substrate.
C. Sealing Mastic: Asphalt roof cement, ASTM D 2822, Type I.

## PART 3 – EXECUTION

### 3.1 EXAMINATION
A. Verify existing conditions before starting work.
B. Verify substrate surfaces are durable, free of matter detrimental to adhesion or application of dampproofing system.
C. Verify that surfaces and site conditions are ready to receive work.
D. Verify items which penetrate surfaces to receive dampproofing are securely installed.

## 3.2 PREPARATION

A. Protect adjacent surfaces not designated to receive dampproofing.
B. Clean and prepare surfaces to receive dampproofing in accordance with manufacturer's instructions.
C. Do not apply dampproofing to surfaces unacceptable to manufacturer.
D. Apply mastic to seal penetrations, small cracks, or minor honeycomb in substrate.

## 3.3 PIPE PENETRATIONS

A. Flash pipe with pre-molded pipe flashings where installation is possible.
B. Where the molded pipe flashings cannot be installed, use field fabricated flashing techniques using uncured EPDM.

## 3.4 APPLICATION

A. Prime surfaces in accordance with manufacturer's instructions.
B. Apply bitumen with mop.
C. Apply bitumen in one coat, continuous and uniform, at a rate of ____ gal/100 sq ft per coat.
D. Seal items projecting through dampproofing surface with mastic. Seal watertight.

**END OF SECTION**

**SECTION 071326**

**SHEET WATERPROOFING**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Sheet membrane waterproofing.
B. Cant strips and other accessories.
C. Drainage panels.

### 1.2 RELATED SECTIONS
A. Section 033000 - Cast in Place Concrete
B. Section 072113 - Board and Batt Insulation: Insulation used for protective cover.
C. Section 312323 - Fill and Backfill.

### 1.3 REFERENCES
A. ASTM D 638 - Standard Test Method for Tensile Properties of Plastics
B. NRCA ML104 - The NRCA Roofing and Waterproofing Manual; National Roofing Contractors Association; Fifth Edition.

### 1.4 SUBMITTALS
A. See Section 013300 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data for membrane and surface conditioner.
C. Shop Drawings: Indicate special joint or termination conditions and conditions of interface with other materials.
D. Certificate: Certify that products meet or exceed specified requirements.
E. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention, and acceptable installation temperatures.
F. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

### 1.5 QUALITY ASSURANCE
A. Perform Work in accordance with NRCA Roofing and Waterproofing Manual for rubberized-asphalt sheet system.
B. Membrane Manufacturer Qualifications: Company specializing in waterproofing sheet membranes with three years experience.
C. Installer Qualifications: Company specializing in performing the work of this section approved by manufacturer.
D. Commence backfill operations immediately following installation of sheet waterproofing system, or follow Manufacturer's written recommendations for protecting sheet materials from UV radiation. If materials have been exposed to UV radiation for an extended period not recommended by manufacturer, contractor shall coordinate a review by the manufacturer’s representative to determine if materials in place are viable for use or require replacement. This review shall be conducted prior to any backfilling operations. Contractor shall replace and pay for all materials determined to require replacement by the manufacturer’s representative.

### 1.6 MOCK-UP
A. Construct mockup 100 sq ft of horizontal waterproofed panel; to represent finished work including internal and external corners.
B. Locate where directed.
C. Mockup may remain as part of the Work.

### 1.7 ENVIRONMENTAL REQUIREMENTS
A. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application and until liquid or mastic accessories have cured.

**SECTION 071326**

**SHEET WATERPROOFING**

**1.8 WARRANTY**

A. See Section 017700 - Closeout Submittals, for additional warranty requirements.
B. Correct defective Work within a five year period after Date of Substantial Completion.
C. Provide five year manufacturer warranty for waterproofing failing to resist penetration of water.
D. For warranty repair work, remove and replace materials concealing waterproofing.

**PART 2 – PRODUCTS**

**2.1 MANUFACTURERS**

A. Acceptable Manufacturers:
   1. Carlisle Coatings and Waterproofing, Sapulpa, OK 74067
   2. Mirafi, Norcross, GA 30092
   3. Sarnafil Waterproofing Systems, Canton, MA 02021
   4. W.R. Meadows, Elgin, IL 60121
   5. Substitutions: See Section 016000 - Product Requirements.

**2.2 MEMBRANE MATERIALS**

A. "CCW-701 Sheet Membrane Waterproofing System" by Carlisle Coatings and Waterproofing.
B. "Miradri 800/861" by Mirafi.
C. "Waterproofing System 2000" by Sarnafil Waterproofing Systems.
D. "Sealtight Mel-Rol" by W.R. Meadows.

**2.3 ACCESSORIES**

A. Protection Board: Rigid insulation specified in Section 072113.
B. Drainage Panel: 3/8 inch thick formed plastic, hollowed sandwich.
C. Cant Strips: Premolded composition material.
D. Flexible Flashings: Type recommended by membrane manufacturer.

**PART 3 – EXECUTION**

**3.1 EXAMINATION**

A. Verify existing conditions before starting work.
B. Verify substrate surfaces are durable; free of matter detrimental to adhesion or application of waterproofing system.
C. Verify items which penetrate surfaces to receive waterproofing are securely installed.

**3.2 PREPARATION**

A. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions.
B. Do not apply waterproofing to surfaces unacceptable to membrane manufacturer.
C. Primer Apply primer at a rate recommended by manufacturer. Protect conditioner from rain or frost until dry.

**3.3 INSTALLATION - MEMBRANE**

A. Install membrane waterproofing in accordance with manufacturer's instructions.
B. Roll out membrane. Minimize wrinkles and bubbles.
C. Overlap edges and ends and seal by method recommended by manufacturer, minimum 3 inches; unless otherwise noted by manufacturer. Seal permanently waterproof.
D. Reinforce membrane with multiple thickness of membrane material over joints, whether joints are static or dynamic.
E. Weather lap joints on sloped substrate in direction of drainage. Seal joints and seams.
F. Install flexible flashings. Seal items penetrating through membrane with flexible flashings. Seal watertight to membrane.

G. Seal membrane and flashings to adjoining surfaces. Install termination bar at all edges. Install counterflashing over all exposed edges.

**3.4 INSTALLATION - PROTECTION BOARD**

A. Place protection board directly against membrane; butt joints. Scribe and cut boards around projections, penetrations, and interruptions.
B. Adhere protection board to substrate with compatible adhesive.

**3.5 PROTECTION**

A. Do not allow waterproofing membrane to be directly exposed to the elements for an extended period of time; per manufacturer's recommendations.

**END OF SECTION**

**SECTION 072113**

**BOARD AND BATT INSULATION**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Board insulation and integral vapor retarder at cavity wall construction and perimeter foundation wall.
B. Batt insulation and vapor retarder in exterior wall, ceiling, and roof construction.
C. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

### 1.2 RELATED SECTIONS
A. Section 033000 - Cast in Place Concrete: perimeter insulation.
B. Section 042000 - Unit Masonry Assemblies: Insulation for Cavity spaces.
C. Section 072119 – Foamed-In Place Insulation
D. Section 092900 - Gypsum Board Assemblies: Acoustic insulation.

### 1.3 REFERENCES
A. ASTM C578 - Preformed, Cellular Polystyrene Thermal Insulation.
B. ASTM C 665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2001.
C. ASTM D 2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics; 2001.
D. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2001.
E. ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials; 2000.

### 1.4 SYSTEM DESCRIPTION
A. Materials of This Section: Provide continuity of thermal barrier at building enclosure.
B. Materials of This Section: Provide thermal protection to vapor retarder in conjunction with vapor retarder materials in Section 072726.

### 1.5 SUBMITTALS
A. See Section 013300 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data on product characteristics, performance criteria, and product limitations, ASTM Test Compliance and data.
   1. Provide product data on all materials and accessories comprising a complete installation including but not limited to all adhesives, clips and other accessories.
C. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.
D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

### 1.6 ENVIRONMENTAL REQUIREMENTS
A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

### 1.7 SEQUENCING
A. Sequence work to ensure fireproofing, firestop, vapor retarder, air barrier, and other related materials are in place before beginning work of this section.
B. Protection Board for Waterproofing: Provide complete installation of all waterproofing membrane, drainage and all related accessories. Allow Architect access to waterproofing for review prior to installing protection board or backfilling. Complete any remedial work as directed by Architect.

### 1.8 COORDINATION
A. Coordinate work under provisions of Section 013300.
B. Coordinate the work with Section 072726 for installation of vapor retarder.
C. Coordinate the work with Section 072119 for installation of foamed-in Place insulation

## PART 2 – PRODUCTS

### 2.1 BOARD INSULATION MATERIALS

A. Extruded Polystyrene Board Insulation: Extruded polystyrene board with natural skin surfaces; with the following characteristics relative to application:
   1. Cavity wall applications; ASTM C 578 type VI.
      a. Board Size: 48 x 96 inch with 16 inch perforations for horizontal reinforcing applications.
      b. Board Thickness: 1-1/2 inches.
      c. Board Edges: Square.
      d. Thermal Resistance of 1 inch thickness at 75 degrees F: 5.0 minimum.
      e. Compressive Resistance: Min. 40 psi.
      f. Board Density: 1.8 lb/cu ft.
      g. Water Absorption, maximum: 0.3 percent, volume.
   2. Foundation or below grade applications; ASTM C 578 type VII.
      a. Board Size: 24 x 96 inch.
      b. Board Thickness: 2 inches.
      c. Board Edges: Square.
      d. Thermal Resistance of 1 inch thickness at 75 degrees F: 5.0 minimum.
      e. Compressive Resistance: 60 psi.
      f. Board Density: 2.2 lb/cu ft.
      g. Water Absorption, maximum: 0.3 percent, volume.
   3. Manufacturers:
      a. Dow Chemical Co: www.dow.com.
      b. Owens Corning Corp: www.owenscorning.com.
      c. Pactiv Building Products formerly Tenneco Building Product 2907 Log Cabin Drive Smyrna, Georgia 30080-7013 800-241-4402 .
      d. Substitutions: See Section 016000 - Product Requirements.

### 2.2 MANUFACTURERS - ADHESIVES

A. As manufactured and recommended by insulation manufacturer.
B. Chem Rex, Inc., "Contact Brand PL300 Foam Board Adhesive."
C. Dacar Products, In., "Foamgrab PS."
D. Substitutions: Not permitted.

### 2.3 BATT INSULATION MATERIALS

A. Batt Insulation: ASTM C 665; preformed glass fiber batt; friction fit, conforming to the following:
   1. Manufacturers:
      a. CertainTeed Corporation: www.certainteed.com.
      b. Johns Manville Corporation: www.jm.com.
      c. Owens Corning Corp: www.owenscorning.com.
   2. Substitutions: See Section 016000 - Product Requirements.

### 2.4 ACCESSORIES

A. Sheet Vapor Retarder Type 1: Black polyethylene film for above grade application, 10 mil mil thick.
B. Tape: Bright aluminum self-adhering type, mesh reinforced and 2 inch wide.
C. Insulation Fasteners: Impaling clip of unfinished steel with washer retainer and clips, to be adhered to surface to receive board insulation, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. Verify site conditions under provisions of Section 013300.
B. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation and adhesive.
C. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

### 3.2 BOARD INSTALLATION AT FOUNDATION PERIMETER

A. Adhere a 6-inch wide strip of polyethylene sheet over construction, control, and expansion joints with double beads of adhesive each side of joint.
B. Apply adhesive to back of boards:
    1. Three continuous beads per board length.
    2. Full bed 1/8 inch thick.
C. Install boards horizontally on foundation perimeter.
D. Place boards to maximize adhesive contact.
E. Install in running bond pattern.
F. Stagger side joints.
G. Butt edges and ends tightly to adjacent boards and to protrusions.
H. Extend boards over control and expansion joints, un-bonded to foundation 8 inches on one side of joint.
I. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
J. All Boards to extend a minimum of 24” below outside grade.

### 3.3 BOARD INSTALLATION AT CAVITY WALLS

A. Adhere a 6-inch wide strip of polyethylene sheet over expansion joints with double beads of adhesive each side of joint.
    1. Extend sheet full height of joint.
B. Install using adhesive recommended by insulation manufacturer for application. Apply adhesive to back of boards:
    1. Three continuous beads per board length.
    2. Full bed 1/8 inch thick.
C. Install boards to fit snugly between wall ties.
    1. Place membrane surface facing out, and tape seal board joints.
D. Install boards horizontally on walls.
    1. Place boards to maximize adhesive contact.
    2. Install in running bond pattern.
    3. Butt edges and ends tightly to adjacent boards and to protrusions.
    4. Place impale fastener locking discs.
E. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

### 3.4 PROTECTION OF UNFINISHED WORK

A. Do not permit work to be damaged prior to covering insulation.

### 3.5 BATT INSTALLATION

A. Install insulation and vapor retarder in accordance with manufacturer's instructions.
B. Install in exterior wall and roof spaces without gaps or voids. Do not compress insulation.
C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.
E. Install with factory applied vapor retarder membrane facing warm side of building spaces. Lap ends and side flanges of membrane over framing members.
F. Staple facing flanges in place at maximum 6 inches on center.
G. Tape seal butt ends, lapped flanges, and tears or cuts in membrane.

H. At metal framing, place vapor retarder on warm side of insulation; lap and seal sheet retarder joints over member face.
I. Tape seal tears or cuts in vapor retarder.
J. Extend vapor retarder tightly to full perimeter of adjacent window and door frames and other items interrupting the plane of the membrane. Tape seal in place.

**3.6 PROTECTION OF FINISHED WORK**

A. Do not permit installed insulation to be damaged prior to its concealment.

**END OF SECTION**

**SECTION 072119**

**FOAMED-IN-PLACE INSULATION**

## PART 1 – GENERAL

### 1.1 SUMMARY

A. This section includes the following:
   1. Closed-cell, medium-density spray polyurethane foam insulation.

B. Related Work in other Sections includes the following:
   1. Section 014000 - Quality Requirements; coordination with Owner's independent testing and inspection agency.
   2. Section 014000 - Mock-Ups; exterior wall mock-ups.
   3. Section 015000 - Temporary Facilities and Controls; requirement to schedule work to prevent sunlight and weather exposure of materials beyond limits established by manufacturer; requirement to protect materials from damage after installation and prior to installation of enclosing work.
   4. Section 033000 – Cast-In-Place Concrete; requirement that backup concrete be smooth without protrusions.
   5. Section 042000 – Unit Masonry; requirement that backup masonry joints are flush and completely filled with mortar, and that excess mortar on brick ties will be removed; requirement for gap at deflection joints and fillers; coordination with sequencing of through-wall flashing.
   6. Section 054000 – Cold-Formed Metal Framing; metal exterior wall framing assemblies to support the closed-cell, medium density sprayed polyurethane foam.
   7. Section 075323 – Single Ply Roofing – Fully Adhered EPDM; requirement for coordination with sequencing of membrane roofing; requirement to seal roof membrane to wall air barrier.

### 1.2 REFERENCES

A. ASTM International:
   1. ASTM C518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
   2. ASTM C1029 Standard Specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation.
   3. ASTM C1338 Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings.
   4. ASTM D1621 Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
   5. ASTM D1622 Standard Test Method for Apparent Density of Rigid Cellular Plastics.
   6. ASTM D1940 Method of Test for Porosity of Rigid Cellular Plastics.
   7. ASTM D2842 Standard Test Method for Water Absorption of Rigid Cellular Plastics.
   8. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
   9. ASTM E90 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
   10. ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials.
   11. ASTM E283 Standard Test Method for Determining Rate of Air Leakage.
   12. ASTM E413 Classification for Rating Sound Insulation.
   13. ASTM E2178 Standard Test Method for Air Permeance of Building Materials.
   14. ASTM E2357 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies

B. CAN/ULC
   1. CAN/ULC-S774-VOC emissions profiling by Dynamic Chamber Analysis

C. NFPA
   1. NFPA 285 Standard Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components.
   2. NFPA 286 Standard Test Method of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth

3. Section 015000 - Temporary Facilities and Controls; requirement to schedule work to prevent sunlight and weather exposure of materials beyond limits established by manufacturer; requirement to protect materials from damage after installation and prior to installation of enclosing work.

## 1.3 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test methods indicated below or other testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
   1. Surface Burning Characteristics (ASTM E84): 25 / 450.
   2. Assembly Fire Resistance Rating (NFPA 285): Passes NFPA 285 as part of an approved assembly.
   3. Combustion Characteristics (NFPA 286): Pass

B. Material Performance: Provide materials which have an air permeance not to exceed 0.004 cubic feet per minute per square foot under a pressure differential of 0.3 in. water (1.57 pounds per square foot) [0.02 liters per second per square meter at a pressure difference of 75 Pascals (0.02 L/(s·m²) @ 75 Pa)] when tested in accordance with ASTM E 2178 (unmodified). The water vapor permeance shall be determined in accordance with ASTM E 96 and shall be declared by the manufacturer. (ABAA Certified projects only)

C. Assembly Performance: Provide a continuous air barrier in the form of an assembly that has an air leakage not to exceed 0.040 cubic feet per square foot per minute under a pressure differential of 0.3 in. water (1.57 pounds per square foot) [0.20 liters per second per square meter at a pressure difference of 75 Pascals (0.20 L/(s·m²) @ 75 Pa)] when tested in accordance with ASTM E 2357. Assembly shall accommodate movements of building materials by providing expansion and control joints as required. Expansion / control joints, changes in substrate and perimeter conditions shall have appropriate accessory materials at such locations. (ABAA Certified projects only)
   1. Assembly shall be capable of withstanding combined design wind, fan and stack pressures, both positive and negative on the envelope without damage or displacement and shall transfer the load to the structure.
   2. Assembly air barrier material shall not displace adjacent materials in the assembly under full load.
   3. Assembly shall be joined in an airtight and flexible manner to the air barrier material of adjacent assemblies, allowing for the relative movement of assemblies due to thermal and moisture variations, creep, and anticipated seismic movement.

D. Adjacent Materials: Install closed-cell spray polyurethane foam to prevent air leakage at the following locations: (ABAA Certified projects only)
   1. Foundation and walls, including penetrations, ties and anchors.
   2. Walls, windows, curtain walls, storefronts, louvers and doors.
   3. Different assemblies and fixed openings within those assemblies.
   4. Wall and roof/ceiling connections.
   5. Walls, floor and roof across construction, control and expansion joints.
   6. Walls, floors and roof to utility, pipe and duct penetrations.
   7. Expansion joints.
   8. All other potential air leakage pathways in the building envelope.

## 1.4 SUBMITTALS

A. Submittals: Submit in accordance with Division 01 requirements.

B. Product Data: Submit manufacturer’s product data, manufacturer's instructions for evaluating, preparing, and treating substrate, temperature and other limitations of installation conditions, technical data, and tested physical and performance properties.
   1. Submit letter from primary materials manufacturer indicating approval of products not manufactured by primary manufacturer.

2. Include statement that materials are compatible with adjacent materials proposed for use.
3. Submit letter from the sealant manufacturer indicating sealant adhesion to the air barrier material meet the requirements of the project.

C. Samples: Submit clearly labeled samples, three inch by 4 inch (75 mm by 100 mm) minimum size of each material specified.

D. Shop Drawings: Submit shop drawings showing locations and extent of air barrier assemblies and details of all typical conditions, intersections with other envelope assemblies and materials, membrane counter-flashings, and details showing how gaps in the construction will be bridged, how inside and outside corners are negotiated, how materials that cover the materials are secured with air-tight condition maintained, and how miscellaneous penetrations such as conduits, pipes, electric boxes and similar items are sealed.
   1. Include VOC content of each material, and applicable legal limit in the jurisdiction of the project.
   2. Include statement that materials are compatible with adjacent materials proposed for use.
   3. Include recommended values for field adhesion test on each substrate.

E. Compatibility: Submit letter from manufacturer stating that materials proposed for use are permanently chemically compatible and adhesively compatible with adjacent materials proposed for use. Submit letter from manufacturer stating that cleaning materials used during installation are chemically compatible with adjacent materials proposed for use.

F. Accredited Laboratory Testing for Materials: Laboratory accredited by International Accreditation Service Inc. (IAS), American Association for Laboratory Accreditation (A2LA), or the Standards Council of Canada (SCC).

G. VOC Regulations: Provide products which comply with applicable regulations controlling the use of volatile organic compounds.

H. Preconstruction Meeting: Convene a minimum of two weeks prior to commencing Work of this Section. Agenda shall include, at a minimum, construction and testing of mock-up, sequence of construction, coordination with substrate preparation, air barrier materials approved for use, compatibility of materials, coordination with installation of adjacent and covering materials, and details of construction and chemical/fire safety plans. Attendance is required by representatives of related trades including covering materials, substrate materials and adjacent materials.

I. Mock-Ups: Contribute to the project mock-up as directed by the Architect. It shall include the materials and components proposed for use in the exterior wall assembly.

## 1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing urethane foam products and systems of this section with minimum ten (10) years documented experience.

## 1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product, date of manufacture, and directions for storage.

B. Store materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by air barrier spray foam manufacturer. Protect stored materials from direct sunlight.

C. Handle materials in accordance with manufacturer’s recommendations.

## 1.7 PROJECT CONDITIONS

A. Temperature: Install closed-cell, medium density spray polyurethane foam air barrier within range of ambient and substrate temperatures recommended by air barrier manufacturer. Do not apply air barrier to a damp or wet substrate.

B. Field Conditions: Do not install air barrier in snow, rain, fog, or mist. Do not install air barrier when the temperature of substrate surfaces and surrounding air temperatures are below those recommended by the manufacturer.

C. Sequencing. Do not install air barrier material before the roof assembly has been sufficiently installed to prevent a buildup of water in the interior of the building.

D. Compatibility. Do not allow closed-cell, medium density spray polyurethane foam to come in contact with chemically incompatible materials.
E. Ultra-violet exposure. Do not expose the air barrier material to sunlight longer than as recommended by the manufacturer (if applicable).

### 1.8 WARRANTY

A. Manufacturer's Warranty: Provide manufacturer's standard product warranty, for a minimum five (5) years from date of Substantial Completion.
B. Manufacturer's Warranty: Provide manufacturer's limited product warranty, for a maximum of 10 years from date of Substantial Completion.

## PART 2 – PRODUCTS

### 2.1 FOAMED-IN-PLACE INSULATION

A. **Basis of Design**: Medium Density Closed Cell Spray Polyurethane Foam Air Barrier: JM Corbond III, as manufactured by Johns Manville or approved equal. Air barrier system shall not require the priming of substrates nor the application of sealing tape at wallboard seams and other wall penetrations.
   1. Application Rate: Up to 3.5 inches in a single pass, to the total thickness required for the project.
   2. Physical Properties:
      a. Nominal Density (ASTM D1622): 2.0 lb/cu.ft.
      b. Compressive Strength, 1 inch thickness (ASTM D1621): 36 psi.
      c. Closed-Cell Content (ASTM D1940): Greater than 90 percent.
      d. K-Factor (ASTM C518 initial): 0.15.
      e. K-Factor (ASTM C1029 180-day aged): 0.16.
      f. R-Value (ASTM C518 initial): 7.0.
      g. R-Value (ASTM C1029 180-day aged): 7.0.
      h. Water Absorption (ASTM D2842): 0.020 (gm/cc).
      i. Water Vapor Transmission (ASTM E96): 0.61 perms at 1.5 inches.
      j. Air Infiltration (ASTM E283): 75 Pa 0.001 L/S/m2 (1.57 psf) (less than 0.001 cfm/ft2); 300 Pa 0.001 L/S/m2 (6.24 psf) (less than 0.001 cfm/ft2).
      k. Air Permeance (ASTM E2178): 75 Pa 0.000055 L/S.m2.Pa 0.000117 ft3/min.mw.Pa; 300 Pa 0.000024 L/./m2.Pa 0.000051 ft3/min.mw.Pa.
      l. Sound Transmission Coefficient (STC) (ASTM E90 and ASTM E413): 36 STC

### 2.2 ACCESSORIES

A. Primer: As required by insulation manufacturer base on substrate materials and conditions.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. Examine substrates, areas, and conditions under which the air barrier assembly will be installed, with Installer present, for compliance with requirements.
   1. Verify that surfaces and conditions are suitable prior to commencing work of this section. Do not proceed with installation until unsatisfactory conditions have been corrected.
   2. Ensure that the following conditions are met:
      a. Surfaces are sound, dry, even, and free of oil, grease, dirt, excess mortar or other contaminants
      b. Concrete surfaces are cured and dry, smooth without large voids or sharp protrusions.
      c. Masonry joints are reasonably flush, and all excess mortar sitting on masonry ties has been removed.

3. Verify substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263 and take suitable measures until substrate passes moisture test.
4. Verify sealants are compatible with membrane proposed for use. Perform field peel-adhesion test on materials to which sealants are adhered.
5. Notify Architect in writing of anticipated problems using closed-cell, medium density spray polyurethane foam over substrate prior to proceeding.

## 3.2 SURFACE PREPARATION

A. Clean, prepare, and treat substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air barrier application.
   1. Ensure that penetrating work by other trades is in place and complete.
   2. Prepare surfaces by brushing, scrubbing, scraping, grinding or compressed air to remove loose mortar, dust, oil, grease, oxidation, mill scale and other contaminants which will affect adhesion of the closed-cell, medium density spray polyurethane foam.
   3. Where there are release agents or other non-compatible coatings, wipe down metal surfaces to remove these release agents or other non-compatible coatings, using clean sponges or rags soaked in a solvent compatible with the spray polyurethane foam.
   4. Ensure veneer anchors are in place.

B. Protection from Spray Applied Materials:
   1. Mask and cover adjacent areas to protect from overspray.
   2. Ensure any required foam stop or back up material are in place to prevent over spray and achieve complete seal.
   3. Erect barriers, isolate area and post warning signs to advise non-protected personnel to avoid the spray area.

## 3.3 INSTALLATION

A. Spray Polyurethane Foam Installation: Install materials in accordance with manufacturer's recommendations, ULC S 705.2 and the following:
   1. Warning signs shall be displayed and non-protected personnel shall be kept from the spray area in accordance with ULC S705.2.
   2. Equipment used to spray polyurethane foam shall comply with ULC S 705.2 and the manufacturer’s recommendations for the specific type of application. Record equipment settings on the Daily Work Record as required by the ULC S 705.2 installation standard. Each proportioner unit shall supply only one spray gun.
   3. Apply only when surfaces and environmental conditions are within limits prescribed by the material manufacturer or the ULC S 705.2 Installation standard.
   4. Apply in consecutive passes as recommended by manufacturer to thickness as indicated on drawings. Passes shall be not less than 1/2 inch (12 mm) and not greater than 3.5 inches (75 mm). An additional pass shall only be done after the first pass has had time to cool down in accordance with with the manufacturer’s recommendations
   5. Install within manufacturer’s tolerances, but not more than minus 1/4 inch (6 mm).
   6. Do not install spray polyurethane foam within 3 inches (75 mm) of heat emitting devices such as light fixtures and chimneys.
   7. Finished surface of foam insulation to be free of voids and embedded foreign objects.
   8. Remove masking materials and over spray from adjacent areas immediately after foam surface has hardened. Ensure cleaning methods do not damage work performed by other sections.
   9. Trim, as required, any excess thickness that would interfere with the application of cladding/covering system by other trades.
   10. Clean and restore surfaces soiled or damaged by work of the section. Consult with section of work soiled before cleaning to ensure methods used will not damage the work.
   11. Complete connections to other components and repair any gaps, holes or other damage using material which conforms to ULC S 710.1 (single component) or ULC S 711.1 (two components) and installed in accordance with ULC S 710.2 or ULC S 711.2 as applicable.

## 3.4 FIELD QUALITY CONTROL

A. Inspection and Testing: Cooperate with Project Testing Agency. Allow access to work areas and staging. Notify Owner's testing agency in writing of schedule for Work of this Section to allow sufficient time for testing and inspection. Do not cover Work of this Section until testing and inspection is accepted.

## 3.5 PROTECTING AND CLEANING

A. Protec material from damage during installation and the remainder of the construction period, according to manufacturer's written instructions.
   1. Coordinate with installation of materials which cover the air barrier assemblies, to ensure exposure period does not exceed that recommended by the manufacturer.

B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction and acceptable to the primary material manufacturer.

**END OF SECTION**

**SECTION 072726**

**FLUID APPLIED MEMBRANE AIR BARRIERS, VAPOR-RETARDING**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Surface preparation.
B. Application of liquid-applied, vapor-retarding air barrier.
C. Application of materials to bridge and seal air leakage pathways in the following conditions:
   1.Wall-to-roof connections and penetrations.
   2.Wall-to-foundation connections.
   3.Windows, curtain walls, storefronts, louvers and door penetrations.
   4.Expansion and control joints.
   5.Masonry ties.
   6.All other penetrations through the wall assembly.

### 1.2 RELATED SECTIONS
A. Section 04810 – Unit Masonry Assemblies.
B. Section 07212 – Board and Batt Insulation.
C. Section 07531 – Single Ply Roofing – Fully Adhered EPDM
D. Section 07620 – Sheet Metal Flashing and Trim.
E. Section 07840 – Firestopping.
F. Section 07920 – Joint Sealers
G. Section 08110 – Steel Door and Frames

### 1.3 REFERENCES
A. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.
B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
C. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
D. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors.
E. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform or Cyclic Static Air Pressure Difference.
F. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials.
G. ASTM E2357 - Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.

### 1.4 SUBMITTALS
A. See Section 01300 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data for membrane and surface conditioner.
C. Shop Drawings: Indicate special joint or termination conditions and conditions of interface with other materials.
D. Certificate: Certify that products meet or exceed specified requirements.
E. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention, and acceptable installation temperatures.
F. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

### 1.5 QUALITY ASSURANCE
A. Use an experienced installer and adequate number of skilled personnel who are thoroughly trained and experienced in the application of the air barrier.
B. Air Barrier Installer performing Work shall be approved by air barrier membrane manufacturer.
C. Obtain air barrier materials from a single manufacturer regularly engaged in manufacturing the product.

**1.6 MOCK-UP**

A. Prior to installation of air barrier, apply air barrier as follows to verify details under shop drawing submittals and to demonstrate tie-ins with adjoining construction, and other termination conditions, as well as qualities of materials and execution.
B. Construct typical exterior wall panel, 8 feet (2.4 m) long by 8 feet (2.4 m) wide, incorporating back-up wall, cladding, insulation, flashing; illustrating materials interface and seals.
C. Do not cover any installed air barrier membrane unless it has been inspected, tested, and approved.
D. Mockup may remain as part of the Work.

**1.7 ENVIRONMENTAL REQUIREMENTS**

A. Cover air barrier no later than 4 months after application. Longer term exposure increases potential for UV degradation and physical damage.
B. Do not proceed with product application if rainfall is forecast or imminent within 12 hours.
C. Do not apply when air, material and surface temperatures are expected to fall below 20 degrees F (-6.7 degrees C) within 24 hours of completed application.

**1.8 WARRANTY**

A. See Section 01780 - Closeout Submittals, for additional warranty requirements.
B. Correct defective Work within a five-year period after Date of Substantial Completion.
C. Provide five year manufacturer warranty for waterproofing failing to resist penetration of water.
D. For warranty repair work, remove and replace materials concealing waterproofing.

**PART 2 – PRODUCTS**

**2.1 MANUFACTURERS**

A. Acceptable Manufacturers:
   1. Basis of Design: W. R. MEADOWS®, INC., 300 Industrial Drive / PO Box 338, Hampshire, Illinois 60140-0338. (800) 342-5976, Website: www.wrmeadows.com.
   2. Carlisle Coatings and Waterproofing, Sapulpa, OK 74067
   3. Mirafi, Norcross, GA 30092
   4. Substitutions: See Section 01600 - Product Requirements.

**2.2 MEMBRANE MATERIALS**

A. Basis of Design: AIR-SHIELD LSR by W. R. MEADOWS.
B. Liquid-Applied, Vapor-Retarding Air Barrier System: Single-component, liquid synthetic rubber, asphalt-free and vapor-retarding air barrier membrane.
   1. Performance Based Specification: Vapor-retarding air barrier membrane shall have the following characteristics:
      a. Color: Sprays pink, dries to desert tan.
      b. Minimum Application Temperature: 20 degrees F (-6.7 degrees C).
      c. Air Permeability, ASTM E2178: <0.004 cfm / ft2 @ 75 Pa (1.57 lbs. / ft2).
      d. Air Barrier Assembly, ASTM E2357: <0.04 cfm / ft2 @ 75 Pa (1.57 lbs. / ft2).
      e. Water Vapor Permeance, ASTM E96 (Method B): ≤ 0.1 perms.
      f. Elongation, ASTM D412: 700 %.
      g. Tensile Strength, ASTM D412: 250 psi.
      h. Nail Sealability, ASTM D1970: Pass.
      i. Maximum Service Temperature: 175 degrees F (80 degrees C).
      j. Flexibility at -15 degrees F (-26 degrees C) ASTM C836 2-inch mandrel: Pass.
      k. Flame Spread and Smoke Development, ASTM E84: Class A.
      l. Flame Propagation Testing, NFPA 285: Complies with various assemblies.
      m. VOC Content: 138 g/L.

## 2.3 ACCESSORIES

A. Transition Membrane and Flashing: 40-mil self-adhesive polymeric membrane for reinforcement of joints, inside and outside corners and dissimilar material connections.
B. Through-Wall Flashing: 40-mil self-adhesive polymeric sheet membrane.
C. Liquid Flashing: Fluid-applied, single-component, flashing membrane reinforcement of joints, inside and outside corners and dissimilar material connections.
D. Alternate Flashing: 40-mil self-adhesive polymeric sheet flashing membrane with aluminum facer for use at door and window openings.
E. Joint Reinforcing Fabric: Spun-bonded polyester fabric for reinforcement of flat joints and corner conditions with primary fluid-applied membrane.
F. Membrane Adhesive/Primer:
    1. Temperatures above 40 F degrees F (4 degrees C): Water-Based Adhesive
        a. MEL-PRIME™ W/B Water-Based Adhesive by W. R. MEADOWS (Basis of Design).
    2. Temperatures below 30 degrees F (-1 degrees C): Solvent-Based Primer.
        a. MEL-PRIME VOC-Compliant Solvent-Base Adhesive or Standard Solvent-Base Adhesive by W. R. MEADOWS (Basis of Design).
G. Pointing Mastic: mastic for sealing penetrations and terminations of membrane.
H. Termination Sealant: non-slump waterproofing material for joint detailing.
I. Concrete Repair Materials: general purpose patching materials.
J. Termination Bar: optional termination for through-wall flashing membrane.

# PART 3 – EXECUTION

## 3.1 EXAMINATION

A. Examine surfaces to receive membrane are deemed appropriate in accordance with air barrier manufacturer’s current technical literature.
B. Notify Architect if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected.
C. Start of the Work shall construe installer acceptance of substrates and conditions.

## 3.2 PREPARATION

A. Protect adjacent surfaces not designated to receive air barrier.
B. Clean and prepare surfaces to receive air barrier membrane in accordance with manufacturer's instructions.
C. Ensure all areas to receive joint treatment, reinforcement and membrane application are clean, dry, smooth, and free from all bond-breaking contaminants. Remove and replace any damaged structural substrate components.
D. Do not apply membrane system to surfaces unacceptable to manufacturer.
E. All surfaces to receive fluid-applied membrane air barrier system must be clean, free of standing water, ice, snow, frost, dust, dirt, oil, curing compounds, or any other foreign material detrimental to proper adhesion of the membrane.
F. Prefill all bug holes on concrete and masonry with appropriate cementitious patching mortar. Strike masonry joints flush.
G. Patch all cracks, small voids, offsets, irregularities, and small deformities on concrete and masonry surfaces with appropriate cementitious patching mortar at least two hours before application. Eliminate all sharp protrusions and fins in cast-in-place concrete.

## 3.3 INSTALLATION - MEMBRANE

A. Prime surfaces to receive self-adhering membranes within one working day with applicable primer. Areas not covered within one day shall be re-primed. Ensure primer extends a minimum of 1-inch (25.4 mm) beyond area to receive self-adhering membranes.
B. Crack and Joint Treatment of Cast-in-Place Concrete:
    1. Prefill nonmoving 1/16 inch to ¼-inch (1.6 mm – 3.2 mm) cracks and joints with termination sealant, mastic or liquid flashing and tool smooth, ensuring 1-inch coverage to both sides.

2. Prefill nonmoving 1/4 inch to 1-inch (6.4 mm – 25.4 mm) cracks and joints with termination sealant, mastic or liquid flashing and allow to cure. Apply and tool smooth liquid flashing 3-inches (76.2 mm) band beyond both sides of the joint area. Alternatively, apply a 4-inch-wide (101.6 mm) section of self-adhered transition membrane, centered over joint.

C. Dissimilar Material Connections:
   1. Connect joints between dissimilar building materials with a 6-inch-wide (152.4 mm) section of self-adhering transition membrane, centered over the dissimilar material joint.
   2. Alternatively, apply an 8-inch-wide (203.2 mm) band of liquid flashing, centered over the joint between material joint.

D. Exterior Sheathing Panels:
   1. Install and fasten exterior wood sheathing panels according to the sheathing manufacturer's instructions. Install and fasten exterior gypsum panels in accordance with manufacturer's instructions and ASTM C1280.
   2. Cover all fastener heads and removed fastener holes with termination sealant, mastic or liquid flashing.
   3. Joint Treatment with Termination Sealant:
      a. Prefill flat joints up to ¼ inch (6.4 mm) with joint termination sealant and strike flush with both sides of the exterior sheathing panels.
      b. Allow joint sealant to cure for a minimum of 24 hours prior to proceeding with full application of air barrier membrane.
   4. Joint Treatment with Liquid Flashing
      a. Prefill flat joints up to ¼ inch (6.4 mm) with liquid flashing and strike flush with both sides of the exterior sheathing panels.
      b. Prefill joints greater than ¼ inch (6.4 mm) but not greater than ½ inch (12.8 mm) with liquid flashing and allow to become firm. Apply liquid flashing extending 3-inches (76.2 mm) from the center of the joint onto both sides of the exterior sheathing panels.
      c. Run the spreader tool over the liquid flashing to remove inconsistencies.
   5. Joint Treatment with Self-Adhesive Membrane
      a. Prime both sides of the joint extending 3 inch (76.2 mm) from the center with the required primer/adhesive.
      b. Apply a 4-inch (25.4 mm) wide strip of self-adhesive membrane centered over the joint and roll press firmly into place.
      c. Fill all joints wider than ¼ inch (6.4 mm) with termination sealant prior to application of self-adhesive membrane.
   6. Joint Treatment with Fluid-Applied Membrane
      a. Fill joint area with fluid applied membrane using a spreader tool or putty knife.
      b. Apply fluid applied membrane extending beyond the joint line 3-inch (76.2 mm) onto face of exterior sheathing.
      c. Fully embed the reinforcing fabric 3-inch (76.2 mm) wide into the wet fluid applied membrane centered over the joint.
      d. Run the spreader tool or putty knife over the embedded reinforcing fabric to remove any air bubbles.

E. Inside and Outside Corners:
   1. Apply a 6-inch-wide (152.4 mm) section of self-adhering transition membrane flashing or liquid flashing onto properly prepared substrates at the center of inside and outside corners. Ensure a 2-inch (50.8 mm) overlap of successive sections.
   2. Roll all areas of membrane with roller ensuring full adhesion. Eliminate all wrinkles and fish-mouths.
   3. Alternatively, apply liquid flashing at the center of inside and outside corners, ensuring a minimum 3-inch (76.2 mm) lap onto each adjacent plane.

F. Through-Wall Flashing:
   1. Apply self-adhering through-wall flashing a minimum 8 inches (203.2 mm) onto properly primed backup wall substrates. Ensure through-wall flashing is recessed ½-inch (12.7 mm) from exterior face of masonry cladding.

2. Overlap successive sections of through-wall flashing 4 inches (101.6 mm) and apply termination sealant or mastic to each lap. Seal overlapped seams with mastic.
3. Roll all areas of through-wall flashing to ensure full adhesion.
4. Apply a bead of termination sealant or mastic onto horizontal leading edges and tool smooth to permit water shedding.

G. Primary Fluid-Applied Membrane Air Barrier Installation:
1. Apply air barrier membrane in accordance with manufacturer's instructions.
2. Thoroughly mix membrane prior to application while avoiding air entrapment.
3. Apply membrane by spray or roller to provide a uniform thickness of 75 wet mils.
4. Overlap fluid-applied air barrier 2 inches (50.8 mm) onto the leading edges of transition membranes and flashings.
5. Regularly inspect surface area with a wet mil gauge to ensure consistent thickness.
6. Cured thickness of membrane should be 40 mils dry.
7. Allow 48 hours for full cure of the membrane.

**3.4 PROTECTION**

A. Cover air barrier as soon as possible after application, as air barrier is not intended for permanent exposure.

**END OF SECTION**

**SECTION 074213**

**METAL WALL PANELS**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Pre-finished, pre-fabricated Architectural metal wall panel system. All metal trim, accessories, fasteners, insulation and sealants indicated on the drawings as part of this section.

### 1.2 RELATED SECTIONS
A. Section 076200- Sheet Metal Flashing and Trim
B. Section 079200- Joint Sealers

### 1.3 DEFINITIONS
A. Metal Wall Panel Assembly: Metal wall panels, attachment system components, miscellaneous metal framing, thermal, and accessories necessary for a complete weathertight system.

### 1.4 QUALITY ASSURANCE
A. Manufacturer and erector shall demonstrate experience of a minimum of five (5) years in this type of project.
B. Sheet Metal Industry Standard: Comply with Sheet Metal and Air Conditioning Contractors National Association (SMACNA) Architectural Sheet Metal Manual.
C. Panels shall be factory-produced only. No portable, installer-owned or installer-rented machines will be permitted.

### 1.5 SUBSTITUTIONS
A. The material, products and equipment specified in this section establish a standard for required function, dimension, appearance and quality to be met by any proposed substitution.

### 1.6 SYSTEM DESCRIPTION
A. Material to comply with:
   1. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

### 1.7 ROOF SYSTEM PERFORMANCE TESTING
A. General Performance: Metal wall panels shall comply with performance requirements without failure due to defective manufacture, fabrication, installation or other defects in construction.
B. Panels to meet:
   1. Metal Wall or Metal Soffit System shall be designed to meet applicable Local Building Code and the Soffit System shall have been tested by the Manufacturer per ASTM E-330 and have the applicable Load Tables published from this Air Bag testing for negative loads.

### 1.8 WARRANTIES
A. Finish warranty: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal wall panels that show evidence of deterioration of factory-applied finish within specified warranty period.
   1. Exposed Panels Finish - deterioration includes 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 a paint to adhere to a bare metal.
   2. Warranty Period: 20 Years from the date of substantial completion
B. Applicator shall furnish written warranty for a two (2) year period from date of substantial completion of building covering repairs required to maintain roof and flashings in watertight condition.

## 1.9 SUBMITTALS

A. Submittals shall be in conformance with section 013300 – Administrative Requirements.
B. Samples
   1. Panel assembly: Two samples of each type of assembly, 12” x 12” minimum.
   2. Two samples of each color or finish selected, 3" x 4" minimum.
C. Shop Drawings: Submit shop drawings showing project layout and elevations; fastening and anchoring methods; detail and location of joints, sealants, and gaskets, including joints necessary to accommodate thermal movement; trim; flashing; accessories; and details illustrating interface with adjacent materials.
D. Manufacturer’s literature shall certify that material meets specifications.
E. Submit fabrication drawings showing location and type of aluminum-extruded stiffeners at typical panels and at corner panels, if required.

## 1.10 DELIVERY, STORAGE AND HANDLING

A. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
B. Deliver components, sheets, metal wall panels and other manufactured items so as not to be damaged or deformed. Package metal wall panels for protection during transportation and handling.
C. Unload, store and erect metal wall panels in a manner to prevent bending, warping, twisting and surface damage.
D. Stack metal wall panels on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal wall panels to ensure dryness. Do not store metal wall panels in contact with other materials that might cause staining, denting or other surface damage.
E. Protect strippable protective coating on any metal coated product from exposure to sunlight and high humidity, except to the extent necessary for material installation.

## 1.11 PROJECT CONDITIONS

A. Weather Limitations: proceed with installation only when existing and forecasted weather conditions permit metal wall panel work to be performed.
B. Field Measurements: Verify actual supporting and adjoining construction by field measurements before fabrication and indicate recorded measurements on final shop drawings. Coordinate construction to ensure that wall panel assemblies fit properly to supporting and adjoining construction and coordinate schedule with construction progress to avoid delaying the work.
   1. Established dimensions: where field measurements cannot be made without delaying the work, guarantee dimensions and proceed with fabrication of wall panel assemblies corresponding to the established dimensions.

# PART 2 – PRODUCTS

## 2.1 MANUFACTURER

A. Basis of Design: Petersen Aluminum Corporation, 1005 Tonne Road, Elk Grove Village, IL 60007. Phone – 800-722-7440, Fax: 800-722-7150, www.pac-clad.com
   1. HWP Precision Series Wall Panels; .032 aluminum
B. Products indicated are provided by specified manufacturer. Other approved manufacturers shall provide products equal in thickness, panel weight, bond integrity, fire rating, paint color and finish to those specified and shall meet or exceed all minimum specifications listed.
   1. Substitutions: See Section 016000 - Product Requirements.

## 2.2 PANEL DESIGN

A. General: Provide factory-formed metal wall panels designed for wall, soffit and fascia applications where a flush or flat appearance is desired. A round interlock leg and concealed fastening system act to improve the flush appearance while providing additional strength.
B. Wall panels shall be Flush in 12" widths with 7/8" height.

C. Panels to be produced Smooth - Factory Standard.
Specifier note: Factory standard is smooth unless specified.
Specifier Note: Depending on producing factory, panels may be specified with venting strips or perforated, aluminum panels only, for soffit applications. Check with local factory for capabilities.

D. Forming: Use continuous end rolling method. No end laps on panels. No portable rollforming machines will be permitted on this project, no installer-owned or installer-rented machines will be permitted. It is the intent of the Architect to provide Factory-Manufactured panel systems only for this project.

## 2.3 MATERIALS AND FINISHES

A. Preformed metal panels shall be fabricated of .032 Aluminum, and shall be Herr-Voss corrective leveled for flat appearance.

B. Color shall be Colonial Red.

C. Finish shall be Kynar 500 or Hylar 5000 Fluorocarbon coating with a top side film thickness of 0.70 to 0.90 mil over a 0.25 to 0.3 mil prime coat to provide a total dry film thickness of 0.95 to 1.25 mil, to meet AAMA 621. Bottom side shall be coated with a primer with a dry film thickness of 0.25 mil. Finish shall conform to all tests for adhesions, flexibility and longevity as specified by Kynar 500 or Hylar 5000 finish supplier.

D. If Strippable coating to be applied on the pre-finished panels to the top side to protect the finish during fabrication, shipping and handling, film shall be removed before installation.

E. Trim: Trim shall be fabricated of the same material and finish to match the profile, and will be press broken in lengths of 10 to 12 feet. Trim shall be formed only by the manufacturer of their approved dealer. Trim to be erected in overlapped condition. Use lap strips only as indicated on drawings. Miter conditions shall be factory welded material to match the sheeting.

F. Accessories/Fasteners: Fasteners shall be of type, material, size, corrosion resistance, holding power and other properties required to fasten miscellaneous framing members to substrates. Accessories and their fasteners shall be capable of resisting the specified design wind uplift forces and shall allow for thermal movement of the wall panel system. Exposed fasteners shall not restrict free movement of the roof panel system resulting from thermal forces, except at designed points of roof panel fixity

G. Insulation: See Section 072113: Board and Batt Insulation.

H. Substrate shall be Plywood

I. Underlayment
   1. On all surfaces to be covered with metal wall panels, furnish and install a 40 mil "Peel & Stick membrane", required as outlined by metal panel manufacturer. Membrane to be a minimum of 40 mil thickness, smooth, non-granular, by one of the following manufacturers:
      a. W.R Grace "Ice & Water Shield"
      b. Cetco Strongseal
      c. Carlisle CCW WIP 300HT
      d. Interwrap Titanium PSU
      e. MFM Corp "Wind & Water Shield"
      f. Polyguard Deck Guard HT of Polyglas HT
      g. Tamko TW Tile and Metal Underlayment

J. Sealants
   1. Provide two-part polysulfide class B non-sag type for vertical and horizontal joints or
   2. One part polysulfide not containing pitch or phenolic extenders or
   3. Exterior grade silicone sealant recommended by roofing manufacturer or
   4. One part non-sag, gun grade exterior type polyurethane recommended by the roofing manufacturer.

## 2.4 FABRICATION

A. Comply with dimensions, profile limitations, gauges and fabrication details shown and if not shown, provide manufacturer's standard product fabrication.
   1. Max panel length is 25'.
B. Fabricate components of the system in factory, ready for field assembly.
C. Fabricate components and assemble units to comply with fire performance requirements specified.
D. Apply specified finishes in conformance with manufacturer's standard, and according to manufacturer's instructions.

## 2.5 ACCESSORIES

A. Extrusions, formed members, sheet and plate shall conform with ASTM B209 and the recommendations of the manufacturer.
B. Panel stiffeners, if required, shall be structurally fastened or restrained at the ends and shall be secured to the rear face of the composite panel with silicone of sufficient size and strength to maintain panel flatness. Stiffener material and/or finish shall be compatible with the silicone.
C. Sealants and gaskets within the panel system shall be as per manufacturer's standards to meet performance requirements.
D. Fabricate flashing materials from 0.040" minimum thickness aluminum sheet or as recommended by panel manufacturer to match the adjacent curtain wall/panel system where exposed. Post-painted spray-applied flashings are not acceptable. Provide a lap strap under the flashing at abutted conditions and seal lapped surfaces with a full bead of non-hardening sealant.
E. Fasteners (concealed/non-corrosive): Fasteners as recommended by system manufacturer.

# PART 3 – EXECUTION

## 3.1 INSPECTION

A. Examine alignment of structural steel and related supports, primary and secondary roof framing, solid roof sheathing, prior to installation.
B. For the record, prepare written report, endorsed by installer, listing conditions detrimental to performance of the Work.
C. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 FASTENERS

A. Secure units to supports
B. Place fasteners as indicated in manufacturer's standards.

## 3.3 INSTALLATION

A. Compliance: Comply with manufacturer's product data, recommendations and installation instructions for substrate verification, preparation requirements and installation.
B. Panels shall be installed plumb and true in a proper alignment and in relation to the structural framing. The erector must have at least five years successful experience with similar applications.
C. Install metal panels, fasteners, trim and related sealants in accordance with approved shop drawings and as may be required for a weather-tight installation.
D. Provide uniform, neat seams.
E. Fasteners: Conceal fasteners where possible in exposed work. Cover and seal fasteners and anchors for watertight and leakproof installation.
F. Remove all strippable coating and provide a dry-wipe down cleaning of the panels as they are erected.

G. Panels attached to any TREATED LUMBER MUST HAVE AN APPROPRIATE VAPOR BARRIER INSTALLED OVER THE TREATED LUMBER PRIOR TO INSTALLING ANY SOFIT PANELS OR RELATED FLASHINGS. DO NOT ALLOW ANY METAL PRODUCTS TO COME INTO DIRECT CONTACT WITH TREATED LUMBER.

**3.4 DAMAGED MATERIAL**

A. Upon determination of responsibility, repair or replace damaged metal panels and trim to the satisfaction of the Architect and Owner.

**3.5 CLEANING**

A. Cleaning: Remove temporary coverings and protection of adjacent work areas. Repair or replace damage installed products. Clean installed products in accordance with manufacturer's instruction prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.
B. Make sure weep holes and drainage channels are unobstructed and free of dirt and sealants.
C. Final cleaning shall not be part of the work of this section.

**END OF SECTION**

**SECTION 075323**

**SINGLE PLY ROOFING-FULLY ADHERED EPDM**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Substrate covering over metal deck and vapor retarder.
B. Vapor retarder and sheathing over metal deck surfaces.
C. Insulation.
D. EPDM Membrane roofing, base flashings, roof expansion joints, and all accessories and appurtenances for a complete system.

### 1.2 RELATED SECTIONS
A. Section 053100 - Steel Deck: Supply of acoustical insulation for deck flutes.
B. Section 061053 - Wood Blocking and Curbing
C. Section 076200 - Sheet Metal Flashing and Trim
D. Section 221006 - Plumbing Piping Specialties.

### 1.3 REFERENCES
A. ASTM C79 - Gypsum Sheathing Board
B. ASTM C 1177 - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
C. ASTM C1289-01 - Class I Grade II - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
D. E108 - Standard Test Methods for Fire Tests of Roof Coverings
E. E119 - Standard Test Methods for Fire Tests of Building Construction and Materials
F. FM 4470 (Factory Mutual Engineering Corporation) - Roof Assembly Classifications.

### 1.4 SYSTEM DESCRIPTION
A. Elastomeric Sheet Membrane EPDM Roofing System: Fully adhered single ply membrane roofing and flashing with vapor retarder, insulation, and all accessories and appurtenances for a complete system.

### 1.5 SUBMITTALS
A. Section 013300 - Administrative Requirements: Procedures for submittals.
B. Submit written certification that the roofing contractor/subcontractor has been an approved applicator of selected roof system for 5 years or more.
C. Submit written certification of license under the Illinois Roofing Industry Licensing Act.
D. Submit written certification from the proposed SPM manufacturer that all appropriate warranty paper work has been submitted prior to starting the work.
E. Submit a notice to award warranty, or similar, from proposed SPM roof system manufacturer stating that all details and specifications for roofing system have been reviewed and satisfy the requirements necessary to provide the specified manufacturer's system warranty.
F. Submit written certification from roofing system manufacturer that all details indicated in the drawings are acceptable to the roofing system manufacturer.
G. Submit written certification from insulation manufacturer that their insulation is compatible with the proposed SPM.
H. Submit written certification from roofing system manufacturer that proposed insulation faces are compatible with proposed single ply membranes.
I. Product Data: Provide characteristics on membrane materials, flashing materials, insulation, vapor retarders, and all products to be installed as part of roofing system.
    1. Material safety and technical information data sheets for all roofing system components.
    2. Insulation
        a. Polyisocyanurate
    3. EPDM
        a. membrane
        b. Self adhering flashing
        c. Adhesives
        d. Seam Tape

e. SPM sealant
f. Water cut off mastic

4. Mechanical Fasteners:
   a. Nails
   b. Screw Fasteners
5. SPM manufacturer's specification and instruction manual for all components of roofing system.
6. Sample copy of manufacturer's 15 year full roof system and 20 year material warranty.
7. Rubber walkway pads.
8. Vapor Retarder Materials
   a. Asphalt primer
   b. Asphalt
   c. Base sheet
   d. Top sheet
   e. Roofing Cement
9. Concrete Pavers.
10. Coverboard.

J. Shop Drawings:
   1. Submit shop drawings to the Architect. Shop drawings shall represent standards and detailing as specified herein or as indicated in the drawings.
   2. Minimum scale: 3" = 1'-0", except where otherwise specified. Manufacturer's standard details are unacceptable.
   3. Submit:
      a. Base flashing:
         1) Utilizing field ply EPDM as base flashing
         2) Utilizing reinforced EPDM strip
      b. Parapet Roof edge with coping.
      c. Mechanical/electrical equipment curbs.
      d. Roof plumbing vents.
      e. Roof drains showing appropriate extensions rings.
      f. Pipe penetration curb.
      g. Gutter roof edge.
      h. Expansion joints.
      i. Pipe Penetrations.
      j. Overflow scupper detail
      k. Base conditions at mechanical penthouse
      l. Roof plan/insulation layout:
         1) Tapered insulation layout minimum scale 1/8" = 1'-0".
         2) Indicate all roof curbs, penetrations, required saddles, and crickets.
         3) NO FLAT SUMPS AT DRAINS PERMITTED.
      m. Roof plan with proposed lap seam layout.

K. Samples: Submit 2 Manufacturer's samples.
   1. Insulation:
      a. Polyisocyanurate 3 pieces
   2. EPDM.
   3. Semi cured self adhering EPDM cover strip.
   4. Fasteners, as indicated on the drawings:
      a. Nails
      b. Screw fasteners w/stress plates
   5. 1/8 x 1 inch aluminum Termination bar
   6. Foam insulation adhesive
   7. Rubber walkway pad
   8. Concrete pavers
   9. Coverboard

## 1.6 SUBMITTALS FOR INFORMATION

A. Section 013300 - Administrative Requirements: Procedures for submittals.
B. Manufacturer's Installation Instructions: Indicate special precautions required for seaming the membrane.
C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
D. Manufacturer's Field Reports: Submit under provisions of Section 014000.
   1. Submit 3 copies of in-progress inspection reports.
E. Reports: Indicate procedures followed; ambient temperatures, humidity, wind velocity during application, work in progress and observations.

## 1.7 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing the products specified in this section with five years documented experience.
B. Applicator: Company specializing in performing the work of this section with five continuous years documented experience as an approved applicator of one of the specified manufacturer's.
C. Be certified by the State of Illinois in accordance with the Illinois Roofing Industry Licensing Act, Senate Bill 1664, as amended.
D. Have all crew members trained by the SPM manufacturer in the installation of their system. Written certification of same must be forwarded upon request.
E. Have installed five (5) fully adhered EPDM roof systems within the last year, 300 squares or larger.
F. Perform work in accordance with current published manufacturer's instructions and recommendations.

## 1.8 REGULATORY REQUIREMENTS

A. Conform to applicable code for roof assembly fire hazard requirements.
B. UL 790: Class A Fire Hazard Classification.
C. FM 4470: Roof Assembly Classification, of Class 1 Construction, wind uplift requirement of I-90, in accordance with FM Construction Bulletin 1-28.

## 1.9 PRE-INSTALLATION MEETING

A. Section 013300 - Administrative Requirements: Pre-Installation meeting.
B. Convene one week before starting work of this section.
C. Roof Foreman for project - MUST BE IN ATTENDANCE.

## 1.10 DELIVERY, STORAGE, AND PROTECTION

A. Section 016000 - Product Requirements: Transport, handle, store, and protect products.
B. Store products on clean raised pallets in weather protected environment, clear of ground and moisture per manufacturer's recommendations.
C. Deliver all materials in manufacturer's original, unopened containers and rolls with all labels intact and legible.
D. Deliver materials requiring fire resistance classification packaged with labels attached as required by the labeling service.
E. Deliver materials in sufficient time and quality to allow continuity of work and compliance with approved construction schedule.
F. Store rolled goods on end and handle rolled goods in manner to prevent damage to edges or ends.
G. Provide continuous protection of materials against damage or deterioration.
H. Remove damaged or defective materials from site.
I. Roof Insulation:
   1. Store insulation on clean, raised platforms, remove manufacturer’s wrappings and cover with breathable, waterproof weather protective coverings.
   2. Provide continuous protection of insulation materials against wetting and moisture absorption.

3. Remove wet insulation materials from the project site.
4. Once insulation becomes wet, it will be removed from the site and not used. Wet insulation which then dries shall be removed from the site, the same as wet insulation.

J. Comply with fire and safety regulations.
K. SPM splice cleaner to be contained in UL approved safety cans at all times.
L. All materials shall be new.
M. Do not store material or park vehicles/dumpsters in front of doors.
N. No materials shall be stored on any new or existing roofing system.

## 1.11 ENVIRONMENTAL REQUIREMENTS

A. Section 016000 - Product Requirements: Environmental conditions affecting products on site.
B. Do not apply EPDM roofing membrane during inclement weather and/or ambient temperatures below 20 degrees F or above 95 degrees F.
C. Do not apply roofing membrane to damp or frozen deck surface.
D. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.
E. All SPM sealants and adhesives must be kept at 60 degrees F prior to installation when the ambient temperature falls below 40 degrees.

## 1.12 COORDINATION

A. Coordinate work under provisions of Section 013300.
B. Coordinate the work with the installation of trades whose impinges on the roofing and of associated metal flashings, as the work of this section proceeds.

## 1.13 PROTECTION

A. Avoid heavy traffic on heavy work.
B. Restore to original condition or replace all the work or materials damaged by roofing operations.
C. Protect the paving, grass and building walls adjacent to hoists and kettles prior to starting work.
   1. Lap all suitable protective materials at least 6 inches.
   2. Secure protective coverings against wind.
   3. Leave protective covering in place for duration of roofing work.
   4. Repair any damage to existing conditions caused by work of this section.
D. Remove protection upon completion of the roofing work.

## 1.14 WARRANTY

A. Refer to Section 017700 - Closeout Submittals for additional information.
B. Correct defective work within a two-year period after Substantial Completion for damage to building resulting from failure to prevent penetration of water.
C. General Contractor: To provide manufacturer's 15 year total roofing system warranty for roofing system, guaranteeing the materials manufacturer will pay for repairs to stop the leaks resulting from the natural deterioration of the membrane or from any errors in application of the membrane.
   1. Carlisle Golden Seal Roofing System Warranty.
   2. Elevate Red Shield Roofing System Limited Warranty.
   3. Gencorp Inc.; EPDM Roofing System Warranty.
   4. Manville Roofing Systems Gold Shield Roofing System Guarantee.
   5. Versico Roofing Systems Total System Warranty.
   6. Warranty shall include the asphalt used to fully adhere the high density, closed cell, polyisocyanurate cover board.
D. General Contractor: To provide manufacturer's standard 20 year guarantee/warranty for roofing membrane guaranteeing that the membrane material used in the roofing system will not deteriorate to the point of failure due to weathering.
   1. Carlisle Syntec Incorporated 20-Year Membrane and Material Warranty.
   2. Elevate roofing, wall, and lining systems, Roofing Membrane Limited Warranty.

3. Gencorp Inc.; Limited Membrane Only Warranty.
4. Manville Roofing Systems 20-Year Membrane and Material Warranty.
5. Versico Roofing Systems 20 Year Extended Membrane Material Warranty.

E. The guarantee shall start from the day of inspection by the manufacturer's representative. The date shall be established as the date the Architect and the manufacturer's representative inspect the work and find that all work is complete and forms a watertight installation.
F. The roofing contractor shall notify the Architect in writing when the roof is complete for final inspection.
G. Regardless of the warranty specified, the installing contractor shall utilize the Architect's details for roof installation except where requirements to obtain the warranty are more stringent than the Architect's details or if no Architect's detail is provided for a specific condition, in which case the Manufacturer's detail shall be utilized.
H. Following the complete installation of the roofing system and sheet metal, all roof drain downspouts are to be rodded clean and written verification submitted verifying all roof drain downspouts are in working order.
I. Completed Operations Inspection:
   1. Upon completion of installation of EPDM roof system, an inspection of the entire roof system shall be made by Contractor to determine compliance with manufacturer's requirements. Submit written notice of same in accord with Section 017300.
   2. Upon completion of installation of EPDM roof system, Manufacturer shall certify in writing to the Architect that materials, workmanship, and installation were in accordance with the manufacturer's printed instructions and current recommendations.
J. See Section 017700 - Closeout Submittals, for additional warranty requirements.

## PART 2 – PRODUCTS

### 2.1 MANUFACTURERS- MEMBRANE MATERIAL

A. Elevate roofing, wall, and lining systems, 26 Century Blvd., Suite 205, Nashville, Tennessee, www.holcimelevate.com.
B. Manville Roofing Systems, P.O. Box 5108, Denver, CO 80217-5108
C. Carlisle Syntec Incorporated, P.O. Box 7000, Carlisle, PA 1701 Phone: 800-4-SYNTEC.
D. Genflex Roofing Systems, 1722 Indian Wood Circle, Suite A, Maumee, OH 43537
E. Jersico Roofing Systems Total System Warranty, 3485 Fortuna Drive, Akron, OH. 44312. Phone: 800-992-7663.
F. Section 016000 - Materials and Equipment: Product options. Substitutions: Not permitted.

### 2.2 MEMBRANE AND ASSOCIATED MATERIALS

A. Membrane: EPDM reinforced 60 mil thick.

| | Properties | Test | Pass Test |
|---|---|---|---|
| 2. | Tensile Strength | ASTM D412 | 1305 psi |
| 3. | Elongation | ASTM D412 | 350% |
| 4. | Tear Strength | ASTM D624 Die C | 175#/in. |
| 5. | Water Absorption | ASTM E96 | 0.1 perms |
| 6. | Moisture Vapor Perms | ASTM E96 | 0.1 perms |
| 7. | Resistant to Outdoor Weathering | ASTM D22 | No cracks- No crazing |
| 8. | Low Temperature Brittleness | ASTM D746 | -75 degrees F. |
| 9. | Ozone Resistance | ASTM D1149 | No cracks |

B. Seaming Materials: As recommended by membrane manufacturer.

### 2.3 ADHESIVE MATERIALS

A. Surface Conditioner: Compatible with membrane, as recommended by membrane manufacturer.
B. Membrane Adhesives: As recommended by membrane manufacturer.
C. Insulation Adhesive: As recommended by insulation manufacturer.

D. Thinner and Cleaner: As recommended by adhesive manufacturer, compatible with sheet membrane.

## 2.4 SUBSTRATE COVERING MATERIALS

A. Fiberglass faced Gypsum Roof Board: 1/2 inch thickness, Type X, water resistant, zero flame spread, zero smoke development; ASTM E-136, Dens-Deck Prime, Georgia Pacific, Atlanta GA.
B. Coverboard: Facing Compatible with roofing membrane, ½ inch thickness high density, closed cell, polyisocyanurate equal to Elevate Isogard HD or Dens-Deck Prime as recommended by EPDM manufacturer. Install as per recommendations of cover board manufacturer.
C. 3 ply vapor retarder

## 2.5 INSULATION

A. Manufacturers:
   1. Carlisle Syntec Incorporated.
   2. Elevate roofing, wall, and lining systems.
   3. Genflex Roofing Systems.
   4. Manville Roofing Products.
   5. Versigard Roofing Systems.
   6. Section 016000 - Product Requirements: Product options. Substitutions: Not permitted.
B. Polyisocyanurate foam panels shall be HCFC free and formulated with hydrocarbon blowing agents chemically bonded during the foaming process to facers on top and bottom surfaces.
C. Flat Insulation: Flat rigid board conforming to ASTM C1289 -01 Type II, Class I, Grade II, UL 1256 No. 120 and 123, UL 790 (ASTM E108) Class A, Ul 263 (ASTM E119) FM 4450 / 4470 Class I fire rating, polyisocyanurate rigid board, both faces surfaced with fiber reinforced faces, with the following characteristics:
   1. Board Density: 2.0 lb/cu ft
   2. Board Size: 48 inches x 48 inches or 48 inches x 96 inches.
   3. Board Thickness: 1 1/2 inches
   4. Thermal Conductivity: LTTR value of 6/inch per ASTM C1303.
   5. Board Compressive Resistance: 20 psi min. PER ASTM D 1621
   6. Board Edges: Square
D. Tapered Insulation: Conforming to ASTM C1289 -01 Type II, Class I, Grade II, UL 1256 No. 120 and 123, UL 790 (ASTM E108) Class A, Ul 263 (ASTM E119) FM 4450 / 4470 Class I fire rating, polyisocyanurate rigid board, both faces surfaced with fiber reinforced faces, with the following characteristics:
   1. Board Density: 2.0 lb/cu ft
   2. Board Size: 48 inches x 48 inches
   3. Board Taper: Beginning thickness ½ inch minimum 1/8 inch/ft. slope.
   4. Thermal Conductivity: Aged R value of 5.56/inch as per ASTM C1303.
   5. Board Edges: Square
   6. Board Compressive Resistance: 20 psi min.
E. Cover board: Facing Compatible with roofing membrane, ½ inch thickness high density, closed cell, polyisocyanurate equal to Elevate Isogard HD or Dens-Deck Prime as recommended by EPDM manufacturer. Install as per recommendations of cover board manufacturer.

## 2.6 FLASHINGS

A. Flexible Flashings same material as membrane.
B. Copings, Fascias, Counterflashings and Misc. Sheet Metal: As specified in Section 076200.
C. Control or Expansion Joint Flashing: As specified in Section 076200.

## 2.7 ACCESSORIES

A. Prefabricated Roof Specialties: As specified in Section 07710.
B. Tapered Edge Strips: Polyisocyanurate, compatible with EPDM. Tapered edge strip manufactured configuration as detailed. Provided by EPDM membrane manufacturer.

C. Sheathing Adhesive: Non-combustible type, for adhering gypsum sheathing to metal deck.
D. Sheathing Joint Tape: Paper type.
E. Insulation Joint Tape: Asphalt treated glass fiber reinforced; 6 inches wide; self adhering.
F. Cover Strips: 6 inch minimum widths semi-cured self adhering EPDM as supplied by roof system manufacturer and provided by contractor.
G. Roofing Nails: Ring shank aluminum, size as required to suit application with 1 inch plastic washer heads.
H. Insulation Fasteners: Appropriate for purpose intended and approved by Factory Mutual and system manufacturer; length required for thickness of material with metal washers; manufactured by EPDM manufacturer.
I. Sealants: As recommended by membrane manufacturer.
J. Walkway Pads: 24 inches x 24 inches x 2-1/4 inches thick Sure Seal Rubber Pavers; Carlisle Syntec or equal.
K. Preformed Boots: Flexible boot with self adhering flange for pipe penetrations through membrane by membrane manufacturer.
L. SPM Manufacturers Water Cut-Off Mastic: Provide as needed to sheet metal manufacturer.
M. Foam Adhesive: PL200 Panel and Foam Adhesive by Rexnord Chemical Products, Minneapolis, MN.
N. Steep Asphalt: Type III, ASTM 312.
O. Rosin Paper.
P. Finishing Felts/Fiberglass Felts: Type IV, ASTM 2178.
Q. Fiberglass Base Sheet: Type II, ASTM 4601.
R. Self Adhering Vapor Retarder.
S. Miro Pipe Curbs.
T. Termination Bars: 1/8 inch by 1 inch minimum as supplied by roofing manufacturer and provided by contractor.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. Verify that surfaces and site conditions are ready to receive work.
B. Verify deck is supported and secure.
C. Verify deck is clean and smooth, free of depressions, waves, or projections, properly sloped to drains.
D. Verify deck surfaces are dry and free of snow or ice. Confirm dry deck by moisture meter with 12 percent moisture maximum.
    1. Cast-in-place concrete must cure a minimum of 28 days prior to the installation of vapor barrier.
E. Verify adjacent precast concrete roof members do not vary more than 1/4 in height. Verify grout keys are filled flush.
F. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set and wood blocking is in place.
G. Verify that all work of subcontractors which penetrates roof deck or requires men and equipment to traverse roof deck has been completed.
H. Do not issue a proceed order to the subcontractor or proceed with work until all defects are corrected to satisfaction of and with written approval of the roofing system manufacturer.
I. Repair any minor sections of the roof deck which may have been damaged to provide smooth level surface.
J. Do not install any roof insulation until all perimeter roof edge wood blocking is installed. All wood blocking shall be ACQ Type D treated lumber, installed with staggered and scarfed joints, without buckles or warps and be screw fastened.
K. Verify that all roof edge perimeter conditions are constructed prior to roof system installation.

## 3.2 PREPARATION - METAL DECK

A. Install preformed sound absorbing fiber insulation strips supplied by Section 053100, in acoustic deck flutes; in accordance with manufacturer's instructions.
B. Install gypsum sheathing coverboard on metal deck with FM approved screw fasteners and stress plates at one per every two square feet, into top flute of metal roof deck only.
C. Lay sheathing with long side at right angle to flutes; stagger end joints; provide support at ends.
D. Cut sheathing cleanly and accurately at roof breaks and protrusions to provide smooth surface. Tape joints.
E. Mechanically fasten sheathing at full roof area using FM approved screw fasteners and stress plates at one per every two square feet.
F. Adhere sheathing to roof deck in accordance with the adhesive manufacturer's printed recommendations.
G. Mechanically fasten sheathing to roof deck, in accordance with Factory Mutual requirements.

## 3.3 INSTALLATION

A. Install roofing with flashing systems and accessory items in strict accordance with system manufacturer's printed instructions current at the date of bidding documents. When items of conflict arise between the manufacturer's recommendations and the contract documents, the more stringent will govern unless it violates manufacturer’s warranty requirements.

## 3.4 VAPOR RETARDER APPLICATION

A. Vapor Retarder: 3 Ply Asphalt Adhesive
    1. Kettle Temperatures:
        a. Each kettle shall be provided with a thermometer in good working order.
        b. Heating of Asphalt: 525 degrees F per manufacturer's recommendation.
        c. Application: Steep Asphalt Manufacturer's published EVT with a range of 25 degrees + or –
    2. At continuous option, a self-adhering asphalt vapor barrier may be used.
    3. Asphalt Application:
        a. Roofing materials shall not be applied when moisture, in any form such as dew, can be seen or felt on the surface to which the materials are to be applied. Properly apply waterproofing.
        b. Materials shall not be applied when any foaming, blistering or bubbling of the hot asphalt occurs.
        c. All hot asphalt applications shall be maintained within 25 degrees F or asphalt's EVT temperature, as supplied by the material manufacturer. Asphalt temperature shall never fall below 400 degrees F. at the point of membrane application. The kettle temperatures shall never exceed the manufacturer recommended maximum temperature.
    4. Metal Roof Decks:
        a. Install ½ inch layer of Dens Deck prime and mechanically fasten with FM approved screw fasteners and stress plates at a rate of 1 per 2 square feet into top flute of metal roof deck only.
            1) Errantly installed fasteners into the bottom flute are to be removed.
        b. Starting at the low point, embed base sheet mopped to the entire surface of the insulation with steep asphalt at a rate of 20 lbs. per square feet. Lap sides 2 inches. Lap ends 6 inches.
        c. Starting at the low point, mop in finishing felts solid over base sheet with approximately 20 lbs. per square of steep asphalt, and while hot, embed finishing felt lapping sides a minimum of 4 inches and lapping the ends of the roll a minimum of 6 inches. Offset base sheet felt 12 inches.
        d. Set third ply offset 12inches from 2nd finishing felt.
        e. Cover exposed vapor barrier felts with a glaze coat of asphalt, utilizing a squeegee application of 10 lbs. per square on the day of felt installation.

**3.5 INSULATION APPLICATION: Adhesive Application**

A. Ensure vapor retarder is clean and dry.
B. Apply adhesive to deck in accordance with adhesive and insulation manufacturer's instructions. Embed insulation into adhesive with full contact. Step into place and position so that no cupping occurs.
C. Apply adhesive to the top surface of insulation. Embed the second layer of insulation into adhesive, with joints staggered minimum 12 inch from joints of first layer.
D. Place the constant thickness first layer and the tapered thickness insulation second layer to the required slope pattern in accordance with manufacturer's instructions.
E. Minimum total Insulation thickness: 2 inches.
F. Place Boards perpendicular to deck flutes with edges over top flute surface for bearing support.
G. Lay boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.
H. Lay tapered boards in full compliance with approved tapered insulation shop drawings layout.
I. Apply no more insulation than can be covered with high density, closed cell, polyisocyanurate cover board in same day.
J. Tape joints of insulation in accordance with insulation manufacturer's instruction.
K. Leading edge of tapered insulation shall be ½ inch with 0 to ½ inch tapered edge strips provided for a flush transition. Fully adhere.
L. Install two-way tapered saddles and edge strips in adhesive, as indicated on the drawings. Step into place and position so that no cupping occurs.
M. Insulation shall have surface joints ¼ inch or less in width.
N. Repair all joints or holes greater than ¼ inch in diameter with same material.
O. Field cut tapered and base insulation to fit around the differing deck elevations and roof curbs.
P. Tapered insulation shall originate at center of the roof drain and be cut perpendicular to the drain flange at the clamping ring.

**3.6 INSULATION APPLICATION: Mechanically Fastened**

A. Ensure vapor retarder is clean and dry.
B. Mechanically fasten insulation to deck in accordance with insulation manufacturer's instructions, utilizing FM approved screw fasteners and stress plates at one per two square feet using stand-up pneumatic screw fasteners hand-gun installation tool (e.g. Accutrac 11 by Buildex) into top flute of metal deck only.
C. Place the second layer of insulation with joints staggered minimum of 18 inches from joints of first layer.
D. Place one FM approved screw fastener and stress plate per 2 square feet of insulation board into top flute of metal roof deck.
E. Place the constant thickness first layer and the tapered thickness insulation second layer to the required slope pattern in accordance with manufacturer's instructions.
F. Minimum total Insulation thickness: 2 inches.
G. Place boards perpendicular to deck flutes with edges over to flute surface for bearing support.
H. Lay boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.
I. Lay tapered boards in full compliance with approved tapered insulation shop drawings layout.
J. Tape joints of insulation in accordance with insulation manufacturer's instructions.
K. Leading edge of tapered insulation shall be ½ inch with 0 to ½ inch tapered edge strips provided for a flush transition. Mechanically fasten tapered edge strips at 12 inches on center.
L. Install two-way tapered saddles and edge strips in hot asphalt, as indicated on the drawings. Mechanically fasten.
M. Top layer of insulation shall have surface joints ¼ inch or less in width.
N. Repair all joints or holes greater than ¼ inch in diameter with same material or spray foam insulation.
O. Field cut tapered and base insulation to fit around the differing deck elevations and roof curbs.
P. Tapered insulation shall originate at center of the roof drain and be cut perpendicular to the drain flange at the clamping ring.

## 3.7 MEMBRANE

A. Install reinforced 60 mil EPDM securement strip at the perimeter conditions.
B. Position membrane without stretching over the substrate.
C. Allow the membrane to relax for approximately 1/2 hour before adhering.
D. Fold sheet in half longitudinally.
E. Apply bonding adhesive to insulation and SPM after adhesive has dried to where it does not string or stick when pushed into with finger.
    1. Roll EPDM into bonding adhesive.
    2. Broom EPDM flush to insulation to achieve positive bonding.
F. Repeat steps B through E for remaining portion of the roof.
G. Membrane should be fully adhered to insulation and perimeter wood blocking with bond adhesive and to securement strip with splice adhesive. Membrane should extend up and over perimeter wood blocking and down 1 inch minimum onto the masonry, fully adhere and nail 6 inches on center with cap nails on the same day installed.
H. Exposed corners of the perimeter wood blocking are to be flashed with uncured EPDM extending 1 inch down onto masonry and nailed at 6 inches on center with ecap nails.
I. Install water cut-offs at end of the day's work using water cut-off mastic. Remove water cut-off mastic prior to beginning the next day's work.
J. Where applicable, fold the EPDM field sheet into corners and create a "pig's ear" to eliminate excess material. Do not cut membrane. Adhere the pig's ear to the EPDM with splice adhesive.
K. Lap joints shall be a minimum of 5 feet from roof drains.
    1. Seams shall be water lapped.

## 3.8 LAP SEAM TAPE SPLICES

A. All field lap seams to be fabricated using tape adhesive.
B. Shingle lay membrane 5 inches towards the roof drain.
C. Mark 1 inch to the low side of the overlapping sheet with a crayon.
D. Tack back the overlaying sheet with primer at 4 feet on center.
E. Thoroughly clean and prime membrane, both on the overlap and the underlap conditions. Allow to dry.
F. When washing and priming seam, be sure to wash lengthwise across the sheet, except at factory seams where you should wash in direction of factory seam to remove talc.
G. Install tape in proper alignment so it will protrude out ¼ inch to ½ inch beyond the overlaying sheet.
H. Roll seam tape with 4 inches hand roller. Using hand pressure only is not acceptable.
I. Bring overlapping membrane over the top of the seam tape and release the paper.
J. Remove release paper by pulling at a 45 degree angle.
K. At seam tape laps, lap seam tape 1 inch.
L. Untack the EPDM sheet and allow it to fall into place.
M. Following removal of the release paper, broom membrane into sealant tape.
N. Roll seam with 1-1/2 inches silicone roller at 45 degree angle to the seam.
O. All products used in seam must be supplied by membrane manufacturer.
P. All SPM field lap seams to be covered with 6 inches uncured EPDM, self-adhering EPDM cover strips.
Q. In irregular areas where ¼ inch seam tape is not shown and at tee-joints, patches of uncured EPDM will be required.
R. At tee-joints, cut out portion of membrane below cover piece to offer full adherence of all pieces of membrane. Following this, install 6 inches x 6 inches patches of uncured EPDM over same. Use a soft bristled push broom.
S. Following approval by Architect and/or membrane manufacturer, clean and prime top of completed seam at the edge and install a continuous bead of SPM lap sealant.

## 3.9 LAP SEAM COVER STRIPS

A. Following Architect's inspection of lap seam and the Architect's approval of same, wash the lap seam and EPDM membrane 6 inches to each side of the lap seam edge to remove any accumulated debris with clean water.
B. Scrub the power washed lap seam and EPDM membrane with water and soap, using a scrub brush. Rinse thoroughly.
C. Splice wash cleaned area. Prime 6 inches to each side of lap splice edge.
D. Install splice adhesive across the primed membrane with either a roller or a paint brush.
E. When the splice adhesive has been flashed off and is tacky to a finger-push test, install a 6 inches piece of self-adhering cured EPDM; center down lap splice edge.
F. Thoroughly roll the self-adhering cured EPDM cover strip into place with a rubber roller
   1. The salvaged adhesive edge of cover strip shall be thoroughly rolled into place.
   2. At cover strip laps and laps with other membranes, carefully roll along the covered edge.
G. At the cover strip laps, tee joints and other membrane location laps, an uncured EPDM patch, large enough to extend a minimum of 3 inches beyond the lap in all directions is to be installed. All patch corners are to be ROUNDED.
H. Splice wash all edges of the cured EPDM cover strip and the uncured EPDM patches.
I. Install a continuous bead of lap sealant over the edge of the cover strip and patches. Using an SPM lap sealant screed, tool lap sealant into and over the edge of the cover strip and patching membrane.
J. All lap seam cover strip application to be reviewed and approved by the Architect, prior to the installation of the gravel ballast and/or concrete pavers.

## 3.10 ROOF CURB AND BASE FLASHING

A. Secure field membrane by screwing through metal anchor bar at 6 inches on center with approved screw fasteners, where possible install reinforced 60 mil EPDM securement strip previously fastened at 6 inches on center.
B. Extend roofing membrane up wall or vertical surface or over wood blocking nailer, as indicated and fully adhere to reinforcement strip vertical surface.
C. Nail top of base flashing to wood nailer strip at 6 inches on center with 1-inch hard roofing nails with cap nails.
D. All flashings and termination shall be done in accord with the manufacturer's standard details or as detailed, whichever is more stringent.
E. Use prefabricated, self adhering corners where possible.
F. Cover anchor bar strips with SPM flashing, extending above anchor bar and 6 inches out on horizontal roof surface.
G. Apply appropriate adhesive to the SPM flashing, the roofing membrane, and the curb wall.
H. After the lap cement dries to a point where it does not string or stick to the dry finger touch, roll the base flashing into the adhesive and roll with steel roller to achieve positive bonding.
I. Clean the edges of completed SPM flashing laps with an approved splice wash. Then apply the lap sealant along both edges of the SPM flashing. Feather.
J. All vertical splice laps shall be covered with a 6 inches minimum cover strip of uncured EPDM extend 3 inches beyond horizontally on the flat.
K. Fold SPM flashing into corners to create a "pig's ear" and eliminate excess material. Do not cut off membrane. Adhere "pig's ear" to SPM.
L. Cover the vertical surfaces of end wall flashing with the uncured neoprene flashing. Apply SPM lap sealant to exposed edges of uncured neoprene flashing.
M. Terminate top of flashing on masonry with 1/8 x 1 inch aluminum termination bar with manufacturer-approved expansion anchors at 6 inches on center.
   1. Install water cut-off mastic between masonry and SPM, prior to installation of termination bar.
   2. Cut EPDM flush to top of termination bar.
   3. Install SPM lap sealant to top of termination bar.

N. Terminate vertical flashing ends on masonry with 1/8 inch aluminum termination bar with manufacturer-approved expansion anchors at 4 inches on center.
   1. Install the water-cut off mastic between masonry and SPM prior to installation of the termination bar.
   2. Cut EPDM flush to top of termination bar.
   3. Install SPM lap sealant to top of termination bar.
O. Cover termination bar with metal counterflashing.
P. Secure top of flashing on plywood and wood blocking with aluminum nails at 4 inches on center. Seal top of flashing with SPM Lap Sealant installed same day as flashing.
Q. The 1/8 inch thick aluminum termination bar must be installed atop base flashing on day base flashing in installed.

## 3.11 PIPE PENETRATIONS

A. Flash pipe with premolded pipe flashings with self adhering flange where installation is possible.
B. Where the molded pipe flashings cannot be installed, use field fabricated flashing techniques using uncured EPDM.
C. Raise the pipe penetrations and roof vents to maintain a minimum of 8 inches projection above surface of new roof surface. Verify that all pipe penetrations extend to a minimum of 8 inches above the finished roof surface.
D. Apply lap sealant at all flashing edges.
E. Provide water cut-off mastic between the pipe and molded pipe flashing.
F. Install stainless steel clamping ring around pipe at top of premolded pipe flashing.
G. Install SPM lap sealant at top pipe boot/field flashing.
H. Premolded pipe boot:
   1. When flashing must be cut to fit pipe penetration and top of premolded boot is below 8 inches above SPM, pipe penetration is to be wrapped in uncured EPDM.
   2. Top edge is to be a minimum of 8 inches above the SPM. Premolded pipe boot is then to be installed.
   3. Wrap all gas vent pipe penetration with cured EPDM membrane following completion of field flashing.
      a. Field Flashings
         1) Install stainless steel rain cap around pipe and over tip of field flashing.

## 3.12 ROOF DRAINS

A. Insert base insulation and tapered insulation under drain extension ring. Twist extension ring tight into insulation.
B. Originate tapered insulation at center of the drain. Cut high density, closed cell, polyisocyanurate cover board insulation perpendicular to drain flange at the clamping ring.
C. Seal between the membrane and drain flange with water cut-off mastic, as indicated in manufacturer's standard details.
D. Set clamping rings and secure.

## 3.13 DAILY SEAL

A. Temporarily seal loose edges of membrane with water cut-off mastic or adhesive at end of the working day. Loose night seals are unacceptable.
   1. Surface shall be clean and dry.
   2. Apply water cut-off mastic at a rate of 100 lineal feet per gallon, 12 inches back from edge of sheet onto exposed surface.
   3. If necessary, use a trowel to spread material in order to achieve complete seal.
B. After embedding the membrane in night seal, check for continuous contact. Weight edge, providing continuous pressure over length of the cut off.
C. When the work is resumed, pull sheet face free before continuing installation.
D. Cut off and remove a portion of SPM with water cut-off mastic on it.

### 3.14 RUBBER WALKWAY PADS

A. Install in full accordance with manufacturer's printer instructions as laid out on the drawings.
B. Verify location with Architect and Head of Maintenance or Director of Facilities.

### 3.15 FIELD QUALITY CONTROL

A. Section 014000 - Quality Requirements: Field inspection and Testing.
B. Correct identified defects or irregularities.
C. Require site attendance of roofing and insulation materials' manufacturer during installation of the Work.

### 3.16 CLEANING

A. Section 017700 - Closeout Submittals: Cleaning installed work.
B. In areas where finished surfaces are soiled by Work of this section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.
C. Repair or replace defaced or disfigured finishes caused by Work of this section.

### 3.17 EXTRA STOCK

A. Upon completion of all roofing work, provide the Owner with the following extra stock materials.
    1. 1 case SPM lap sealant
    2. 1 gallon can manufacturer's splice wash
    3. 1 case 6' diameter self-adhering uncured EPDM patches
B. Provide MSDS sheets on each material applied as extra stock.
C. Provide training to the Owner as to the appropriate installation of the self-adhering uncured EPDM patch.

### 3.18 PROTECTION OF FINISHED WORK

A. Section 017700 - Closeout Submittals: Protecting installed work.
B. Protect building surfaces against damage from roofing work.
C. Where traffic must continue over finished roof membrane, protect surfaces.

**END OF SECTION**

## SECTION 07620

## SHEET METAL FLASHING AND TRIM

### PART 1 – GENERAL

#### 1.1 SECTION INCLUDES
A. Flashings, counter-flashings, fabricated sheet metal items, and fabricated sheet metal items, and through wall rigid flashings.
B. Reglets and accessories.

#### 1.2 RELATED SECTIONS
A. Section 042000 - Unit Masonry Assemblies: Rigid Through-wall flashings in masonry.
B. Section 061053 - Wood Blocking and Curbing
C. Section 079200 - Joint Sealers.

#### 1.3 REFERENCES
A. ASTM A 666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2000.
B. ASTM B 370 - Standard Specification for Copper Sheet and Strip for Building Construction; 1998.
C. ASTM D 226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 1997a.
D. SMACNA (ASMM) - Architectural Sheet Metal Manual; Sheet Metal and Air Conditioning Contractors' National Association; 1993, Fifth Edition.

#### 1.4 DESIGN REQUIREMENTS
A. Sheet Metal Flashings: Comply with the criteria of SMACNA "Architectural Sheet Metal Manual." and Copper Development Association "Copper in Architecture - Handbook."

#### 1.5 SUBMITTALS
A. See Section 013300 - Administrative Requirements, for submittal procedures.
B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
C. Samples: Submit two full size samples, 12" inches long illustrating typical coping material and finish. Include continuous cleats, backer plates, cover plates and/or drive cleats.

#### 1.6 SUBMITTALS AT PROJECT CLOSEOUT
A. Section 017300 - Execution Requirements Procedures for submittals.
B. Warranty: Submit manufacturer's 20 year material warranty. Ensure forms have been completed in Owner's name and registered with manufacturer.
C. Warranty: Submit contractor's two year workmanship warranty.

#### 1.7 QUALITY ASSURANCE
A. Perform work in accordance with SMACNA Architectural Sheet Metal Manual requirements and standard details, except as otherwise indicated.
B. Maintain one copy of each document on site.
C. Fabricator and Installer Qualifications: Company specializing in sheet metal work with five years of documented experience.

#### 1.8 PRE-INSTALLATION CONFERENCE
A. See Section 013300 - Administrative Requirements for additional requirements.
B. Convene one week before starting work of this section.

## 1.9 DELIVERY, STORAGE, AND HANDLING

A. Section 016000 - Product Requirements: Transport, handle, store, and protect.
B. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
   1. When material is stored on the roof it must be placed on ½" minimum plywood on 1" rigid insulation. Ends of plywood shall exceed end of sheet metal goods by 2'-0".
C. All field cutting of sheet metal performed over new roofing shall be permitted only where the new roof is protected by ½" minimum plywood on 1" rigid insulation.
D. Prevent contact with materials which may cause discoloration or staining.

## 1.10 PROJECT CONDITIONS

A. Project Coordination: Section 013300 - Administrative Requirements.
B. Coordinate with the work of Section 042000 for installing recessed flashing reglets and rigid through wall flashings.

## 1.11 WARRANTY

A. Section 017700 - Closeout Submittals
B. Sheet Metal Contractor to issue guarantee of workmanship to correct defective work within a two year period after Date of Substantial Completion. Defective work includes failure of water-tightness or seals and oil canning due to rupture restricted expansion/contractors or faulty workmanship.
C. Material warranty from the sheet metal manufacturer for a period of 20 years against deterioration of color, chalking and film integrity.

# PART 2 – PRODUCTS

## 2.1 SHEET MATERIALS

A. Pre-Finished Galvanized Steel: ASTM A 653/A 653M, with G90/Z275 zinc coating; minimum 0.02 inch 24 gauge core steel, shop pre-coated with PVDF coating; color as selected by Architect from Manufacturer's standard range.
   1. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system; color as scheduled.
B. Pre-Finished Aluminum Sheet: ASTM B 209 (ASTM B 209M), H005 alloy, H12 or H14 temper;.063 inch thick; plain finish shop pre coated with PVDF coating of color as selected by Architect from Manufacturer's standard range.
C. Stainless Steel: ASTM A 666 Type 304, soft temper, 0.015 inch thick; smooth No. 4 finish.
D. Contractor to coordinate indicated locations of metal type and notify architect of any galvanic conflicts prior to fabrication and/or installation.

## 2.2 ACCESSORIES

A. Fasteners: Same material and finish as flashing metal, with soft neoprene washers.
B. Underlayment: ASTM D 226, organic roofing felt, Type I ("No. 15").
C. Slip Sheet: Rosin sized building paper.
D. Primer: Zinc Molybdate type.
E. Protective Backing Paint: Zinc molybdate alkyd.
F. Sealant: Polyurethane type, manufactured by:
   1. Tremco: Dymeric
   2. Sonnoborn: NPI.

## 2.3 FABRICATION - GENERAL

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
B. Fabricate cleats of same material as sheet, minimum 3 inches wide, interlocking with sheet a minimum of 1/2 inch.
   1. Drill pilot holes at 4" o.c. for attachment to wood.
   2. Drill pilot holes at 6" o.c. for attachment to masonry or concrete.
C. All fastener locations will have predrilled pilot holes:
   1. Nails - 1/4" diameter @ 4" o.c.
   2. Screw Fasteners - 5/16" diameter @ 1'-0" o.c.
D. Form pieces in longest possible lengths.
E. Hem exposed edges on underside 1/2 inch; miter and seam corners.
F. Form material with flat lock seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
G. Fabricate corners from one piece with minimum 24-inch long legs; welded for rigidity, seal with sealant and post finished to match adjacent finish.
H. Fabricate vertical faces with bottom edge formed outward 1/4 inch (6 mm) and hemmed to form drip.
I. Fabricate flashings to allow toe to extend 2 inches over roofing gravel. Return and brake edges.

## 2.4 FACTORY FINISHING

A. PVDF coating: Multiple coat, thermally cured, fluoropolymer system conforming to AAMA 605.2.
B. Primer Coat: Finish concealed side of metal sheets with primer compatible with finish system, as recommended by finish system manufacturer.
   1. All metal materials to be delivered to the site with protective, strippable plastic film.

# PART 3 – EXECUTION

## 3.1 EXAMINATION

A. Verify of existing conditions before starting work.
B. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
C. Verify roofing termination and base flashings are in place, sealed, and secure.
   1. Verify that surfaces to receive sheet metal are smooth and clean will not impinge upon the integrity of the sheet metal.
D. Verify that all wood blocking to receive sheet metal is properly installed, anchored without warps and covered with EPDM.
E. Do not start sheet metal work until conditions relevant to sheet metal work are acceptable. Commencing of work will indicate acceptance of condition.

## 3.2 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.
B. Install surface mounted reglets true to lines and levels. Seal top of reglets with sealant.
C. Lay out joints to be symmetrical about the building corners. May require more than one run be cut down to attain symmetry.
D. Paint dissimilar metals with bituminous paint to form a complete barrier.

## 3.3 INSTALLATION

A. Secure flashings in place using concealed fasteners as indicated.
   1. Apply plastic cement compound between metal flashings and felt flashings.
      a. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles. Install work watertight, without buckles, warps, fastening stresses or distortion. Allow for expansion and contraction.

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.
E. Continuous Cleats: Set in water cut-off mastic supplied by the Roofing Contractor or sealant, as indicated in the drawings. Secure to the surface with nail fasteners through 1/4-inch predrilled pilot holes at 4-inch on center.
F. Verify that height of roof base flashing and termination bar allows for installation of counter-flashing and sealant below weep holes and through-wall flashing.
G. Copings: Set continuous cleat in a full bed of water cut-off mastic supplied by the roofing contractor. Cover roof edge with rosin paper. Set the outside and inside corners. Secure with ¾" x ¼" Atlas HHA stainless steel Type A point screw fasteners with neoprene washers that are covered with sealant, following Architect's approval.
    1. Lay out coping joints symmetrical about the building corners. May require multiple cutting at 10'-0" lengths to achieve same. Install backer plates at joint locations. Nail through predrilled 1/4-inch pilot holes. Apply continuous sealant to backer plate vertical and horizontal surfaces as indicated in drawings.
    2. Run joints at +10'-0", except where the cut pieces are required for symmetry between existing corners.
    3. Secure coping to continuous cleat and pull coping over roof edge wood block. Cut 10'- 0" lengths to size to provide symmetrical placement between existing building corners.
    4. Verify coping is tight to wood blocking. Anchor with 1-¼" x ¼" Atlas HHA stainless steel screw fasteners, Type A points with neoprene washers. Cover with sealant, following Architect's approval.
    5. Install sealant to each side of joints.
    6. Install drive cleat.
H. Fascias:
    1. Set continuous cleat in full bed of [sealant] water cut-off mastic supplied by Roofing Contractor. Secure with nails at 4" on center through ¼" pre-drilled pilot holes.
    2. Set the outside and inside corners. Secure with nails at 4" o.c. through ¼" pre-drilled pilot holes.
    3. Lay out fascia joints symmetrical about corners. May require multiple cutting to achieve lengths of 10'-0".
    4. Install backer plates at joint locations in full bed of water cut-off mastic supplied by the roofing contractor. Nail through pre-drilled pilot holes. Install bond breaker tape down the center, as indicated on drawings.
    5. Apply continuous sealant to backer plate vertical and horizontal surfaces as indicated in drawings.
    6. Apply continuous sealant to top of backer plate.
    7. Running joints at +10'-0", except where the cut pieces are required for symmetry between the existing corners.
    8. Secure fascia to continuous cleat and nail at 4" o.c. through 1/4-inch pre-drilled pilot holes.
I. Counter-flashing:
    1. Overlap the base flashing a minimum of 3".
    2. Install continuous butyl caulk tape to vertical portion of the counter-flashing.
    3. Secure to the masonry with 1-¼" x 3/16" tapcons with climaseal corrosion resistive coating and neoprene washers at 1'-0" on center through 5/16" pre-drilled pilot holes. Cover with sealant following the Architect's approval.
    4. Lap counter-flashing pieces 3" with bead of sealant and between pieces.
    5. Cover fastener heads with sealant after the Architect's approval.
    6. Fill sealant reservoir with sealant to shed water.
    7. Counter-flashing Corner Pieces: Install pieces per Steps 1 through 6 in 3.3.I. above.
J. End Wall Flashings:
    1. Set in full bed of water cut-off mastic.
    2. Secure with screw fasteners through ¼" pre-drilled pilot holes as indicated on drawings.

3. Coordinate installation with roofing contractor.
4. Have the roofing contractor flash in vertical flange of end wall flashing.
5. Install coping, or standing seam siding, over the end wall flashing by:
6. Secure to end wall flashing vertical flange and pulling coping over the roof edge wood blocking, or, securing to the continuous clip and laying against mansard

K. Thru Wall Flashing: Coordinate with masonry contractor.
L. Miscellaneous Flashings: Install as indicated on drawings.
   1. Coordinate with interfacing contractors.

## 3.4 CLEANING

A. Leave material clean and free of stains.
B. Remove all sheet metal debris from roof top daily.
C. Remove all sheet metal debris from site daily.

## 3.5 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for field inspection requirements.
B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

**END OF SECTION**

**SECTION 078413**

**FIRESTOPPING**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Firestopping materials.
B. Firestopping of all penetrations and interruptions to fire rated assemblies, whether indicated on drawings or not, and other openings indicated.

### 1.2 REFERENCES
A. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

### 1.3 SUBMITTALS
A. See Section 013300 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data on product characteristics and fire rating.
C. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.
D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

### 1.4 QUALITY ASSURANCE
A. Fire Testing: Provide firestopping assemblies of designs which provide the specified fire ratings when tested in accordance with methods indicated.
B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.
C. Installer Qualifications: Company specializing in performing the work of this section and:
    1. Approved by Factory Mutual Research under FM Standard 4991, Approval of Firestop Contractors, or meeting any two of the following requirements:
        a. With minimum 3 years documented experience installing work of this type.
        b. Able to show at least 5 satisfactorily completed projects of comparable size and type.
        c. Licensed by authority having jurisdiction.
        d. Approved by firestopping manufacturer.

### 1.5 MOCK-UP
A. Install one firestopping assembly representative of each fire rating design required on project.
    1. Where one design may be used for different penetrating items or in different wall constructions, install one assembly for each different combination.
    2. Where firestopping is intended to fill a linear opening, install minimum of 1 linear ft.
B. If accepted, mock-up will represent minimum standard for the Work.
C. If accepted, mock-up may remain as part of the Work. Remove and replace mock-ups not accepted.

### 1.6 ENVIRONMENTAL REQUIREMENTS
A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation. Maintain minimum temperature before, during, and for 3 days after installation of materials.
B. Provide ventilation in areas where solvent-cured materials are being installed.

## PART 2 – PRODUCTS

### 2.1 FIRESTOPPING ASSEMBLIES
A. Firestopping at Control and Expansion Joints (without Penetrations), of widths 2 inches or less: Any material meeting requirements.
    1. Floor-to-Floor:
        a. UL Design No. FF-DD-0002, FF-D-0005, F Rating 1 & 2 hour.
        b. UL Design No. FF-D-0011, FF-D-0001, F Rating 3 hour.
    2. Floor-to-Wall:
        a. UL Design No. FW-D-0004, FW-D-0005, FW-D-0002, F Rating 1 & 2 hour.

b. UL Design No. FFW-D-0007, FW-D-0002, F Rating 3 hour.
3. Wall-to-Wall:
   a. UL Design No. WW-D-0013, WW-D-0004, WW-D-0017, F Rating 1 & 2 hour.
   b. UL Design No. WW-D-0013, WW-D-0001, F Rating 3 hour.
4. Head-of-Wall:
   a. UL Design No. HW-D-0020, HW-D-0043, HW-D-0034, F Rating 1 & 2 hour.
   b. UL Design No. HW-D-0060, HW-D-0061, F Rating 3 hour.

B. Firestopping at Metallic Pipe, Conduit, or Tubing Penetrations, of diameter 4 inches or less; for single penetrations: Any material meeting requirements.
1. Concrete Floors 5 inches in thickness or less:
   a. UL Design No. C-AJ-1014, C-AJ-1240, C-AJ-1149, F Rating 1 & 2 hour.
   b. UL Design No. C-AJ-1058, C-AJ-1198, C-AJ-1155, F Rating 3 hour.
2. Concrete Floors 5 inches in thickness or greater:
   a. UL Design No. C-AJ-1004, C-AJ-1005, F Rating 1 & 2 hour.
   b. UL Design No. C-AJ-1004, C-AJ-1005, F Rating 3 & 4 hour.
3. Roof Slabs 5 inches in thickness or less:
   a. UL Design No. C-AJ-1014, C-AJ-1240, C-AJ-1149, F Rating 1 & 2 hour.
   b. UL Design No. C-AJ-1058, C-AJ-1198, C-AJ-1155, F Rating 3 hour.
4. Roof Slabs 5 inches in thickness or greater:
   a. UL Design No. C-AJ-1004, C-AJ-1005, F Rating 1 & 2 hour.
   b. UL Design No. C-AJ-1004, C-AJ-1005, F Rating 3 & 4 hour.
5. Concrete/Masonry Walls 8 inches in thickness or less:
   a. UL Design No. C-AJ-1014, C-AJ-1240, C-AJ-1149, F Rating 1 & 2 hour.
   b. UL Design No. C-AJ-1058, C-AJ-1198, C-AJ-1155, F Rating 3 hour.
6. Concrete/Masonry Walls 8 inches in thickness or greater:
   a. UL Design No. C-AJ-1004, C-AJ-1005, F Rating 1 & 2 hour.
   b. UL Design No. C-AJ-1004, C-AJ-1005, F Rating 3 & 4 hour.
7. Framed Floors:
   a. UL Design No. F-C-1002, F-C-1010, F-C-1059, F Rating 1 & 2 hour.
8. Framed Walls:
   a. UL Design No. W-L-1001, W-L-1049, W-L-1054, F Rating 1 & 2 hour.
   b. UL Design No. W-L-1001, W-L-1172, F Rating 3 hour.

C. Firestopping at Metallic Pipe, Conduit, or Tubing Penetrations, of diameter 4 inches or less; for multiple penetrations: Any material meeting requirements.
1. Concrete Floors 5 inches in thickness or less:
   a. UL Design No. C-AJ-1092, C-AJ-1047, C-AJ-1140, F Rating 1 & 2 hour.
   b. UL Design No. C-AJ-1234, F Rating 3 hour.
2. Concrete Floors 5 inches in thickness or greater:
   a. UL Design No. C-AJ-1003, F Rating 1 & 2 hour.
3. Roof Slabs 5 inches in thickness or less:
   a. UL Design No. C-AJ-1092, C-AJ-1047, C-AJ-1140, F Rating 1 & 2 hour.
   b. UL Design No. C-AJ-1234, F Rating 3 hour.
4. Roof Slabs 5 inches in thickness or greater:
   a. UL Design No. C-AJ-1003, F Rating 1 & 2 hour.
5. Concrete/Masonry Walls 8 inches in thickness or less:
   a. UL Design No. C-AJ-1092, C-AJ-1047, C-AJ-1140, F Rating 1 & 2 hour.
   b. UL Design No. C-AJ-1234, F Rating 3 hour.
6. Concrete/Masonry Walls 8 inches in thickness or greater:
   a. UL Design No. C-AJ-1003, F Rating 1 & 2 hour.
7. Framed Floors:
   a. UL Design No. F-C-1065, F-C-1066, F Rating 1 & 2 hour.
8. Framed Walls:
   a. UL Design No. W-L-1001, W-L-1049, W-L-54, F Rating 1 & 2 hour.
   b. UL Design No. W-L-1001, W-L-1172, F Rating 3 & 4 hour.

D. Firestopping at Non-Metallic Pipe, Conduit, or Tubing Penetrations, of diameter 4 inches or less; for single penetrations: Any material meeting requirements.
   1. Concrete Floors 5 inches in thickness or less:
      a. UL Design No. C-AJ-2143, C-AJ-2063, C-AJ-2271, F Rating 1 & 2 hour.
      b. UL Design No. C-AJ-2117, C-AJ-2038, C-AJ-2271, F Rating 3 hour.
   2. Concrete Floors 5 inches in thickness or greater:
      a. UL Design No. C-AJ-2001, C-AJ-2002, F Rating 1 & 2 hour.
      b. UL Design No. C-AJ-2001, C-AJ-2002, F Rating 3 & 4 hour.
   3. Roof Slabs 5 inches in thickness or less:
      a. UL Design No. C-AJ-2143, C-AJ-2063, C-AJ-2271, F Rating 1 & 2 hour.
      b. UL Design No. C-AJ-2117, C-AJ-2038, C-AJ-2271, F Rating 3 hour.
   4. Roof Slabs 5 inches in thickness or greater:
      a. UL Design No. C-AJ-2001, C-AJ-2002, F Rating 1 & 2 hour.
      b. UL Design No. C-AJ-2001, C-AJ-2002, F Rating 3 & 4 hour.
   5. Concrete/Masonry Walls 8 inches in thickness or less:
      a. UL Design No. C-AJ-2143, C-AJ-2063, C-AJ-2271, F Rating 1 & 2 hour.
      b. UL Design No. C-AJ-2117, C-AJ-2038, C-AJ-2271, F Rating 3 hour.
   6. Concrete/Masonry Walls 8 inches in thickness or greater:
      a. UL Design No. C-AJ-2001, C-AJ-2002, F Rating 1 & 2 hour.
      b. UL Design No. C-AJ-2001, C-AJ-2002, F Rating 3 & 4 hour.
   7. Framed Floors:
      a. UL Design No. F-C-2024, F-C-2020, F-C-2025, F Rating 1 & 2 hour.
   8. Framed Walls:
      a. UL Design No. W-L-2162, W-L-2047, W-L-2075, F Rating 1 & 2 hour.
      b. UL Design No. W-L-2162, W-L-2195, F Rating 3 hour.

E. Firestopping at Non-Metallic Pipe, Conduit, or Tubing Penetrations, of diameter 4 inches or less; for multiple penetrations: Any material meeting requirements.
   1. Concrete Floors 5 inches in thickness or less:
      a. UL Design No. C-AJ-2093, C-AL-2140, F Rating 1 & 2 hour.
      b. UL Design No. C-AJ-2092, F Rating 3 hour.
   2. Roof Slabs 5 inches in thickness or less:
      a. UL Design No. C-AJ-2093, C-AL-2140, F Rating 1 & 2 hour.
      b. UL Design No. C-AJ-2092, F Rating 3 hour.
   3. Concrete/Masonry Walls 8 inches in thickness or less:
      a. UL Design No. C-AJ-2093, C-AL-2140, F Rating 1 & 2 hour.
      b. UL Design No. C-AJ-2092, F Rating 3 hour.
   4. Framed Floors:
      a. UL Design No. F-C-2115, F-C-2129, F-C-2158, F Rating 1 & 2 hour.
   5. Framed Walls:
      a. UL Design No. C-AJ-2021, W-L-2032, F Rating 1 & 2 hour.

F. Firestopping at Cable Tray Penetrations: Any material meeting requirements.
   1. Concrete Floors 5 inches in thickness or less:
      a. UL Design No. C-AJ-4003, C-AJ-4020, C-AJ-4017, F Rating 1 & 2 hour.
      b. UL Design No. C-AJ-4003, C-AJ-4020, C-AJ-4017, F Rating 3 hour.
   2. Roof Slabs 5 inches in thickness or less:
      a. UL Design No. C-AJ-4003, C-AJ-4020, C-AJ-4017, F Rating 1 & 2 hour.
      b. UL Design No. C-AJ-4003, C-AJ-4020, C-AJ-4017, F Rating 3 hour.
   3. Concrete/Masonry Walls 8 inches in thickness or less:
      a. UL Design No. C-AJ-4003, C-AJ-4020, C-AJ-4017, F Rating 1 & 2 hour.
      b. UL Design No. C-AJ-4003, C-AJ-4020, C-AJ-4017, F Rating 3 hour.
   4. Framed Walls:
      a. UL Design No. W-L-4004, W-L-4005, W-L-4011, F Rating 1 & 2 hour.

G. Firestopping at Cable Penetrations, not in Conduit or Cable Tray: Any material meeting requirements.
   1. Concrete Floors 5 inches in thickness or less:
      a. UL Design No. C-AJ-3030, C-AJ-3133, C-AJ-3072, F Rating 1 & 2 hour.
      b. UL Design No. C-AJ-3030, C-AJ-3023, C-AJ-3072, F Rating 3 hour.
   2. Concrete Floors 5 inches in thickness or greater:
      a. UL Design No. C-BK-3001, C-BK-3002, F Rating 1 & 2 hour.
      b. UL Design No. C-BK-3001, C-BK-3002, F Rating 3 hour.
   3. Roof Slabs 5 inches in thickness or less:
      a. UL Design No. C-AJ-3030, C-AJ-3133, C-AJ-3072, F Rating 1 & 2 hour.
      b. UL Design No. C-AJ-3030, C-AJ-3023, C-AJ-3072, F Rating 3 hour.
   4. Roof Slabs 5 inches in thickness or greater:
      a. UL Design No. C-BK-3001, C-BK-3002, F Rating 1 & 2 hour.
      b. UL Design No. C-BK-3001, C-BK-3002, F Rating 3 hour.
   5. Concrete/Masonry Walls 8 inches in thickness or less:
      a. UL Design No. C-AJ-3030, C-AJ-3133, C-AJ-3072, F Rating 1 & 2 hour.
      b. UL Design No. C-AJ-3030, C-AJ-3023, C-AJ-3072, F Rating 3 hour.
   6. Concrete/Masonry Walls 8 inches in thickness or greater:
      a. UL Design No. C-BK-3001, C-BK-3002, F Rating 1 & 2 hour.
      b. UL Design No. C-BK-3001, C-BK-3002, F Rating 3 hour.
   7. Framed Floors:
      a. UL Design No. F-C-3002, F-C-3045, F-C-3012, F Rating 1 & 2 hour.
   8. Framed Walls:
      a. UL Design No. W-L-3110, W-L-3076, W-L-3065, F Rating 1 & 2 hour.
      b. UL Design No. W-L-3139, F Rating 3 hour.

H. Firestopping at Insulated Piping: Any material meeting requirements.
   1. Concrete Floors 5 inches in thickness or less:
      a. UL Design No. C-AJ-5001, C-AJ-5058, C-AJ-5045, F Rating 1 & 2 hour.
      b. UL Design No. C-AJ-5001, C-AJ-5058, C-AJ-5061, F Rating 3 hour.
   2. Concrete Floors 5 inches in thickness or greater:
      a. UL Design No. C-BK-5001, C-BK-5002, F Rating 1 & 2 hour.
      b. UL Design No. C-BK-5001, C-BK-5002, F Rating 3 hour.
   3. Roof Slabs 5 inches in thickness or less:
      a. UL Design No. C-AJ-5001, C-AJ-5058, C-AJ-5045, F Rating 1 & 2 hour.
      b. UL Design No. C-AJ-5001, C-AJ-5058, C-AJ-5061, F Rating 3 hour.
   4. Roof Slabs 5 inches in thickness or greater:
      a. UL Design No. C-BK-5001, C-BK-5002, F Rating 1 & 2 hour.
      b. UL Design No. C-BK-5001, C-BK-5002, F Rating 3 hour.
   5. Concrete/Masonry Walls 8 inches in thickness or less:
      a. UL Design No. C-AJ-5001, C-AJ-5058, C-AJ-5045, F Rating 1 & 2 hour.
      b. UL Design No. C-AJ-5001, C-AJ-5058, C-AJ-5061, F Rating 3 hour.
   6. Concrete/Masonry Walls 8 inches in thickness or greater:
      a. UL Design No. C-AJ-5001, C-AJ-5058, C-AJ-5045, F Rating 1 & 2 hour.
      b. UL Design No. C-AJ-5001, C-AJ-5058, C-AJ-5061, F Rating 3 hour.
   7. Framed Floors:
      a. UL Design No. F-C-5038, F-C-5055, F-C-5029, F Rating 1 & 2 hour.
   8. Framed Walls:
      a. UL Design No. W-L-5011, W-L-5014, W-L-5029, F Rating 1 & 2 hour.
      b. UL Design No. W-L-5101, W-L-5023, W-L-5085, F Rating 3 hour.

I. Firestopping at Miscellaneous Electrical Penetrants such as Busducts: Any material meeting requirements.
   1. Concrete Floors 5 inches in thickness or less:
      a. UL Design No. C-AJ-6002, C-AJ-6003, C-AJ-6006, F Rating 1 & 2 hour.
      b. UL Design No. C-AJ-6002, C-AJ-6003, C-AJ-6006, F Rating 3 hour.

2. Roof Slabs 5 inches in thickness or less:
   a. UL Design No. C-AJ-6002, C-AJ-6003, C-AJ-6006, F Rating 1 & 2 hour.
   b. UL Design No. C-AJ-6002, C-AJ-6003, C-AJ-6006, F Rating 3 hour.
3. Concrete/Masonry Walls 8 inches in thickness or less:
   a. UL Design No. C-AJ-6002, C-AJ-6003, C-AJ-6006, F Rating 1 & 2 hour.
   b. UL Design No. C-AJ-6002, C-AJ-6003, C-AJ-6006, F Rating 3 hour.
4. Framed Walls:
   a. UL Design No. W-L-6002, W-L-6001, W-L-6004, F Rating 1 & 2 hour.

J. Firestopping at Miscellaneous Mechanical Penetrants such as Air Ducts: Any material meeting requirements.
1. Concrete Floors 5 inches in thickness or less:
   a. UL Design No. C-AJ-7013, C-AJ-7047, F Rating 1 & 2 hour.
   b. UL Design No. C-AJ-7003, C-AJ-7046, F Rating 3 hour.
2. Roof Slabs 5 inches in thickness or less:
   a. UL Design No. C-AJ-7013, C-AJ-7047, F Rating 1 & 2 hour.
   b. UL Design No. C-AJ-7003, C-AJ-7046, F Rating 3 hour.
3. Concrete/Masonry Walls 8 inches in thickness or less:
   a. UL Design No. C-AJ-7013, C-AJ-7047, F Rating 1 & 2 hour.
   b. UL Design No. C-AJ-7003, C-AJ-7046, F Rating 3 hour.
4. Framed Floors:
   a. UL Design No. F-C-7001, F-C-7002, F-C-7013, F Rating 1 & 2 hour.
5. Framed Walls:
   a. UL Design No. W-L-7041, W-L-7025, W-L-7040, F Rating 1 & 2 hour.

K. Firestopping at Groupings of penetrations including any combination of items above: Any material meeting requirements.
1. Concrete Floors 5 inches in thickness or less:
   a. UL Design No. C-AJ-8001, C-AJ-8016, C-AJ-8041, F Rating 1 & 2 hour.
   b. UL Design No. C-AJ-8001, C-AJ-8016, C-AJ-8041, F Rating 3 hour.
2. Roof Slabs 5 inches in thickness or less:
   a. UL Design No. C-AJ-8001, C-AJ-8016, C-AJ-8041, F Rating 1 & 2 hour.
   b. UL Design No. C-AJ-8001, C-AJ-8016, C-AJ-8041, F Rating 3 hour.
3. Concrete/Masonry Walls 8 inches in thickness or less:
   a. UL Design No. C-AJ-8001, C-AJ-8016, C-AJ-8041, F Rating 1 & 2 hour.
   b. UL Design No. C-AJ-8001, C-AJ-8016, C-AJ-8041, F Rating 3 hour.
4. Framed Walls:
   a. UL Design No. W-L-8013, W-L-8016, F Rating 1 & 2 hour.
   b. UL Design No. W-L-8014, W-L-8015, F Rating 3 hour.

L. Temporary Firestopping: Intumescent pillows; UL Design No. C-AJ-2020, F Rating 1-1/2 hour; provide at locations indicated on drawings.

## 2.2 MATERIALS

A. Manufacturers:
1. 3M Fire Protection Products.
2. Firestop Systems, Inc.
3. Hilti Construction Chemicals, Inc.
4. Isolatek International.
5. Johns Mansville International, Inc.
6. Specified Technologies, Inc.
7. Tremco.
8. Substitutions: See Section 016000 - Product Requirements.

B. Elastomeric Silicone Firestopping: Single component silicone elastomeric compound and compatible silicone sealant. Type required for tested assembly design.
1. Color: Dark grey.

C. Fibered Compound Firestopping: Formulated compound mixed with incombustible non-asbestos fibers. Type required for tested assembly design.
   1. Color: Dark grey.
D. Fiber Packing Material: Mineral fiber packing insulation. Type required for tested assembly design.
E. Foil Tape: Nominal 3 mil. thick pressure sensitive aluminum foil tape. Type required for tested assembly design.
F. Firestop Devices: Mechanical device with incombustible filler and galvanized steel jacket, collar, and flanged stops. Type required for tested assembly design.
G. Intumescent Composite Sheet: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet. Type required for tested assembly design.
H. Hangers: Minimum 1 inch wide strips of minimum 0.034 inch (20 gauge) galvanized steel sheet. Type required for tested assembly design.
I. Fire Spray: Sprayable, flexible, water-based coating that is water-resistant. Type required for tested assembly design.
J. Caulks: Single component, water-based, non-flammable, paintable coating with non-sag and low shrinkage characteristics. Type required for tested assembly design.
K. Mortars: Prepackaged, dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar. Type required for tested assembly design.
L. Primers, Sleeves, Forms, and Accessories: Type required for tested assembly design.

## PART 3 – EXECUTION

### 3.1 EXAMINATION
A. Verify openings are ready to receive the work of this section.

### 3.2 PREPARATION
A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter which may affect bond of firestopping material.
B. Remove incompatible materials which may affect bond.
C. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

### 3.3 INSTALLATION
A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.

### 3.4 CLEANING AND PROTECTION
A. Clean adjacent surfaces of firestopping materials.
B. Protect adjacent surfaces from damage by material installation.

**END OF SECTION**

**SECTION 079200**

**JOINT SEALANTS**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Sealants and joint backing.

### 1.2 RELATED SECTIONS
A. Section 092900 – Gypsum Board Assemblies: Acoustic Sealant.

### 1.3 REFERENCES
A. ASTM C 834 - Standard Specification for Latex Sealants; 2000.
B. ASTM C 919 - Standard Practice for Use of Sealants in Acoustical Applications; 2002.
C. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants; 2002.
D. ASTM C 1193 - Standard Guide for Use of Joint Sealants; 2000.
E. ASTM D 1667 - Standard Specification for Flexible Cellular Materials--Vinyl Chloride Polymers and Copolymers (Closed-Cell Foam); 1997.

### 1.4 SUBMITTALS
A. See Section 013300 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, and color availability.

### 1.5 QUALITY ASSURANCE
A. Applicator Qualifications: Company specializing in performing the work of this section with minimum 3 years experience and approved by manufacturer.

### 1.6 ENVIRONMENTAL REQUIREMENTS
A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

### 1.7 WARRANTY
A. See section 017700 – Closeout Submittals, for additional warranty requirements.
B. Correct defective work within a five year period after the Date of Substantial Completion.
C. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal, exhibit loss of adhesion or cohesion, or do not cure.

## PART 2 – PRODUCTS

### 2.1 MANUFACTUERS
A. Silicone Sealants:
   1. Bostik Findley; www.bostikfindley-us.com.
   2. GE Plastics: www.geplastics.com.
   3. Pecora Corporation: www.pecora.com.
   4. Sonneborn, ChemRex, Inc; www.chemrex.com.
   5. Dow Corning: www.dowcorning.com
   6. Tremco, Inc: www.tremcosealants.com.
   7. Substitutions: See Section 016000 - Product Requirements.
B. Polyurethane Sealants:
   1. Bostik Findley; www.bostikfindley-us.com.
   2. Pecora Corporation: www.pecora.com.
   3. Sonneborn, ChemRex, Inc; www.chemrex.com.
   4. Tremco, Inc: www.tremcosealants.com.
   5. Substitutions: See Section 016000 - Product Requirements.
C. Butyl Sealants:
   1. Bostik Findley; www.bostikfindley-us.com.

2. Pecora Corporation: www.pecora.com.
3. TEC Specialty Products Inc.
4. Tremco, Inc: www.tremcosealants.com.
5. Substitutions: See Section 016000 - Product Requirements.

D. Preformed Compressible Foam Sealers:
1. Emseal Joint Systems, Ltd: www.emseal.com.
2. Sandell Manufacturing Company, Inc: www.sandellmfg.com.
3. Polytite Manufacturing Corporation: www.polytite.com.
4. Substitutions: See Section 016000 - Product Requirements.

## 2.2 SEALANTS

A. Type S1 - General Purpose Exterior Sealant: Polyurethane; ASTM C 920, Grade NS, Class 25, Uses M, G, and A; single component.
1. Color: As selected by Architect from Manufacturer's full line of colors.
2. Applications:
a. Control, expansion and soft joints in masonry.
b. Joints between concrete and other materials.
c. Joints between metal frames and other materials.
d. Other exterior joints for which no other sealant is indicated.

B. Type S2 - General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C 834, Type OP, Grade NF single component, paintable.
1. Color: As selected by Architect from Manufacturer's full line of colors.
2. Applications:
a. Interior wall and ceiling control joints.
b. Joints between door and window frames and wall surfaces.
c. Other interior joints for which no other sealant is indicated.

C. Type S3 - Interior Floor Joint Sealant: Polyurethane, self-leveling; ASTM C 920, Grade P, Class 25, Uses T, M and A; single component.
1. Color: As selected by Architect from Manufacturer's full line of colors.
2. Applications:
a. Approved by manufacturer for wide joints up to 1-1/2 inches.
b. Expansion joints in floors.

D. Type S4 - Concrete Paving Joint Sealant: Polyurethane, self-leveling; ASTM C 920, Class 25, Uses T, I, M and A; single component.
1. Color: As selected by Architect from Manufacturer's full line of colors.
2. Applications:
a. Joints in sidewalks and vehicular paving.
b. Compressible filler joints adjacent to foundations.

## 2.3 ACCESSORIES

A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
C. Joint Backing: Round foam rod compatible with sealant; ASTM D 1667, closed cell PVC; oversized 30 to 50 percent larger than joint width.
D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

# PART 3 – EXECUTION

## 3.1 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.
B. Verify that joint backing and release tapes are compatible with sealant.

## 3.2 PREPARATION

A. Remove loose materials and foreign matter which might impair adhesion of sealant.
B. Clean and prime joints in accordance with manufacturer's instructions.
C. Perform preparation in accordance with manufacturer's instructions and ASTM C 1193.
D. Protect elements surrounding the work of this section from damage or disfigurement.

## 3.3 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 C 1193.
C. Perform acoustical sealant application work in accordance with ASTM C 919.
D. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
E. Install bond breaker where joint backing is not used.
F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
G. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
H. Tool joints concave.

## 3.4 CLEANING

A. Clean adjacent soiled surfaces.

## 3.5 PROTECTION OF FINISHED WORK

A. Protect sealants until cured.

## 3.6 SCHEDULE

A. Exterior Joints for Which No Other Sealant Type is Indicated: Type S1; colors as selected.
B. Control and Expansion Joints in Paving: Type S4.
C. Exterior Wall Expansion Joints: Type S1.
D. Joints Between Exterior Metal Frames and Adjacent Work (except masonry): Type S1.
E. Interior Joints for Which No Other Sealant is Indicated: Type S2.
F. Control and Expansion Joints in Interior Concrete Slabs and Floors: Type S3.
G. Joints Between Plumbing Fixtures and Walls and Floors, and Between Countertops and Walls: Type S2.

**END OF SECTION**

**SECTION 081113**

**STEEL DOORS AND FRAMES**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Non-fire-rated steel doors and frames.
B. Fire-rated steel doors and frames.
C. Thermally insulated steel doors.

### 1.2 RELATED SECTIONS
A. Section 087100 - Door Hardware.
B. Section 099100 - Paints and Coatings: Field painting.

### 1.3 REFERENCES
A. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 1998.
B. ANSI A250.8 - SDI-100 Recommended Specifications for Standard Steel Doors and Frames; 1998.
C. ANSI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 1998.
D. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2002a.
E. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus; 1997.
F. NAAMM HMMA 840 - Installation and Storage of Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers; 1999.
G. NAAMM HMMA 860 - Guide Specifications for Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers; 1992.
H. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers; 2000.
I. NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association; 1999.
J. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association; 1999.
K. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.

### 1.4 SUBMITTALS
A. See Section 013300 - Administrative Requirements for submittal procedures.
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 grade standard.
C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and identifying location of different finishes, if any.
D. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.

### 1.5 QUALITY ASSURANCE
A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum Five years documented experience.
B. Maintain at the project site a copy of all reference standards dealing with installation.

### 1.6 DELIVERY, STORAGE, AND PROTECTION
A. Store in accordance with NAAMM HMMA 840.
B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion.

## PART 2 – PRODUCTS

### 2.1 MANUFACTUERS

A. Steel Doors and Frames:
   1. Ceco Door Products; www.cecodoor.com.
   2. Curries; www.curries.com.
   3. Kewanee Corp., Kewanee, IL.
   4. LaForce Inc.; www.laforceinc.com.
   5. Republic Builders Products; www.republicdoor.com.
   6. Steelcraft Manufacturing Co; www.steelcraft.com.
   7. Trussbilt; www.trussbilt.com.
   8. Substitutions: See Section 016000 - Product Requirements.

### 2.2 DOORS AND FRAMES

A. Requirements for All Doors and Frames:
   1. Door Top Closures: Flush with top of faces and edges.
   2. Door Edge Profile: Beveled on both edges.
   3. Door Texture: Smooth faces.
   4. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
   5. Hardware Preparation: In accordance with DHI A115 Series, with reinforcement welded in place, in addition to other requirements specified in door grade standard.
   6. Galvanizing for Units in Wet Areas: All components hot-dipped zinc-iron alloy-coated (galvannealed), Manufacturer's standard coating thickness.
   7. Finish: Factory primed, for field finishing.

B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with all 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.

### 2.3 STEEL DOORS

A. Exterior Doors:
   1. Grade: NAAMM HMMA 861, physical performance Level A.
      a. Minimum Hardware Reinforcing:
         1) Butts: #7 gauge steel.
         2) Locks: #12 gauge steel.
         3) Surface Applied Hardware: #12 gauge steel.
   2. Core: Foamed in place polyurethane.
   3. Top Closures for Out swinging Doors: Flush with top of faces and edges.
   4. Texture: Smooth faces.
   5. Finish: Factory primed, for field finishing.
   6. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A 653/A 653M, with manufacturer's standard coating thickness.
   7. Weatherstripping: See Section 087100 - Hardware

B. Interior Doors, Non-Fire-Rated:
   1. Grade: NAAMM HMMA 860, physical performance Level A.
      a. Minimum Hardware Reinforcing: Same as specified for exterior doors.
   2. Core: Mineral rock wool, 6 lb. density or fiberglass.
   3. Thickness: 1-3/4 inches.
   4. Texture: Smooth faces.
   5. Finish: Factory primed, for field finishing.
   6. Minimum Reinforcing Size:
      a. Butts and Pivots: Full interior width at door by 10-inches long.
      b. Closers: Inverted channel, 6-inch sides by 18 inches long.

c. Other Surface Applied Hardware: To template.
d. Locks: To template.

C. Drilling and tapping for surface applied hardware shall be done in the field.
D. Provide hardware reinforcing for closers on all doors.
E. Interior Doors, Fire-Rated:
1. Grade: NAAMM HMMA 861, physical performance Level A.
2. Fire Rating: As indicated on Door and Frame Schedule, with temperature rise ratings as required by code, tested in accordance with NFPA 252.
a. Provide units listed and labeled by UL.
b. Attach fire rating label to each fire rated unit.
3. Minimum Hardware Reinforcing: Same as specified for interior non-fire rated doors.
4. Texture: Smooth faces.
5. Finish: Factory primed, for field finishing.

## 2.4 STEEL FRAMES

A. General: Provide fully welded frames.
1. Comply with the requirements of grade specified for corresponding door, except:
a. Provide 16 gage frames, except provide #14 gauge galvanized for exterior doors.
2. Hardware Reinforcing:
a. Butts and Pivots: 1/4-inch thick.
b. Locks: # 12 gauge.
c. Surface Applied Hardware: #12 gauge.
d. Dust Covers: #20 gauge.
3. Frame Anchors: #14 gauge, corrugated "T" anchors.
a. Frames for Wood Doors: Comply with frame requirements specified in ANSI A250.8 for Level 1, 16 gauge
4. Minimum Reinforcing Size:
a. Butts and Pivots: Full width of frame by 10-inches long.
b. Closers: Full width of frame by 18-inches long.
c. Locks: As required by template.
d. Other Surface Applied Hardware: As required by template.
5. Finish: Factory primed, for field finishing.
a. Frame installer shall coat the interior portion of all exterior frames with a bituminous coating after factory priming and prior to installation (both jambs).
6. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
7. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inches high to fill opening without cutting masonry units.
8. Frames Wider than 48 Inches: Reinforce with steel channel fitted tightly into frame head, flush with top.
9. Exterior Door Frames: Fully welded.
a. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A 653/A 653M, with manufacturer’s standard coating thickness.
b. Weatherstripping: See Section 087100 - Hardware
10. Interior Door Frames, Non-Fire-Rated: Fully welded type.
11. Interior Door Frames, Fire-Rated: Fully welded type.
a. Fire Rating: Same as door, labeled.

## 2.5 ACCESSORY MATERIALS

A. Louvers: Roll formed steel with overlapping frame; factory-painted finish, color as selected; factory-installed.
1. In Fire-Rated Doors: UL-listed fusible link louver, same rating as door.
2. Style: Standard straight slat blade.
B. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.

C. Bitumastic coating for interior side of steel frames:
   1. Installing contractor applied, ultra-high build, single-component coat tar for protecting steel substrates subject to aggressive conditions and below grade requirements complying with MIL-C-18480-B and Bureau of Reclamation CA50 specifications. Apply wet to 18.0 mils (450 microns) in one or two coats. Total dry film thickness of not less than 12 mils (300 microns) or in excess of 30 mils.
   2. Frame installation contractor to provide bitumastic coating for all exterior door frames for frame prior to frame installation.
D. Grout for Frames: Portland cement grout of maximum 4-inch slump for hand troweling; thinner pumpable grout is prohibited unless approved in writing by Architect for areas only inaccessible to troweling during installation.
E. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.
F. Temporary Frame Spreaders: Provide for all factory- or shop-assembled frames.

### 2.6 FINISH MATERIALS
A. Primer: Rust-inhibiting, complying with ANSI A250.10, door manufacturer's standard.
B. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

## PART 3 – EXECUTION

### 3.1 EXAMINATION
A. Verify existing conditions before starting work.
B. Verify that opening sizes and tolerances are acceptable.

### 3.2 PREPARATION
A. Frame installing contractor shall coat inside of frames to be installed in masonry or to be grouted, with bituminous coating prior to installation as noted. Apply wet to 18.0 mils (450 microns) in one or two coats. Total dry film thickness of not less than 12 mils (300 microns) or in excess of 30 mils.

### 3.3 INSTALLATION
A. Install in accordance with the requirements of the specified door grade standard and NAAMM HMMA 840.
B. In addition, install fire rated units in accordance with NFPA 80.
C. Coordinate frame anchor placement with wall construction.
D. Grout frames in solid masonry construction; brace frames so that pressure of grout before setting will not deform frames.
E. Coordinate installation of hardware.
F. Coordinate installation of glazing.
G. Whenever possible, leave frame spreaders intact until frames and masonry are set perfectly square and plumb and all anchors are securely attached. Grout all frames solid.
H. Coordinate installation of electrical connections to electrical hardware or security devices.
I. Grind, bondo, sand, prime and paint over grout holes, anchor heads and any imperfections in frame.
J. Touch up damaged factory finishes.

### 3.4 ERECTION TOLERANCES
A. Clearances between Door and Frame: As specified in ANSI A250.8.
B. Maximum Diagonal Distortion: 1/16 in measured with straight edge, corner to corner.
C. Do not erect members which are observed to be warped, bowed, deformed, or otherwise damaged or defaced to such an extent as to impair strength or appearance. Remove and replace members which have been damaged in the process of erection.

### 3.5 ADJUSTING

A. Adjust for smooth and balanced door movement.

### 3.6 SCHEDULE

A. Refer to Door and Frame Schedule on the drawings.

**END OF SECTION**

**SECTION 083300**

**INSULATED ROLLING SERVICE DOOR**

## PART 1 – GENERAL

### 1.1 SUMMARY

A. Section Includes: Electric operated overhead insulated rolling doors.
B. Related Sections:
   1. 055000 Metal Fabrications. Door opening jamb and head members.
   2. 061000 Rough Carpentry. Door opening jamb and head members.
   3. 083100 Access Doors and Panels. Access doors.
   4. 087100 Hardware. Padlocks. Masterkeyed cylinder.
   5. Division 26. Electrical wiring and conduit, fuses, disconnect switches, connection of operator to power supply, and installation of control station and wiring.
C. Products That May Be Supplied, But Are Not Installed Under This Section:
   1. Control Station

### 1.2 SYSTEM DESCRIPTION

A. Design Requirements:
   1. Air Infiltration to Comply With:
      a. ASHRAE® (American Society of Heating, Refrigeration, and Air-Conditioning Engineers) Standard 90.1-2007, 2010 & 2013 requirements of less than .3 CFM/FT2
      b. IECC® (International Energy Conservation Code) 2012 requirements of less than 1.0 CFM/FT2
   2. Wind Loading:
      a. Supply doors to withstand up to 40 psf design wind load
   3. Cycle Life:
      a. Design doors of standard construction for normal use of up to 20 cycles per day maximum, and an overall maximum of 50,000 operating cycles for the life of the door
   4. Insulated Door Slat Material Requirements:
      a. Flame Spread Index of 0 and a Smoke Developed Index of 10 as tested per ASTM E84
      b. Minimum R-value of 8.0 (U-value of 0.125) as calculated using the ASHRAE Handbook of Fundamentals
      c. Insulation to be CFC Free with an Ozone Depletion Potential (ODP) rating of zero

### 1.3 SUBMITTALS

A. Reference Section 01 33 00 Submittal Procedures; submit the following items:
   1. Product Data
   2. Shop Drawings: Include special conditions not detailed in Product Data. Show interface with adjacent work.
   3. Quality Assurance/Control Submittals:
      a. Provide manufacturer ISO 9001:2015 registration
      b. Provide manufacturer and installer qualifications - see below
      c. Provide manufacturer's installation instruction
      d. Provide manufacturer’s Health Product Declaration (HPD) for each product
      e. Manufacturer must provide independent testing lab results proving .3 CFM/FT2 or less air infiltration
   4. Closeout Submittals:
      a. Operation and Maintenance Manual
      b. Certificate stating that installed materials comply with this specification

### 1.4 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturer Qualifications: ISO 9001:2015 registered and a minimum of five years experience in producing doors of the type specified
   2. Installer Qualifications: Manufacturer's approval

## 1.5 DELIVERY STORAGE AND HANDLING

A. Reference Section 01 66 00 Product Storage and Handling Requirements
B. Follow manufacturer's instructions

## 1.6 WARRANTY

A. Standard Warranty: Two years from date of shipment against defects in material and workmanship
B. Maintenance: Submit for owner’s consideration and acceptance of a maintenance service agreement for installed products

# PART 2 – PRODUCTS

## 2.1 MANUFACTURERS

A. Manufacturer:
    1. Cornell: 24 Elmwood Avenue, Mountain Top, PA 18707. Telephone: (800) 233-8366
    2. Cookson
    3. Clopay Building Products
    4. Substitutions: Not permitted

## 2.2 PRODUCT INFORMATON

A. Model: ESD30

## 2.3 MATERIALS

A. Curtain: Air infiltration rate of less than .3 CFM/FT2, as tested per ASTM E283 validated by an independent testing agency. Test report required.
    1. Fabrication:
        a. Slat Material: No. 6F, (Listed Exterior/Interior):
            1) Stainless Steel/Stainless Steel: Minimum 22/22 gauge AISI type 304 series stainless steel
        b. Insulation: 7/8 inch (22 mm) foamed-in-place, closed cell urethane
        c. Total Slat Thickness: 15/16 inch (24 mm)
        d. Flame Spread Index of 0 and a Smoke Developed Index of 10 as tested per ASTM E84
        e. R-value: 8.0
    2. Exterior and Interior Slat Finish:
        a. Stainless Steel: type 304 #4 finish
B. Endlocks: Fabricate interlocking sections with high strength nylon endlocks on alternate slats each secured with two ¼” (6.35 mm) rivets. Provide windlocks as required to meet specified wind load.
C. Bottom Bar.
    1. Configuration:
        a. Insulated Bottom Bar: Reinforced extruded aluminum interior face with full depth insulation and exterior skin slat to match curtain material and gauge. Minimum 4” tall x 1-1/16” thickness.
    2. Finish:
        a. Exterior: Match slats
        b. Interior: Mill finish
    3. Air Infiltration Certification Label: Must be affixed to bottom bar
D. Guides:
    1. Fabrication:
        a. Thermal break required. Minimum 3/16 inch (4.76 mm) stainless steel angles. Provide windlock bars of same material when windlocks are required to meet specified wind load. Top of inner and outer guide angles to be flared outwards to form bellmouth for smooth entry of curtain into guides. Provide removable guide stoppers to prevent over travel of curtain and bottom bar.

1) Top 16 ½" (419.10 mm) of coil side guide angles to be removable for ease of curtain installation and as needed for future curtain service

2. Finish:
   a. Stainless Steel: Mill finish

E. Counterbalance Shaft Assembly:
1. Barrel: Steel pipe capable of supporting curtain load with maximum deflection of 0.03 inches per foot (2.5 mm per meter) of width
2. Spring Balance: Oil-tempered, heat-treated steel helical torsion spring assembly designed for proper balance of door to ensure that maximum effort to operate will not exceed 25 lbs (110 N). Provide wheel for applying and adjusting spring torque.

F. Brackets:
1. Fabricate from minimum 3/16 inch (5 mm) steel plate with permanently lubricated ball or roller bearings at rotating support points to support counterbalance shaft assembly and form end closures
   a. Finish:
      1) Powder Coat (Stock Colors): Zirconium treatment followed by a gray baked-on polyester powder coat; minimum 2.5 mils (0.065 mm) cured film thickness

G. Hood:
1. Minimum 24 gauge stainless steel with reinforced top and bottom edges. Provide minimum 1/4 inch (6.35 mm) steel intermediate support brackets as required to prevent excessive sag.
   a. Finish:
      1) Stainless steel: type 304 #4 finish

H. Weatherstripping:
1. Bottom Bar: Sensing/weather edge with neoprene astragal extending full width of door bottom bar
2. Guides: Replaceable vinyl strip on guides sealing against fascia side of curtain
3. Lintel Seal: Double brush seal with EPDM sandwiched between the two brush seals at door header to impede air flow.

## 2.4 OPERATION

A. Motor – Standard Use – Model MG (Industrial Duty Gear Head) Operator: The operator must not extend above or below the door coil when mounted front-of-coil. Rated for a maximum of 20 cycles per hour (not to be used for consecutive hours) cULus listed (to comply with UL requirements in The United States and Canada), Totally Enclosed Non Ventilated gear head operator(s) rated 1/3 hp as recommended by door manufacture for size and type of door, ____Volts, ____Phase. Provide complete with electric motor and factory pre-wired motor control terminals, maintenance free solenoid actuated brake, emergency manual chain hoist and control station(s). Motor shall be high starting torque, industrial type, protected against overload with an auto-reset thermal sensing device. Primary speed reduction shall be heavy-duty, lubricated gears with mechanical braking to hold the door in any position. Operator shall be equipped with an emergency manual chain hoist assembly that safely cuts operator power when engaged. A disconnect chain shall not be required to engage or release the manual chain hoist. Operator drive and door driven sprockets shall be provided with #50 roller chain. Provide an integral Motor Mounted Interlock system to prevent damage to door and operator when mechanical door locking devices are provided. Operator shall be capable of driving the door at a speed of up to 9" per second or as recommended for door size. Fully adjustable, driven linear screw type cam limit switch mechanism shall synchronize the operator with the door. The electrical contractor shall mount the control station(s) and supply the appropriate disconnect switch, all conduit and wiring per the overhead door wiring instructions.

B. Control Station:
1. Flush mounted: "Open/Close/Stop" push buttons; NEMA 1B

C. Control Operation:
1. Momentary Contact to Close:
   a. Fail-safe, UL325-2010 Compliant Entrapment Protection for Motor Operation

1) Smartsync Wireless Edge Kit – continuously monitored, wireless sensing/weather edge seal extending full width of door bottom bar. Contact before door fully closes shall cause door to immediately stop downward travel and reverse direction to the fully opened position. Wireless edge kit will use Zigbee wireless technology. Radio band wireless sensing edges will not be permitted.

## 2.5 ACCESSORIES

A. Locking:
   1. Padlockable slide bolt on coil side of bottom bar at each jamb extending into slots in guides. Provide interlock switches on Motor operated units.
B. Operator and Bracket Mechanism Cover: Minimum 24 gauge stainless steel metal cover to enclose exposed moving operating components at coil area of unit. Finish to match door hood.

# PART 3 – EXECUTION

## 3.1 EXAMINATION

A. Examine substrates upon which work will be installed and verify conditions are in accordance with approved shop drawings
B. Coordinate with responsible entity to perform corrective work on unsatisfactory substrates
C. Commencement of work by installer is acceptance of substrate

## 3.2 INSTALLATION

A. General: Install door and operating equipment with necessary hardware, anchors, inserts, hangers and supports
B. Follow manufacturer's installation instructions

## 3.3 ADJUSTING

A. Following completion of installation, including related work by others, lubricate, test, and adjust doors for ease of operation, free from warp, twist, or distortion

## 3.4 CLEANING

A. Clean surfaces soiled by work as recommended by manufacturer.
B. Remove surplus materials and debris from the site

## 3.5 DEMONSTRATION

A. Demonstrate proper operation to Owner's Representative
B. Instruct Owner's Representative in maintenance procedures

**END OF SECTION**

**SECTION 087100**

**DOOR HARDWARE**

## PART 1 – GENERAL

### 1.1 SUMMARY

A. Section includes:
   1. Mechanical and electrified door hardware
   2. Electronic access control system components

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 "General Requirements" sections for Allowances, Alternates, Owner Furnished Contractor Installed, Project Management and Coordination.
   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"
      b. "Flush Wood Doors"
      c. "Stile and Rail Wood Doors"
      d. "Interior Aluminum Doors and Frames"
      e. "Aluminum-Framed Entrances and Storefronts"
      f. "Stainless Steel Doors and Frames"
      g. "Special Function Doors"
      h. "Entrances"
   6. Division 26 "Electrical" sections for connections to electrical power system and for low-voltage wiring.
   7. Division 28 "Electronic Safety and Security" sections for coordination with other components of electronic access control system and fire alarm system.

### 1.2 REFERENCES

A. UL LLC
   1. UL 10B - Fire Test of Door Assemblies
   2. UL 10C - Positive Pressure Test of Fire Door Assemblies
   3. UL 1784 - Air Leakage Tests of Door Assemblies
   4. UL 305 - Panic Hardware

B. 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

C. NFPA – National Fire Protection Association
   1. NFPA 70 – National Electric Code
   2. NFPA 80 – 2016 Edition – Standard for Fire Doors and Other Opening Protectives
   3. NFPA 101 – Life Safety Code
   4. NFPA 105 – Smoke and Draft Control Door Assemblies
   5. NFPA 252 – Fire Tests of Door Assemblies

D. 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

## 1.3 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. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
      a. Wiring Diagrams: For power, signal, and control wiring and including:
         1) Details of interface of electrified door hardware and building safety and security systems.
         2) Schematic diagram of systems that interface with electrified door hardware.
         3) Point-to-point wiring.
         4) Risers.
   3. 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.
   4. 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.
         10) Operational Description of openings with electrified hardware covering egress, ingress (access), and fire/smoke alarm connections.
   5. 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.

## 1.4 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. Fire-Rated Door Openings:
      a. Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction.
      b. Provide only items of door hardware that are listed products tested by UL LLC, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.
   2. Smoke and Draft Control Door Assemblies:
      a. Provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105
      b. Comply with the maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.
   3. Electrified Door Hardware
      a. Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.
   4. 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) Requirements for access control.
         5) 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. Inspect and discuss electrical roughing-in for electrified door hardware.
      d. Review sequence of operation for each type of electrified door hardware.
      e. Review required testing, inspecting, and certifying procedures.
      f. Review questions or concerns related to proper installation and adjustment of door hardware.
   3. Electrified Hardware Coordination Conference:
      a. Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

## 1.5 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.

## 1.6 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.
D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

## 1.7 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) Schlage ND Series: 10 years
            2) Closers
                a) LCN 4000 Series: 30 years

## 1.8 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

## 2.1 MANUFACTURERS

A. Approval of alternate manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category are only to be considered by official substitution request in accordance with section 01 25 00.
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.

## 2.2 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.

C. Cable and Connectors:
   1. Where scheduled in the hardware sets, provide each item of electrified hardware and wire harnesses with number and gage of wires enough to accommodate electric function of specified hardware.
   2. Provide Molex connectors that plug directly into connectors from harnesses, electric locking and power transfer devices.
   3. Provide through-door wire harness for each electrified locking device installed in a door and wire harness for each electrified hinge, electrified continuous hinge, electrified pivot, and electric power transfer for connection to power supplies.

## 2.3 HINGES

A. Manufacturers and Products:
   1. Scheduled Manufacturer and Product:
      a. Ives 5BB series
   2. Acceptable Manufacturers and Products:
      a. Substitutions by official Division 01 request only.

B. Requirements:
   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

## 2.4 CONTINUOUS HINGES

A. Manufacturers:
   1. Scheduled Manufacturer:
      a. Ives
   2. Acceptable Manufacturers:
      a. Substitutions by official Division 01 request only.

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.

## 2.5 CYLINDRICAL LOCKS – GRADE 1

A. Manufacturers and Products:
   1. Scheduled Manufacturer and Product:
      a. Schlage ND series
   2. Acceptable Manufacturers and Products:
      a. Substitutions by official Division 01 request only.

B. Requirements:
   1. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 1, and UL Listed for 3-hour fire doors.
   2. Cylinders: Refer to "KEYING" article, herein.
   3. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2-inch latch throw. Provide proper latch throw for UL listing at pairs.
   4. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
   5. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
   6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
   7. Lever Trim: Solid cast levers without plastic inserts and wrought roses on both sides.
      a. Lever Design: RHO

## 2.6 DEADBOLTS

A. Manufacturers and Products:
   1. Scheduled Manufacturer and Product:
      a. Schlage B600/B700/B800 Series
   2. Acceptable Manufacturers and Products:
      a. Substitutions by official Division 01 request only.

B. Requirements:
   1. Provide grade 1 deadbolt series conforming to ANSI/BHMA A156.
   2. Cylinders: Refer to "KEYING" article, herein.
   3. Provide deadbolts with standard 2-3/4 inches (70 mm) backset. Provide 2-3/8 inches (60 mm) where noted or if door or frame detail requires. Provide deadbolt with full 1-inch (25 mm) throw, constructed of steel alloy.
   4. Provide manufacturer's standard strike.

5. Lock Status Indicator Trim: Where specified, provide escutcheon with lock status indicator widow.
    a. Escutcheon height 4.125 inches, width 2.54 inches. Projection 1.32 inches on thumbturn side and 1.28 inches on cylinder side.
    b. Unlocked and Unoccupied message will display on white background, and Locked and Occupied message will display on red background.
    c. Provide snap-in serviceable window to prevent tampering. Lock must function if indicator is compromised.
    d. Indicator window to provide 180-degree visibility.

## 2.7 ACCESS CONTROL READER

A. Manufacturers and Products:
    1. Scheduled Manufacturer and Product:
        a. By Division 28 supplier
    2. Acceptable Manufacturers and Products:
        a. No Substitute

## 2.8 ELECTRIC STRIKES

A. Manufacturers and Products:
    1. Scheduled Manufacturer and Product:
        a. Von Duprin 6000 Series
    2. Acceptable Manufacturers and Products:
        a. Substitutions by official Division 01 request only.
B. Requirements:
    1. Provide electric strikes designed for use with type of locks shown at each opening.
    2. Provide electric strikes UL Listed as burglary resistant that are tested to a minimum endurance test of 1,000,000 cycles.
    3. Where required, provide electric strikes UL Listed for fire doors and frames.
    4. Provide transformers and rectifiers for each strike as required. Verify voltage with electrical contractor.

## 2.9 CYLINDERS

A. Manufacturers:
    1. Scheduled Manufacturer and Product:
        a. Best SFIC "M" keyway. Field verification required.
    2. Acceptable Manufacturers and Products:
        a. No Substitute
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.

## 2.10 KEYING

A. Scheduled System:
    1. Existing non-factory registered system:
        a. Provide cylinders/cores keyed into Owner’s existing keying system managed by Owner’s locksmith, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference. Contact:
            1) Firm Name:
            2) Contact Person:
            3) Telephone:
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)
      2) Patent Protection: Keys and blanks protected by one or more utility patent(s).
   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) Permanent Control Keys: 3.
      2) Master Keys: 6.
      3) Change (Day) Keys: 3 per cylinder/core that is keyed differently
      4) Key Blanks: Quantity as determined in the keying meeting.

## 2.11 KEY CONTROL SYSTEM

A. Manufacturers:
   1. Scheduled Manufacturer:
      a. Telkee
   2. Acceptable Manufacturers:
      a. HPC
      b. Lund

B. Requirements:
   1. Provide key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of number of locks required for Project.
      a. Provide complete cross index system set up by hardware supplier, and place keys on markers and hooks in cabinet as determined by final key schedule.
      b. Provide hinged-panel type cabinet for wall mounting.

## 2.12 DOOR CLOSERS

A. Manufacturers and Products:
   1. Scheduled Manufacturer and Product:
      a. LCN 4040XP series
   2. Acceptable Manufacturers and Products:

a. Substitutions by official Division 01 request only.

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 high strength cast iron cylinder, and full complement bearings at shaft.
3. Cylinder Body: 1-1/2-inch (38 mm) diameter piston with 5/8-inch (16 mm) diameter double heat-treated pinion journal. QR code with a direct link to maintenance instructions.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and 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. Provide snap-on cover clip, with plastic covers, that secures cover to spring tube.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck. Provide graphically labelled instructions on the closer body adjacent to each adjustment valve. Provide positive stop on reg valve that prevents reg screw from being backed out.
7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
8. Pressure Relief Valve (PRV) Technology: Not permitted.
9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide 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.
11. Closers shall be capable of being upgraded by adding modular mechanical or electronic components in the field.

## 2.13 DOOR TRIM

A. Manufacturers:
1. Scheduled Manufacturer:
a. Ives
2. Acceptable Manufacturers:
a. Substitutions by official Division 01 request only.

B. Requirements:
1. Provide push plates, push bars, pull plates, pulls, and hands-free reversible door pulls with diameter and length as scheduled.

## 2.14 PROTECTION PLATES

A. Manufacturers:
1. Scheduled Manufacturer:
a. Ives
2. Acceptable Manufacturers:
a. Substitutions by official Division 01 request only.

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 2 inches (51 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.

## 2.15 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:
   1. Scheduled Manufacturers:
      a. Glynn-Johnson
   2. Acceptable Manufacturers:
      a. Substitutions by official Division 01 request only.

B. Requirements:
   1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.

## 2.16 DOOR STOPS AND HOLDERS

A. Manufacturers:
   1. Scheduled Manufacturer:
      a. Ives
   2. Acceptable Manufacturers:
      a. Substitutions by official Division 01 request only.

B. Provide door stops at each door leaf:
   1. Provide wall stops wherever possible. Provide concave type where lockset has a push button of 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.

## 2.17 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:
   1. Scheduled Manufacturer:
      a. Zero International
   2. Acceptable Manufacturers:
      a. Substitutions by official Division 01 request only.

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.

## 2.18 DOOR POSITION SWITCHES

A. Manufacturers:
   1. Scheduled Manufacturer:
      a. Schlage
   2. Acceptable Manufacturers:
      a. Substitutions by official Division 01 request only.

B. Requirements:
   1. Provide recessed or surface mounted type door position switches as specified.
   2. Coordinate door and frame preparations with door and frame suppliers. If switches are being used with magnetic locking device, provide minimum of 4 inches (102 mm) between switch and magnetic locking device.

## 2.19 FINISHES

A. FINISH: BHMA 626/652 (US26D); EXCEPT:
   1. Hinges at Exterior Doors: BHMA 630 (US32D)
   2. Aluminum Geared Continuous Hinges: BHMA 628 (US28)
   3. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
   4. Protection Plates: BHMA 630 (US32D)
   5. Overhead Stops and Holders: BHMA 630 (US32D)
   6. Door Closers: Powder Coat to Match
   7. Wall Stops: BHMA 630 (US32D)
   8. Latch Protectors: BHMA 630 (US32D)
   9. Weatherstripping: Clear Anodized Aluminum
   10. Thresholds: Mill Finish Aluminum

# PART 3 – EXECUTION

## 3.1 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. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
C. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 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.
   2. Custom Steel Doors and Frames: HMMA 831.
   3. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A
   4. Installation Guide for Doors and Hardware: DHI TDH-007-20
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. Wiring: Coordinate with Division 26, ELECTRICAL and Division 28 ELECTRONIC SAFETY AND SECURITY sections for:
   1. Conduit, junction boxes and wire pulls.

2. Connections to and from power supplies to electrified hardware.
3. Connections to fire/smoke alarm system and smoke evacuation system.
4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
5. Connections to panel interface modules, controllers, and gateways.
6. Testing and labeling wires with Architect's opening number.

K. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
L. Continuous Hinges: Re-locate the door and frame fire rating labels where they will remain visible so that the hinge does not cover the label once installed.
M. Door Closers & Auto Operators: Mount closers/operators on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers/operators so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.
N. Overhead Stops/Holders: Mount overhead stops/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.
O. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.
P. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
Q. 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.
R. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
S. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
T. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

## 3.3 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. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
   2. 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.

## 3.4 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.

## 3.5 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:

**Hardware Group No. 1**

For use on Door #(s):

| | | | | | |
|---|---|---|---|---|---|
| 100C | 100D | 100E | 100F | 100G | 100H |
| 100J | 100K | 100L | | | |

Provide each SGL door(s) with the following:

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|---|---|---|---|---|---|
| 1 | EA | NOTE: | ALL HARDWARE BY OVERHEAD DOOR MANUFACTURER | UNF | B/O |

**Hardware Group No. 2**

For use on Door #(s):

100

Provide each SGL door(s) with the following:

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|---|---|---|---|---|---|
| 1 | EA | CONT. HINGE | 224XY | 628 | IVE |
| 1 | EA | STOREROOM LOCK | ND80BD RHO | 626 | SCH |
| 1 | EA | SFIC CORE | MATCH EXISTING KEY SYSTEM | 626 | BES |
| 1 | EA | ELECTRIC STRIKE | 6211 FSE CON 12/16/24/28 VAC/VDC | 630 | VON |
| 1 | EA | SURFACE CLOSER | 4040XP HEDA ~~(4040XP SHCUSH)~~ | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | FLOOR STOP | FS18L | BLK | IVE |
| 1 | EA | RAIN DRIP | 142AA | AA | ZER |
| 1 | SET | GASKETING | 328AA-S | AA | ZER |
| 1 | EA | HEAD GASKETING | 429AA | AA | ZER |
| 1 | EA | DOOR SWEEP | 39A | A | ZER |
| 1 | EA | THRESHOLD | 566A-V3-223 | A | ZER |
| 1 | EA | WIRE HARNESS | CON (VERIFY LENGTH AND QUANTITY REQ'D) | | SCH |
| 1 | EA | MULTITECH READER | MTB11/MTB15 BY DIV. 28 | BLK | SCE |
| 1 | EA | DOOR CONTACT | 679-05HM/WD - TYPE AS REQ'D | BLK | SCE |

NOTE: MOUNT 429A HEAD SEAL PRIOR TO MOUNTING CLOSER. 328AA IS TO BE USED AS JAMB SEALS.
NOTE: FIELD VERIFY EXISTING KEYWAY. MATCH AND INTEGRATE INTO EXISTING FACILITY KEY SYSTEM.

OPERATIONAL DESCRIPTION: PRESENTING VALID CREDENTIAL AT CREDENTIAL READER DEVICE IS TO RELEASE THE ELECTRIC STRIKE AND SHUNT ANY ALARM ASSOCIATED WITH THE DOOR POSITION SWITCH ALLOWING INGRESS. KEYED INGRESS IS ALSO AVAILABLE. IMMEDIATE EGRESS IS ALWAYS AVAILABLE. ELECTRIC STRIKE REMAINS LOCKED UPON ACTIVATION OF FIRE ALARM OR LOSS OF POWER (FAIL-SECURE). DOOR POSITION MONITORED (DPS).

ITEMS TO BE PROVIDED BY THE DIVISION 28 SUPPLIER:
1. CREDENTIAL READER DEVICE.
2. REQUIRED POWER AND WIRING TO THE CREDENTIAL READER DEVICE, ELECTRIC STRIKE AND THE DOOR POSITION SWITCH.

**Hardware Group No. 3**

For use on Door #(s):
100A 100B

Provide each SGL door(s) with the following:

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|---|---|---|---|---|---|
| 1 | EA | CONT. HINGE | 224XY | 628 | IVE |
| 1 | EA | SGL CYL DEADBOLT | B660BD | 626 | SCH |
| 1 | EA | SFIC CORE | MATCH EXISTING KEY SYSTEM | 626 | BES |
| 1 | EA | DOOR PULL, 1" ROUND | 8103EZHD 10" STD | 630-316 | IVE |
| 1 | EA | PUSH PLATE | 8200 4" X 16" | 630 | IVE |
| 1 | EA | SURFACE CLOSER | 4040XP SHCUSH | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | RAIN DRIP | 142AA | AA | ZER |
| 1 | SET | GASKETING | 328AA-S | AA | ZER |
| 1 | EA | HEAD GASKETING | 429AA | AA | ZER |
| 1 | EA | DOOR SWEEP | 39A | A | ZER |
| 1 | EA | THRESHOLD | 566A-V3-223 | A | ZER |
| 1 | EA | DOOR CONTACT | 679-05HM/WD - TYPE AS REQ'D | BLK | SCE |

NOTE: MOUNT 429A HEAD SEAL PRIOR TO MOUNTING CLOSER. 328AA IS TO BE USED AS JAMB SEALS.
NOTE: FIELD VERIFY EXISTING KEYWAY. MATCH AND INTEGRATE INTO EXISTING FACILITY KEY SYSTEM.

OPERATIONAL DESCRIPTION: DOOR POSITION MONITORED (DPS).

ITEMS TO BE PROVIDED BY THE DIVISION 28 SUPPLIER:
1. REQUIRED WIRING TO THE DOOR POSITION SWITCH.

**Hardware Group No. 4**

For use on Door #(s):
103 104

Provide each SGL door(s) with the following:

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|---|---|---|---|---|---|
| 1 | EA | CONT. HINGE | 224XY | 628 | IVE |
| 1 | EA | CLASSROOM DEADBOLT | B663BD | 626 | SCH |
| 1 | EA | SFIC CORE | MATCH EXISTING KEY SYSTEM | 626 | BES |
| 1 | EA | DOOR PULL, 1" ROUND | 8103EZHD 10" STD | 630-316 | IVE |
| 1 | EA | PUSH PLATE | 8200 4" X 16" | 630 | IVE |
| 1 | EA | SURFACE CLOSER | 4040XP SCUSH | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | RAIN DRIP | 142AA | AA | ZER |
| 1 | SET | GASKETING | 328AA-S | AA | ZER |

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|---|---|---|---|---|---|
| 1 | EA | HEAD GASKETING | 429AA | AA | ZER |
| 1 | EA | DOOR SWEEP | 39A | A | ZER |
| 1 | EA | THRESHOLD | 566A-V3-223 | A | ZER |

NOTE: MOUNT 429A HEAD SEAL PRIOR TO MOUNTING CLOSER. 328AA IS TO BE USED AS JAMB SEALS.
NOTE: FIELD VERIFY EXISTING KEYWAY. MATCH AND INTEGRATE INTO EXISTING FACILITY KEY SYSTEM.

**Hardware Group No. 5**

For use on Door #(s):

102

Provide each SGL door(s) with the following:

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | CLASSROOM LOCK | ND70BD RHO | 626 | SCH |
| 1 | EA | SFIC CORE | MATCH EXISTING KEY SYSTEM | 626 | BES |
| 1 | EA | WALL STOP | WS406/407CVX | 630 | IVE |
| 1 | EA | GASKETING | 488SBK PSA H & J (PROVIDE SILENCERS AT NON-RATED DOORS) | BK | ZER |

NOTE: FIELD VERIFY EXISTING KEYWAY. MATCH AND INTEGRATE INTO EXISTING FACILITY KEY SYSTEM.

**Hardware Group No. 6**

For use on Door #(s):

101

Provide each SGL door(s) with the following:

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 NRP | 652 | IVE |
| 1 | EA | STOREROOM LOCK | ND80BD RHO | 626 | SCH |
| 1 | EA | SFIC CORE | MATCH EXISTING KEY SYSTEM | 626 | BES |
| 1 | EA | OH STOP & HOLDER | 90F | 630 | GLY |
| 1 | EA | GASKETING | 488SBK PSA H & J (PROVIDE SILENCERS AT NON-RATED DOORS) | BK | ZER |

NOTE: FIELD VERIFY EXISTING KEYWAY. MATCH AND INTEGRATE INTO EXISTING FACILITY KEY SYSTEM.

**SECTION 087100**

**DOOR HARDWARE**

116735 OPT0383495 Version 2

| Door Numbers | HwSet# |
|---|---|
| 100 | 2 |
| 100A | 3 |
| 100B | 3 |
| 100C | 1 |
| 100D | 1 |
| 100E | 1 |
| 100F | 1 |
| 100G | 1 |
| 100H | 1 |
| 100J | 1 |
| 100K | 1 |
| 100L | 1 |
| 101 | 6 |
| 102 | 5 |
| 103 | 4 |
| 104 | 4 |

**END OF SECTION**

## SECTION 092900

## GYPSUM BOARD ASSEMBLIES

### PART 1 – GENERAL

#### 1.1 SECTION INCLUDES
A. Metal stud wall framing.
B. Metal channel ceiling framing.
C. Acoustic insulation.
D. Cementitious backer board for interior applications.
E. Gypsum wallboard.
F. Joint treatment and accessories.

#### 1.2 RELATED SECTIONS
A. Section 061000 – Rough Carpentry: Building framing system and Gypsum sheathing.
B. Section 061053 - Wood Blocking and Curbing: Wood blocking for support of wall-mounted equipment.

#### 1.3 REFERENCES
A. Unless noted otherwise, the most current issue of the reference shall be used.
B. ASTM C 645 - Standard Specification for Nonstructural Steel Framing Members.
C. ASTM C 665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
D. ASTM C 754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
E. Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
F. GA-600 - Fire Resistance Design Manual; Gypsum Association.

#### 1.4 SUBMITTALS
A. See Section 013300 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.
C. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

#### 1.5 QUALITY ASSURANCE
A. Perform in accordance with ASTM C 840. Comply with requirements of GA-600 for fire-rated assemblies.
B. Applicator Qualifications: Company specializing in performing gypsum board application and finishing, with minimum five years of documented experience.

#### 1.6 REGULATORY REQUIREMENTS
A. Conform to applicable code for fire rated assemblies as indicated on drawings.

### PART 2 – PRODUCTS

#### 2.1 METAL FRAMING MATERIALS
A. Metal Framing Manufacturers:
   1. Clark Dietrich Building Systems; www.clarkdietrich.com
   2. Marino-Ware; www.marinoware.com.
   3. Telling Industries; www.buildstrong.com
   4. Substitutions: See Section 016000 - Product Requirements.
B. Metal Framing Connectors and Accessories:
   1. Same manufacturer as framing.

C. Non-Load bearing Framing System Components: ASTM C 645; galvanized sheet steel, of size and properties necessary to comply with ASTM C 754 for the spacing indicated unless exceeded herein, with maximum deflection of wall framing of L/240 at 5 psf. All interior framing shall be a minimum of 20 gauge.
   1. Studs: C shaped with knurled faces.
   2. Runners: U shaped, sized to match studs.
   3. Ceiling Channels: C shaped.
   4. Furring: Hat-shaped sections, minimum depth of 7/8 inch.
D. Shaft Wall Studs and Accessories: ASTM C 645; galvanized sheet steel, of size and properties necessary to comply with ASTM C 754 and specified performance requirements.
E. Ceiling Hangers: Type and size as specified in ASTM C 754 for spacing required.
F. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
   1. Material: ASTM A 653/A 653M steel sheet, SS Grade 50, with G60/Z180 hot dipped galvanized coating.

## 2.2 GYPSUM BOARD MATERIALS

A. Manufacturers:
   1. Georgia Pacific Gypsum Corporation; www.gp.com.
   2. National Gypsum Company; www.nationalgypsum.com.
   3. USG Corporation; www.usg.com.
   4. Lafarge North America Inc.; www.lafargenorthamerica.com
   5. Substitutions: See Section 016000 - Product Requirements.
B. Gypsum Wallboard: ASTM C 36/C 36M and ASTM C 1396/C 1396M. Sizes to minimize joints in place; ends square cut.
   1. Thickness: 5/8 inch.
   2. Edges: Tapered.
C. Type X: Fire resistant, UL or WH rated.
   1. Application: Vertical surfaces, unless otherwise indicated.
      a. Thickness: 5/8 inch.
D. Water-Resistant Gypsum Backing Board: ASTM C 630/C 630M and ASTM C 1396/C 1396M; ends square cut.
E. Abuse Resistant Gypsum Board: Non-paper faced, gypsum-fiber reinforced panels, for partition walls engineered to provide increased resistance to abrasion, indentation, and penetration.
   1. Basis of design: USG Fiberock Brand - AR Interior Panels
   2. Thickness: 5/8 in.
   3. Width: 4 ft.
   4. Edges: Long edges tapered, ends cut square
   5. Meet or exceed ASTM C1278:
      a. Abrasion: Level 1
      b. Indentation: Level 1
      c. Soft Body Impact: Level 2
      d. Hard Body Impact: Level 1
   6. Properties:
      a. Flexural Strength: ASTM C473, >155 lbf
      b. Compressive Strength: >500 psi
      c. Nail-Pull Resistance: ASTM C473, >145 lbs
      d. Weight: C473, 3.1 psf
      e. Mold Resistance: ASTM D3273, 10 (No Growth)
      f. Surface Burning Characteristics: ASTM E84, 5/0 flame/smoke

7. Accessories:
   a. Metal Corner Bead and Trim: USG Sheetrock and Beadex Brand as recommended by manufacturer
   b. Primer-Surfacer: USG Sheetrock Brand Tuffhide as recommended by Manufacturer.
   c. Control Joints: Provide at 28'-0" on center

**2.3 CEMENTUOUS BACKING PANELS**

A. Manufacturers
   1. Custom Building Products; www.custombuildingproducts.com
   2. FinPan, Inc.; www.finpan.com
   3. United States Gypsum Co; www.usg.com
   4. Substitutions: See Section 016000 - Product Requirements.
   5. Cementitious Backer Board for Interior Applications meeting the following requirements:

B. Cementitious Backer Board for interior applications: Meeting or exceeding ASTM C1186 Type A, Grade II aggregated Portland cement panels with glass fiber mesh embedded in front and back surfaces, 1/2 inch thick.

C. Cementitious Backer Board for Exterior and Cavity Applications meeting the following requirements:
   1. Meeting or exceeding ASTM C1186 Type A, Grade II
   2. Meeting or exceeding ASTM E136 for non-combustibility.
   3. High density, glass fiber reinforced both sides.
   4. Thickness: 5/8 inch.
   5. Size: 3 foot x 5 foot
   6. Tape: 2 inch wide, coated glass fiber tape for joints and corners as recommended by the manufacturer.

**2.4 ACCESSORIES**

A. Acoustic Insulation: ASTM C 665; preformed glass fiber, friction fit type, unfaced. Thickness of 3-1/2 inches unless indicated otherwise.

B. Acoustic Sealant: Non-hardening, non-skinning, for use in conjunction with gypsum board.

C. Finishing Accessories: ASTM C 1047, galvanized steel or rolled zinc, unless otherwise indicated.

D. Joint Materials: ASTM C 475 and as recommended by gypsum board manufacturer for project conditions.
   1. Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.

E. Screws: ASTM C 1002; self-piercing tapping type; cadmium-plated for exterior locations.

**PART 3 – EXECUTION**

**3.1 EXAMINATION**

A. Verify that project conditions are appropriate for work of this section to commence.

**3.2 FRAMING INSTALLATION**

A. Metal Framing: Comply with ASTM C 754 and manufacturer's instructions.

B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
   1. Level ceiling system to a tolerance of 1/1200.
   2. Laterally brace entire suspension system.

C. Studs: Space studs as permitted by standard.
   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.
   3. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.

D. T intersections: Construct T intersections by using minimum of three studs with top, bottom and intermediate blocking or four full studs. Lock all walls together by fastening framing members together at 16 inches on center vertically. Walls secured through Gypsum materials only shall not be permitted.
E. Corners: Construct corners using minimum of three studs with top, bottom and intermediate blocking or four full studs. Lock all walls together by fastening framing members together at 16 inches on center vertically. Walls secured through Gypsum materials only shall not be permitted.
F. Openings: Install minimum double studs at wall openings, sides, top and bottom at door and window jambs and all other openings.
G. Standard Wall Furring: Install at concrete and masonry walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.
    1. Orientation: Vertical.
    2. Spacing: As indicated.
H. Acoustic Furring: Install resilient channels at maximum 24 inches on center. Locate joints over framing members.
I. Furring for Fire Ratings: Install as required for fire resistance ratings indicated and to GA-600 requirements.
J. Blocking: Install blocking for support of plumbing fixtures, toilet partitions, wall cabinets, wood frame openings, toilet accessories, hardware, and other wall mounted items. Comply with Section 061053 for wood blocking.

## 3.3 ACOUSTIC ACCESSORIES INSTALLATION

A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
B. Acoustic Sealant: Install in accordance with manufacturer's instructions.

## 3.4 GYPSUM BOARD INSTALLATION

A. Comply with ASTM C 840. Install to minimize butt end joints, especially in highly visible locations.
B. Single Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
C. Single Layer Fire-Rated: Install gypsum board vertically, with ends and edges occurring over firm bearing.
D. Cementitious Backing Board: Install over studs in accordance with manufacturer’s instructions.
E. Installation on Metal Framing: Use screws for attachment of all gypsum board.

## 3.5 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
    1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
B. Corner Beads: Install at external corners, using longest practical length.
C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials and as indicated on drawings.

## 3.6 JOINT TREATMENT

A. Finish gypsum board in scheduled areas in accordance with levels defined in ASTM C 840 and as scheduled below.
B. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

## 3.7 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

### 3.8 FINISH LEVEL SCHEDULE

A. Level 1: Above finished ceilings concealed from view.
B. Level 2: Utility areas and areas behind cabinetry.
C. Level 3: Walls scheduled to receive textured wall finish.
D. Level 4: Walls and ceilings scheduled to receive flat or eggshell paint finish.
E. Level 5: Walls and ceilings scheduled to receive semi-gloss or gloss paint finish.

**END OF SECTION**

**SECTION 095113**

**ACOUSTICAL PANEL CEILINGS**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Acoustical ceiling panels.
B. Suspension system.
C. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings.

### 1.2 RELATED SECTIONS
A. Section 092900 – Gypsum Board Assemblies.
B. Section 233700– Air Outlets and Inlets.
C. Section 265100 – Interior Lighting.

### 1.3 REFERENCES
A. Unless noted otherwise, the most current issue of the reference shall be used.
B. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
C. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
D. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
E. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
F. ASTM C 635 - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
G. ASTM C 636 - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
H. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.
I. ASTM E 580 – Standard Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint.
J. ASTM E 1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum.
K. ASTM E 1111 Standard Test Method for Measuring the Interzone Attenuation of Ceilings Systems.
L. ASTM E 1264 - Standard Classification for Acoustical Ceiling Products.
M. ASTM E 1477 Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.
N. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
O. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.

### 1.4 SUBMITTALS
A. See Section 013300 - Administrative Requirements, for submittal procedures.
B. Shop Drawings: Indicate grid layout and related dimensioning.
C. Product Data: Provide data on suspension system components.
D. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry an approved independent laboratory classification of NRC, CAC, and AC.
E. Samples: Submit two samples of each panel type; 12 x 12 inch in size illustrating material and finish of acoustical units.
F. Samples: Submit two samples of each suspension system type; 12 inches long, of main runner, cross runner, and perimeter molding.
G. Manufacturer’s Installation Instructions: Indicate special procedures.

## 1.5 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.
B. Fire-Resistive Assemblies: Complete assembly listed and classified by UL for the fire resistance indicated.
C. Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.
   1. Surface Burning Characteristics: As follows, tested per ASTM E 84 and complying with ASTM E 1264 for Class A products.
      a. Flame Spread: 25 or less
      b. Smoke Developed: 50 or less
D. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
E. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

## 1.6 ENVIRONMENTAL REQUIREMENTS

A. Maintain uniform temperature of minimum 60 degrees F and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

## 1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.
B. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.
C. Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

## 1.8 PROJECT CONDITIONS

A. All ceiling products and suspension systems must be installed and maintained in accordance with manufacturer’s written installation instructions for that product in effect at the time of installation and best industry practice.
B. Prior to installation, the ceiling product must be kept clean and dry, in an environment that is between 32°F and 120°F and not subject to Abnormal Conditions. Abnormal conditions include exposure to chemical fumes, vibrations, moisture from conditions such as building leaks or condensation, excessive humidity, or excessive dirt or dust buildup.
C. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
D. Install acoustical units after interior wet work is dry.

## 1.9 WARRANTY

A. Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace acoustical panels that fail within the warranty period. Failures include, but are not limited to:
   1. Acoustical Panels: Sagging and warping as a result of defects in materials or factory workmanship.
   2. Grid System: Rusting and manufacturer's defects
   3. Acoustical Panels designated as inherently resistive to the growth of micro-organisms: Visible sag and will resist the growth of mold/mildew and gram positive and gram negative odor and stain causing bacteria.
B. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

## 1.10 EXTRA MATERIALS

A. See Section 016000 - Product Requirements, for additional provisions.
B. Provide 10 percent of total acoustical unit area of each type of acoustical unit for Owner's use in maintenance of project.

## PART 2 – PRODUCTS

## 2.1 ACOUSTICAL UNITS

A. Manufacturers:
   1. Armstrong World Industries, Inc.: www.armstrong.com
   2. CertainTeed Ceilings: www.certainteed.com
   3. USG Interiors, Inc.: www.usg.com
   4. Substitutions: See Section 016000 - Product Requirements.
B. Acoustical Units - General: ASTM E 1264, Class A.
   1. Units for Installation in Fire-Rated Suspension System: Listed and classified for the fire-resistive assembly the suspension system is a part of.
C. Acoustical Panels – **SAT-2 (BUILDING A – KITCHEN)**: Wet formed mineral fiber with acoustically transparent membrane, ASTM E 1264 Type IV, with the following characteristics:
   1. Size: 24 x 24 inches.
   2. Thickness: 1 inch.
   3. Composition: Wet formed mineral fiber with acoustically transparent membrane.
   4. Density: 1.08 lb/cu ft.
   5. Light Reflectance: 86-89 percent, determined as specified in ASTM E 1264.
   6. NRC Range: .70, determined as specified in ASTM E 1264.
   7. Surface Burning Classification: Class A Flame Spread 25.
   8. Edge: 9/16” Square Tegular
   9. Surface Color: White.
   10. Products:
      a. Basis of Design - Armstrong: Calla Health Zone smooth texture.
   11. Suspension System: 9/ 16” Exposed grid, white.

## 2.2 SUSPENSION SYSTEMS

A. Manufacturers:
   1. Basis of Design - Armstrong World Industries, Inc.: www.armstrong.com
   2. USG Interiors, Inc.: www.usg.com
   3. Substitutions: See Section 016000 - Product Requirements.
B. Suspension Systems - General: ASTM C 635; die cut and interlocking components, with stabilizer bars, clips, splices, and perimeter moldings as required.
C. Exposed Steel Suspension System: Hot dipped Galvanized Steel.
   1. Basis of Design – Suprafine XL **9/16”** Exposed Tee.
   2. Finish: White

## 2.3 ACCESSORIES

A. Support Channels and Hangers: Match material and finish of suspension system; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
B. Perimeter Moldings: Same material and finish as suspension system.
   1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.
C. Gasket for Perimeter Moldings: Closed cell rubber sponge tape.
D. Touch-up Paint: Type and color to match acoustical and grid units.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. Verify existing conditions before starting work.
B. Verify that layout of hangers will not interfere with other work.
C. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations.

### 3.2 INSTALLATION - SUSPENSION SYSTEM

A. Install suspension system in accordance with ASTM C 636, ASTM E 580, and manufacturer's instructions and as supplemented in this section.
B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
C. Lay out system to a balanced grid design with edge units no less than 50 percent of acoustical unit size.
D. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
E. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
H. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
I. Do not eccentrically load system or induce rotation of runners.
J. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
    1. Install with continuous gasket.
    2. Use longest practical lengths.
    3. Overlap and rivet corners.
K. Coordinate all existing pipe, conduit, and power pole penetrations through ceiling system. Provide trim plates at all penetrations to match finish of ceiling grid.

### 3.3 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.
B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
C. Fit border trim neatly against abutting surfaces.
D. Install units after above-ceiling work is complete.
E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
F. Cutting Acoustical Units:
    1. Make field cut edges of same profile and finish as factory edges.
G. Coordinate all existing pipe, conduit, and power pole penetrations through ceiling system. Provide trim plates at all penetrations to match finish of ceiling grid.

### 3.4 ERECTION TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

## 3.5 ADJUSTING AND CLEANING

A. Replace damaged and broken panels.
B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage.
C. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

**END OF SECTION**

**SECTION 096723**

**RESINOUS FLOORING**
**POLY-CRETE MDC, WATER CLEAR BROADCAST**
**AND URETHANE TOPCOAT**

## PART 1 – GENERAL

### 1.1 RELATED DOCUMENTS
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

### 1.2 SUMMARY
A. This section includes the following:
   1. Resinous flooring system as shown on the drawings and in schedules.
B. Related sections include the following:
   1. Cast-in-Place Concrete, section 033000
   2. Concrete Curing, section 033900

### 1.3 SYSTEM DESCRIPTION
A. The work shall consist of preparation of the substrate, the furnishing and application of a cementitious urethane based self-leveling seamless flooring system with decorative colored flake aggregate broadcast, epoxy resin grout coat, and urethane topcoat.
B. The system shall have the color and texture as specified by the Owner with a nominal thickness of 1/4 inch. It shall be applied to the prepared area(s) as defined in the plans strictly in accordance with the Manufacturer's recommendations.
C. Cove base (if required) to be applied where noted on plans and per manufacturers standard details unless otherwise noted

### 1.4 SUBMITTALS
A. Product Data: Latest edition of Manufacturer's literature including performance data and installation procedures.
B. Manufacturer’s Safety Data Sheet (SDS) for each product being used.
C. Samples: A 3 x 3 inch square sample of the proposed system. Color, texture, and thickness shall be representative of overall appearance of finished system subject to normal tolerances.

### 1.5 QUALITY ASSURANCE
A. The Manufacturer shall have a minimum of 10 years experience in the production, sales, and technical support of epoxy and urethane industrial flooring and related materials.
B. The Applicator shall have experience in installation of the flooring system as confirmed by the manufacturer in all phases of surface preparation and application of the product specified.
C. No requests for substitutions shall be considered that would change the generic type of the specified System.
D. System shall be in compliance with requirements of United States Department of Agriculture (USDA), Food, Drug Administration (FDA), and local Health Department.
E. System shall be in compliance with the Indoor Air Quality requirements of California section 01350 as verified by a qualified independent testing laboratory.
F. A pre-installation conference shall be held between Applicator, General Contractor and the Owner to review this specification, application procedure, quality control, inspection and acceptance criteria and production schedule.

### 1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING
A. Packing and Shipping
   1. All components of the system shall be delivered to the site in the Manufacturer's packaging, clearly identified with the product type and batch number.

B. Storage and Protection
   1. The Applicator shall be provided with a dry storage area for all components. The area shall be between 60 F and 85 F, dry, out of direct sunlight and in accordance with the Manufacturer's recommendations and relevant health and safety regulations.
   2. Copies of Safety Data Sheets (SDS) for all components shall be kept on site for review by the Engineer or other personnel.
C. Waste Disposal
   1. The Applicator shall be provided with adequate disposal facilities for non-hazardous waste generated during installation of the system.

## 1.7 PROJECT CONDITIONS

A. Site Requirements
   1. Application may proceed while air, material and substrate temperatures are between 60 F and 85 F providing the substrate temperature is above the dew point. Outside of this range, the Manufacturer shall be consulted.
   2. The relative humidity in the specific location of the application shall be less than 85 % and the surface temperature shall be at least 5 F above the dew point.
   3. The Applicator shall be supplied with adequate lighting equal to the final lighting level during the preparation and installation of the system.
B. Conditions of new concrete to be coated with cementitious urethane material.
   1. Concrete shall be moisture cured for a minimum of 7 days and have fully cured a minimum of 14 days in accordance with ACI-308 prior to the application of the coating system pending moisture tests.
   2. Concrete shall have a flat rubbed finish, float or light steel trowel finish (a hard steel trowel finish is neither necessary nor desirable).
   3. Sealers and curing agents should not to be used.
   4. Concrete surfaces on grade shall have been constructed with a vapor barrier to protect against the effects of vapor transmission and possible delamination of the system.
C. Safety Requirements
   1. The Owner shall be responsible for the removal of foodstuffs from the work area.
   2. Non-related personnel in the work area shall be kept to a minimum.

## 1.8 WARRANTY

A. Dur-A-Flex, Inc. warrants that material shipped to buyers at the time of shipment substantially free from material defects and will perform substantially to Dur-A-Flex, Inc. published literature if used in accordance with the latest prescribed procedures and prior to the expiration date.
B. Dur-A-Flex, Inc. liability with respect to this warranty is strictly limited to the value of the material purchase.

# PART 2 – PRODUCTS (EPY-2)

## 2.1 FLOORING

A. Basis of Design: Dur-A-Flex, Inc, Poly-Crete MDC (self leveling broadcast colored flake), epoxy resin, epoxy grout coat, and urethane topcoat seamless flooring system.
   1. System Materials:
      a. Topping: Dur-A-Flex, Inc, Poly-Crete MD resin, hardener and aggregate.
      b. The flake aggregate shall be Dur-A-Flex, Inc. Macro Flake ¼".
      c. Broadcast and grout coat: Dur-A-Glaze #4 Water Clear resin and hardener.
      d. Custom broadcast mix consisting of 5 colors – architect will provide sample.
      e. Topcoat: Sherwin-Williams HTS-100 urethane with high wear additive.

2. Patch Materials
   a. Shallow Fill and Patching: Use Dur-A-Flex, Inc. Poly-Crete MD (up to ¼ inch).
   b. Deep Fill and Sloping Material (over ¼ inch): Use Dur-A-Flex, Inc. Dur-A-Tex UM.

## 2.2 MANUFACTURER

A. Basis of Design: Dur-A-Flex, Inc., 95 Goodwin Street, East Hartford, CT 06108, Phone: (860) 528-9838, Fax: (860) 528-2802. Sebastian.s.sole@sherwin.com (847) 951-7752
B. Manufacturer of Approved System shall be single source and made in the USA.

## 2.3 PRODUCT REQUIREMENTS

| | |
|---|---|
| A. Topping | Poly-Crete MD |
| 1. Percent Reactive | 100 % |
| 2. VOC | 0 g/L |
| 3. Bond Strength to Concrete ASTM D 4541 | >400 psi, substrates fails |
| 4. Compressive Strength, ASTM C 579 | 8,990 psi |
| 5. Tensile Strength, ASTM D 638 | 2,175 psi |
| 6. Impact Resistance @ 125 mils, MIL D-3134, No visible damage or deterioration | >160 inch lbs |
| B. Broadcast Coat and Grout Coat | Dur-A-Glaze #4 Water Clear |
| 1. Percent Solids | 100 % |
| 2. VOC | 0 g/L |
| 3. Compressive Strength, ASTM D 695 | 11,200 psi |
| 4. Tensile Strength, ASTM D 638 | 2,100 psi |
| 5. Flexural Strength, ASTM D 790 | 5,100 psi |
| 6. Abrasion Resistance, ASTM D 4060 | |
| 7. C-10 Wheel, 1,000 gm load, 1,000 cycles | 29 mg loss |
| 8. Flame Spread/NFPA-101, ASTM E 84 | Class A |
| 9. Impact Resistance MIL D-24613 | 0.0007 inches, no cracking or delamination |
| 10. Water Absorption. MIL D-24613 | Nil |
| 11. Potlife @ 70 F | 20 minutes |
| C. Topcoat | HTS-100 |
| 1. VOC ASTM 3960 | 7 g/L |
| 2. Flammability ASTM D635 | 182 mm/min |
| 3. Tensile strength, ASTM D 2370 | 6,250 psi |
| 4. Abrasion Resistance, ASTM D4060 | Satin |
| 5. CS 17 wheel (1,000 g load) 1,000 cycles | 11.7 mg loss with grit |
| 6. Full Chemical resistance | 7 days |

# PART 3 – EXECUTION

## 3.1 EXAMINATION

A. Examine substrates, areas and conditions, with Applicator present, for compliance with requirements for maximum moisture content, installation tolerances and other conditions affecting flooring performance.
   1. Verify that substrates and conditions are satisfactory for flooring installation and comply with requirements specified.

## 3.2 PREPARATION

A. General
   1. New and existing concrete surfaces shall be free of oil, grease, curing compounds, loose particles, moss, algae growth, laitance, friable matter, dirt, and bituminous products.
   2. Moisture Testing: Perform tests recommended by manufacturer and as follows.
      a. Perform relative humidity test using is situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 99% relative humidity level measurement.
      b. If the relative humidity exceeds 99% then the Owner and/or Engineer shall be notified and advised of additional cost for the possible installation of a vapor mitigation system that has been approved by the manufacturer or other means to lower the value to the acceptable limit.
   3. Mechanical surface preparation
      a. Shot blast all surfaces to receive flooring system with a mobile steel shot, dust recycling machine (Blastrac or equal). All surface and embedded accumulations of paint, toppings hardened concrete layers, laitance, power trowel finishes and other similar surface characteristics shall be completely removed leaving a bare concrete surface having a minimum profile of CSP 4-5 as described by the International Concrete Repair Institute.
      b. Floor areas inaccessible to the mobile blast machines shall be mechanically abraded to the same degree of cleanliness, soundness and profile using diamond grinders, needle guns, bush hammers, or other suitable equipment.
      c. Where the perimeter of the substrate to be coated is not adjacent to a wall or curb, a minimum 1/4" deep x 1/4" wide key cut shall be made to properly seat the system, providing a smooth transition between areas. The detail cut shall also apply to drain perimeters and expansion joint edges.
      d. Cracks and joints (non-moving) greater than 1/8 inch wide are to be chiseled or chipped-out and repaired per manufacturer’s recommendations.
   4. At spalled or worn areas, mechanically remove loose or delaminated concrete to a sound concrete and patch per manufactures recommendations.

## 3.3 APPLICATION

A. General
   1. The system shall be applied in five distinct steps as listed below:
      a. Substrate preparation
      b. Topping/overlay application with colored quartz aggregate broadcast.
      c. Resin application with colored quartz aggregate broadcast.
      d. Grout coat application
      e. Topcoat application
   2. Immediately prior to the application of any component of the system, the surface shall be dry and any remaining dust or loose particles shall be removed using a vacuum or clean, dry, oil-free compressed air.
   3. The handling, mixing and addition of components shall be performed in a safe manner to achieve the desired results in accordance with the Manufacturer's recommendations.
   4. The system shall follow the contour of the substrate unless pitching or other leveling work has been specified by the Architect.
   5. A neat finish with well-defined boundaries and straight edges shall be provided by the Applicator.

B. Topping
   1. The topping shall be applied as a self-leveling system as specified by the Architect. The topping shall be applied in one lift with a nominal thickness of 3/16 inch.
   2. The topping shall be comprised of three components, a resin, hardener and filler as supplied by the Manufacturer.
   3. The hardener shall be added to the resin and thoroughly dispersed by suitably approved mechanical means. Aggregate shall then be added to the catalyzed mixture and mixed in a manner to achieve a homogenous blend.
   4. The topping shall be applied over horizontal surfaces using a pin rake, trowels or other systems approved by the Manufacturer.
   5. Immediately upon placing, the topping shall be degassed with a 15/16” spike roller.
   6. Colored flake aggregate shall be broadcast to excess into the wet material at the rate of 0.4 lbs/sf.
   7. Allow material to fully cure. Vacuum, sweep and/or blow to remove all loose aggregate.

C. Broadcast Coat
   1. The broadcast coat shall be comprised of two components, a resin, and hardener as supplied by the Manufacturer and mixed in the ratio of 2 parts resin to 1 part hardener.
   2. The broadcast coat shall be applied over horizontal surfaces using 12” flat window squeegee and back rolled at the rate of 90-100 sf/gal (Q-28) or 60-80 sf/gal (Q-11)
   3. Colored flake aggregate shall be broadcast to excess into the wet material at the rate of 0.5 lbs/sf.
   4. Allow material to fully cure. Vacuum, sweep and/or blow to remove all loose aggregate.

D. Grout Coat
   1. The grout coat shall be comprised of a liquid resin and a liquid hardener that is mixed in the ratio of 1 part hardener to 2 parts resin and installed per the manufacturer’s recommendations.
   2. The grout coat shall be applied using 12" flat window squeegee and back rolled with a coverage rate of 90-100 sf/gal.

E. Topcoat
   1. The topcoat shall be roller applier with a coverage rate:
      a. Resutile HTS -100 applied at 3 mils.
   2. The finished floor will have a nominal thickness of 1/4 inch.

## 3.4 FIELD QUALITY CONTROL

A. Tests, Inspection
   1. The following tests shall be conducted by the Applicator:
      a. Temperature
         1) Air, substrate temperatures and, if applicable, dew point.
      b. Coverage Rates
         1) Rates for all layers shall be monitored by checking quantity of material used against the area covered.

## 3.5 CLEANING AND PROTECTION

A. Cure flooring material in compliance with manufacturer’s directions, taking care to prevent their contamination during stages of application and prior to completion of the curing process.
B. Remove masking. Perform detail cleaning at floor termination, to leave cleanable surface for subsequent work of other sections.

**END OF SECTION**

**SECTION 097700**

**FIBERGLASS REINFORCED WALL PANELS**

## PART 1 – GENERAL

### 1.1 SUMMARY

A. Section Includes: Prefinished polyester glass reinforced plastic sheets and adhered to unfinished gypsum wallboard.
   1. PVC trim
B. Products Not Furnished or Installed under This Section:
   1. Gypsum substrate board.

### 1.2 RELATED SECTIONS

A. Section 092900 – Gypsum Board Assemblies
B. Section 054000 – Cold Formed Metal Framing

### 1.3 REFERENCES

A. American Society for Testing and Materials: Standard Specifications (ASTM)
   1. ASTM D 256 - Izod Impact Strengths (ft #/in)
   2. ASTM D 570 - Water Absorption (%)
   3. ASTM D 638 - Tensile Strengths (psi) & Tensile Modulus (psi)
   4. ASTM D 790 - Flexural Strengths (psi) & Flexural Modulus (psi)
   5. ASTM D 2583- Barcol Hardness
   6. ASTM D 5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels.
   7. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

### 1.4 SUBMITTALS

A. Product Data: Submit sufficient manufacturer's data to indicate compliance with these specifications, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation method
B. Shop Drawings: Submit elevations of each wall showing location of paneling and trim members with respect to all discontinuities in the wall elevation.
C. Selection Samples: Submit manufacturer’s standard color pattern selection samples representing manufacturer's full range of available colors and patterns.
D. Samples for Verification: Submit appropriate section of panel for each finish selected indicating the color, texture, and pattern required
   1. Submit complete with specified applied finish.
   2. For selected patterns show complete pattern repeat.
   3. Exposed Molding and Trim: Provide samples of each type, finish, and color.
E. Manufacturers Material Safety Data Sheets (MSDS) for adhesives, sealants and other pertinent materials prior to their delivery to the site (available as downloads for most Marlite’s products at http://www.marlite.com/tech-details.aspx or by contacting Marlite at info@marlite.com).

### 1.5 QUALITY ASSURANCE

A. Conform to building code requirements for interior finish for smoke and flame spread requirements as tested in accordance with:
   1. ASTM E 84 (Method of test for surface burning characteristics of building Materials)
      a. Wall Required Rating – Class A.
B. Sanitary Standards: System components and finishes to comply with:
   1. United States Department of Agriculture (USDA) / Food Safety & Inspection Services (FSIS) requirements for food preparation facilities, incidental contact.
   2. Food and Drug Administration (FDA) 2013 Food Code 6-101.11.
   3. Canadian Food Inspection Agency (CFIA) requirements.

## 1.6 DELIVERY, STORAGE, AND PROTECTION

A. Deliver materials factory packaged on strong pallets.
B. Store panels and trim lying flat, under cover and protected from the elements. Allow panels to acclimate to room temperature (range of 60 to 75°F) for 48 hours prior to installation.

## 1.7 PROJECT CONDITIONS

A. Environmental Limitations: Building are to be fully enclosed prior to installation with sufficient heat (70°) and ventilation consistent with good working conditions for finish work
B. During installation and for not less than 48 hours before, maintain an ambient temperature and relative humidity within limits required by type of adhesive used and recommendation of adhesive manufacturer
    1. Provide ventilation to disperse fumes during application of adhesive as recommended by the adhesive manufacturer.

## 1.8 WARRANTY

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

# PART 2 – PRODUCTS

## 2.1 MANUFACTURERS

A. Marlite; 1 Marlite Drive, Dover, OH 44622. 800-377-1221 FAX (330) 343-4668 Email: info@marlite.com www.marlite.com.
B. Product: Standard FRP

## 2.2 PANELS

A. Fiberglass reinforced thermosetting polyester resin panel sheets complying with ASTM D 5319.
    1. Dimensions:
        a. Thickness – 0.090 “ (2.29mm) nominal
        b. Width - 4'-0” (1.22m) nominal
        c. Length – 10’-0” (3.0m) nominal
    2. Tolerance:
        a. Length and Width: +/-1/8 “ (3.175mm)
        b. Square - Not to exceed 5/32 “ (3.96mm) for 10 foot (2.4m) panels
B. Properties: Resistant to rot, corrosion, staining, denting, peeling, and splintering.
    1. Flexural Strength - 1.7 x 104 psi per ASTM D 790.
    2. Flexural Modulus – 6.0 x 105 psi per ASTM D 790.
    3. Tensile Strength – 8.0 x 103 psi per ASTM D 638.
    4. Tensile Modulus – 9.43 x 105 psi per ASTM D 638.
    5. Water Absorption - 0.17% per ASTM D 570.
    6. Barcol Hardness (scratch resistance) of 30 as per ASTM D 2583.
    7. Izod Impact Strength of 7.0 ft. lbs./in ASTM D 256
C. Back Surface: Smooth. Imperfections which do not affect functional properties are not cause for rejection.
D. Front Finish: In accordance with sample provided by Architect.
E. Color: to be selected from manufacturer’s standard colors.
F. Surface: Smooth
G. Fire Rating: Class A

## 2.3 MOLDINGS

A. PVC Trim: Thin-wall semi-rigid extruded PVC
    1. M 350 Inside Corner, 10’ length
    2. M 360 Outside Corner, 10’ length
    3. M 365 Division, 10’ length
    4. M 370 Edge, 10’ length

5. Color: To match panel color

B. Outside Corner Guard:
   1. F 560SS Stainless Corner Guard, 10’ length
   2. Finish: #4 brushed satin

## 2.4 ACCESSORIES

A. Fasteners: Non-staining nylon drive rivets.
   1. Match panel colors.
   2. Length to suit project conditions.

B. Adhesive: Either of the following construction adhesives complying with ASTM C 557.
   1. Marlite C-551 FRP Adhesive - Water- resistant, non-flammable adhesive.
   2. Marlite C-915 Construction Adhesive - Flexible, water-resistant, solvent based adhesive, formulated for fast, easy application.
   3. Titebond Advanced Polymer Panel Adhesive – VOC compliant, non-flammable, environmentally safe adhesive

C. Sealant:
   1. Marlite Brand MS-250 Clear Silicone Sealant.
   2. Marlite Brand MS-251 White Silicone Sealant.
   3. Marlite Brand - Color Match Sealant.

# PART 3 – EXECUTION

## 3.1 PREPARATION

A. Examine backup surfaces to determine that corners are plumb and straight, surfaces are smooth, uniform, clean and free from foreign matter, nails countersunk, joints and cracks filled flush and smooth with the adjoining surface.
   1. Verify that stud spacing does not exceed 24” (61cm) on-center.

B. Repair defects prior to installation.
   1. Level wall surfaces to panel manufacturer’s requirements. Remove protrusions and fill indentations.

## 3.2 INSTALLATION

A. Comply with manufacturer's recommended procedures and installation sequence.

B. Cut sheets to meet supports allowing 1/8” (3 mm) clearance for every 8 foot (2.4m) of panel.
   1. Cut and drill with carbide tipped saw blades or drill bits, or cut with shears.
   2. Pre-drill fastener holes 1/8” (3mm) oversize with high speed drill bit.
      a. Space at 8” (200mm) maximum on center at perimeter, approximately 1” from panel edge.
      b. Space at in field in rows 16’ (40.64cm) on center, with fasteners spaced at 12” (30.48 cm) maximum on center.

C. Apply panels to board substrate, above base, vertically oriented with seams plumb and pattern aligned with adjoining panels.
   1. Install panels with manufacturer's recommended gap for panel field and corner joints.
      a. Adhesive trowel and application method to conform to adhesive manufacturer’s recommendations.
      b. Drive fasteners for snug fit. Do not over-tighten.

D. Apply panel moldings to all panel edges using silicone sealant providing for required clearances
   1. All moldings must provide for a minimum 1/8 “(3mm) of panel expansion at joints and edges, to insure proper installation.
   2. Apply sealant to all moldings, channels and joints between the system and different materials to assure watertight installation.

## 3.3 CLEANING

A. Remove excess sealant from panels and moldings. Wipe panel down using a damp cloth and mild soap solution or cleaner.
B. Refer to manufacturer's specific cleaning recommendations Do not use abrasive cleaners.

**END OF SECTION**

**SECTION 097726**

**ARCHITECTURAL SURFACING FILMS**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Graphic films for the following interior and exterior applications:
   1. Vertical surfaces.

### 1.2 RELATED SECTIONS
A. 04810 Unit Masonry Assemblies.
B. Section 09900 Paints and Coatings.

### 1.3 REFERENCES
A. ASTM International (ASTM): ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
B. ASTM International (ASTM): ASTM E 308 - Standard Recommended Practice for Spectophotometry and Description of Color in CIE 1931 System.
C. ASTM International (ASTM): ASTM E 903 - Standard Methods of Test for Solar Absorbance, Reflectance and Transmittance of Materials Using Integrating Spheres.
D. Underwriters Laboratories, Inc. (UL): UL 723 - Test for Surface Burning Characteristics of Building Materials.

### 1.4 SUBMITTALS
A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
B. Product Data: Manufacturer's data sheets for products specified, including but not limited to:
   1. Performance characteristics.
   2. Preparation instructions and recommendations.
   3. Storage and handling requirements and recommendations.
   4. Maintenance data for installed products, including precautions against harmful cleaning materials and methods.
   5. Installation Instructions.
C. Shop Drawings: Submit shop drawings showing layout, profiles, and product components, including dimensions, anchorage, and accessories.
D. Verification Samples: For each film specified, two samples, 4 inches x 4 inches (100 mm x 100 mm), representing actual architectural film colors and patterns.

### 1.5 QUALITY ASSURANCE
A. Manufacturer Qualifications: Regularly engaged in the manufacture of architectural finish films.
B. Installer Qualifications: Installation shall be performed by a trained and qualified installer, specialized and experienced in work required for this project. Tom Sitkowski, VP Bannerville 8170 S. Madison St. Burr Ridge, IL 60527 Ph. #630-320-5522 OR A list of 3M Endorsed installers is available at 3M.com/AMD or 3M Commercial Solutions, 1-888-650-3497.
C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
   1. Finish areas designated by Architect.
   2. Do not proceed with remaining work until workmanship is approved by Architect.
   3. Refinish mock-up area as required to produce acceptable work.
   4. Mock-up area may become part of finished work if it is deemed acceptable by the Architect.
D. Performance:
   1. Description: Custom digital printed opaque graphic film using Latex Inkjet inks with pressure-sensitive adhesive and air release channels. Flexible and highly-conformable for use on compound curves, corrugations, deep channels, and rivets. Field applied application.
   2. High performance, non-PVC 2 mil (51 Microns) thickness, not including adhesive.

3. Meets ASTM 84
   a. Flame-Spread Index: 10 or less.
   b. Smoke-Developed Index: 0
4. Chemical Resistance: Resists mild alkalis, mild acids, and salt.

## 1.6 PRE-INSTALLATION MEETINGS

A. Convene minimum two weeks prior to starting work of this section.

## 1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle materials and products in strict compliance with manufacturer's instructions and recommendations and industry standards.
B. Deliver products in manufacturer's original, unopened, undamaged containers with identification labels intact.
C. Store products protected from weather, temperature, and other harmful conditions as recommended by supplier. Conditions including but not limited to:
   1. 40 degrees F to 90 degrees F (4 degrees C to 32 degrees C) maximum temperature.
   2. Out of sunlight.
   3. Clean dry area.
   4. Original container.
   5. Do not stack boxes over six (6) units high. Excessive weight can damage the film
   6. Relative humidity below 80 percent.
   7. Handle products in accordance with manufacturer's instructions.
   8. Total Pre-installation Shelf Life: Apply within 2 years of date of purchase.

## 1.8 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
   1. Acceptable Temperature Range: 54 degrees F to 100 degrees F (12 degrees C to 38 degrees C).
B. Environmental Limitations: Do not install until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

## 1.9 SEQUENCING

A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

## 1.10 WARRANTY

A. Manufacturer's Standard Limited Warranty: For materials and workmanship.

# PART 2 – PRODUCTS

## 2.1 MANUFACTURERS

A. Acceptable Manufacturer: 3M Commercial Solutions, which is located at: 3M Center Bldg. 223; St. Paul, MN 55144-1000; Toll Free Tel: 888-650-3497; Tel: 651-737-1081; Fax: 651-737-8241; Email:request info (apeters2@mmm.com); Web: http:// 3m.com/3M/en_US/p/
B. Substitutions: See Section 01600 - Product Requirements.

## 2.2 ARCHITECTURAL FINISH FILMS

A. **VF-1:** Envision Print Wrap Film LX480mC for application to interior primed and painted masonry walls. WITH: Envision Matte Wrap Overlaminate 8550M.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. Examine substrate(s) for compliance with requirements for painted masonry walls. Do not proceed with installation until unsatisfactory conditions have been corrected.
B. **VF-1**: Reference 3M Envision Technical Data Sheet and 3M Envision Installation Guide to determine compatibility of finish to substrate.
C. **VF-2**: Reference 3M Scotchal Perforated Window Film Technical Data Sheet and Installation Guide to determine compatibility of finish to substrate.
D. Do not proceed with installation until unsatisfactory conditions have been corrected.
E. Scheduling of installation implies that substrate and conditions are prepared and ready for product installation per the recommendations of the installation specialist.
F. Proceeding with installation implies installer's acceptance of substrate and conditions.

### 3.2 SURFACE PREPARATION

A. Comply with manufacturers' instructions for surface preparation. Consider these factors in determining the suitability of the Product:
    1. Substrate texture affects Product adhesion and application ease.
        a. Unless the substrate is very smooth, its texture may be visible through product.
        b. Compounds used to smooth a textured substrate permanently change that substrate.
        c. Product removal may damage the substrate or its finish.
    2. Application surface conditions affect product adhesion.
        a. Ensure that the existing paint, surface finish, or wall covering has excellent bond to the substrate area where product will be applied.
        b. Repair, prime and paint the substrate, as needed.
        c. An adhesion promoter may be required to increase product adhesion.
    3. Human and environmental conditions affect product.
        a. Temperature and humidity in recommended range.
        b. Direct UV light (sunlight).
        c. Heating or cooling ducts in close proximity.
        d. Unsealed substrates in front of water sources.
        e. People or equipment that will be in contact with the product.
    4. The product may contain a splice. The location of the splices is marked with a tab along the edge of the product. The installer will need to determine the impact of the splice and work around it to make the best use of the material layout.
B. Test and prepare application surfaces per instructions in the 3M Envision Installation Guide.
    1. Use the 3M Adhesion Test to determine the compatibility of the application surface with the Product.
    2. Use the 3M Enhanced Cleaning Method to ensure that the application surface is ready to receive and hold the product.
C. Repair damaged application surfaces per instructions in the 3M Envision Installation Guide
D. Re-clean application surfaces with a lint-free cloth and 70/30 IPA cleaning solution,or use the 3M Enhanced Cleaning Method in the 3M Installation Guide for each specific graphic film type.

### 3.3 APPLICATION

A. Refer to the 3M Installation Guide for specific application instructions (specific for each graphic film type).
B. Application must be performed by a qualified installer. Contact Tom Sitkowski, VP Bannerville 8170 S. Madison St. Burr Ridge, IL 60527  Ph. #630-320-5522 OR refer to 3M.com/AMD for a list of 3M-endorsed installers.
C. Do not proceed with installation until all finishing work has been completed in and around the work area.
D. Paint the wall with a quality, semi-gloss top coat. Do not use matte paint or paint with silicone, graffiti-resistant or texturizing additives.

E. Allow the primer and paint to dry/cure as recommended by the primer/paint manufacturer, but no less than 5 days. Full curing requires at least 30 days in proper conditions.
F. Measure the application surface and cut film to size with a minimum 1/2 in. extra on all sides for trimming.
G. Install on application surfaces with no gaps, wire seams, or overlaps. Form smooth, wrinkle-free, bubble-free surface for finished installation.
H. No exposed joints on corners or other "open" type joints permitted.
I. Verify pattern prior to material acquisition as some part numbers do not allow three-dimensional forming.
J. Comply with manufacturer's installation instructions applicable to products and applications indicated, except where more stringent requirements apply.
K. Apply 3M film over properly prepared substrates.
L. Remove air bubbles, wrinkles, and blisters. Use approved procedures to prevent the formation of air bubbles, wrinkles, blisters and other defects.
M. For graphic films designed to be installed on glass- Substrates must not have coatings such as anti-reflection and scratch resistance, or built-in heating or defrosting elements, or wipers.
N. For graphic films designed to be installed on glass- Application temperature: 40°F to 100°F (4°C to 38°C) air and substrate.

## 3.4 CLEANING AND PROTECTION

A. Use cleaning methods recommended by architectural surfacing manufacturer for applicable environment.
B. Protect completed graphic film during remainder of construction period.
C. Consult with authorized installation specialist for project specifics.

**END OF SECTION**

**SECTION 099100**

**PAINTS AND COATINGS**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Surface preparation.
B. Field application of paints, stains, varnishes, and other coatings.
C. See Schedule - Surfaces to be Finished, at end of Section.

### 1.2 RELATED SECTIONS
A. Section 04810 – Unit Masonry Assemblies

### 1.3 REFERENCES
A. Unless noted otherwise, the most current issue of the reference shall be used.
B. ASTM D 16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications.

### 1.4 DEFINITIONS
A. Conform to ASTM D 16 for interpretation of terms used in this section.

### 1.5 SUBMITTALS
A. See Section 013300 - Administrative Requirements, for submittal procedures.
B. Samples: Submit two paper chip samples, 4 x 4 inch in size illustrating range of colors and textures available for each surface finishing product scheduled.

### 1.6 QUALITY ASSURANCE
A. Applicator Qualifications: Company specializing in performing the work of this section with minimum five years experience.

### 1.7 REGULATORY REQUIREMENTS
A. Comply with applicable code for flame and smoke rating requirements for products and finishes.

### 1.8 MOCK-UP
A. See Section 014000 - Quality Requirements, for general requirements for mock-up.
B. Provide 8’ x 8’ panel as directed by Architect, illustrating special coating color, texture, and finish.
C. Provide door frame assembly illustrating paint color, texture, and finish.
D. Approved mock-up may remain as part of the work. Rejected mock-up must be re-done.

### 1.9 DELIVERY, STORAGE, AND PROTECTION
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 and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

### 1.10 ENVIRONMENTAL REQUIREMENTS
A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
B. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
C. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior, unless required otherwise by manufacturer's instructions.
D. Minimum Application Temperature for Varnish Finishes: 65 degrees F for interior or exterior, unless required otherwise by manufacturer's instructions.
E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

## 1.11 EXTRA MATERIALS

A. See Section 016000 - Product Requirements, for additional provisions.
B. Supply 1 gallon of each color; store where directed.
C. Label each container with color in addition to the manufacturer's label.

# PART 2 – PRODUCTS

## 2.1 MANUFACTURERS

A. Paints:
   1. Glidden Professional; www.gliddenprofessional.com
   2. Benjamin Moore & Co.; www.benjaminmoore.com
   3. PPG Pittsburgh Paints: www.ppg.com
   4. Sherwin-Williams Co: www.sherwin-williams.com
B. Primer Sealers:
   1. Glidden Professional; www.gliddenprofessional.com
   2. Benjamin Moore & Co.; www.benjaminmoore.com
   3. PPG Pittsburgh Paints: www.ppg.com
   4. Sherwin-Williams Co: www.sherwin-williams.com
C. Block Fillers:
   1. Glidden Professional; www.gliddenprofessional.com
   2. Benjamin Moore & Co.; www.benjaminmoore.com
   3. PPG Pittsburgh Paints: www.ppg.com
   4. Sherwin-Williams Co: www.sherwin-williams.com
D. Substitutions: See Section 016000 - Product Requirements.

## 2.2 PAINTS AND COATINGS – GENERAL

A. Paints and Coatings: Ready mixed, except field-catalyzed coatings. Prepare pigments:
   1. To a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating.
   2. For good flow and brushing properties.
   3. Capable of drying or curing free of streaks or sags.

## 2.3 PAINT SYSTEMS - EXTERIOR

A. Paint ME-OP-3A - Ferrous Metals, Unprimed, Alkyd, 3 Coat:
   1. One coat of alkyd primer.
      a. Glidden Professional: 4360-XXXX Devguard Low VOC Multi-Purpose Tank & Structural Primer.
      b. Benjamin Moore & Co.: P06 Super Spec HP® Alkyd Metal Primer
      c. Sherwin-Williams Kem Bond HS, B50WZ Series
   2. Semi-gloss: Two coats of alkyd enamel.
      a. Glidden Professional: GP2406-XXXX Fortis 350 Exterior 100 Percent Acrylic Semi-Gloss Finish.
      b. Benjamin Moore & Co.: Alkyd Urethane Enamel V201
      c. Sherwin-Williams A-100 Exterior Coating, A8 Series
B. Paint MgE-OP-3A - Galvanized Metals, Alkyd, 3 Coat:
   1. Galvanize primer.
      a. Glidden Professional: Devoe Coatings 4360 Devguard Low VOC Multi-Purpose Tank & Structural Primer.
      b. Benjamin Moore: Super Spec HP® Acrylic Metal Primer P04
      c. Sherwin Williams ProIndustrial ProCryl Metal Primer, B66-310 Series
   2. Gloss: Alkyd enamel.
      a. Glidden Professional: Devoe Coatings 4309 Devguard Rust Preventative Gloss Enamel.

b. Benjamin Moore: Super Spec HP D.T.M. Alkyd Gloss Enamel #P26
c. Sherwin-Williams ProIndustrial Industrial Urethane Alkyd Enamel, B54-150 Series

3. Semi-gloss: Alkyd enamel.
   a. Glidden Professional: Devoe Coatings 4306 Devguard Rust Preventative Semi-Gloss Enamel.
   b. Benjamin Moore: Super Spec HP D.T.M. Alkyd Semi-Gloss #P24
   c. Sherwin-Williams Metalastic DTM Alkyd Enamel, B55 series

## 2.4 PAINT SYSTEMS – INTERIOR

A. Paint CI-OP-3L - Concrete/Masonry, Opaque, Latex, 3 Coat:
   1. Primer.
      a. Glidden Professional: GP3210 Gripper Interior /Exterior Primer
      b. Benjamin Moore: Fresh Start All Purpose 100% Acrylic Primer #046
      c. Sherwin-Williams: Problock Latex Primer/Sealer, B51W20
   2. Semi-gloss: Latex enamel.
      a. Glidden Professional: GP1416 Ultra-Hide 150 Interior Semi-Gloss Paint
      b. Benjamin Moore: Ultra Spec 500 Interior Semi-Gloss N539
      c. Sherwin-Williams: ProMar 200 Interior Latex Semi-Gloss, B31-4450 Series
   3. Flat: Latex enamel.
      a. Glidden Professional: GP1210 Ultra-Hide 150 Interior Flat Paint
      b. Benjamin Moore: Super Spec Latex Flat #275
      c. Sherwin-Williams: ProMar 200 Interior Latex Flat, B30-4450 Series

B. Paint MI-OP-3A - Ferrous Metals, Unprimed, Alkyd, 3 Coat:
   1. One coat of alkyd primer.
      a. Glidden Professional: Devoe Coatings 4360 Devguard Low VOC Multi-Purpose Tank & Structural Prime.
      b. Benjamin Moore: P06 Super Spec HP® Alkyd Metal Primer
      c. Sherwin-Williams: Kem Bond HS Metal Primer, B50WZ Series
   2. Gloss: Two coats of alkyd enamel.
      a. Glidden Professional: Devoe Coatings 4309 Devguard Rust Preventative Gloss Enamel.
      b. Benjamin Moore: Super Spec HP Urethane Alkyd Gloss Enamel P22
      c. Sherwin-Williams: ProIndustrial Industrial Urethane Alkyd Enamel, B54-150 Series
   3. Semi-gloss: Two coats of alkyd enamel.
      a. Glidden Professional: Devoe Coatings 4306 Devguard Rust Preventative Semi-Gloss Enamel.
      b. Benjamin Moore: Super Spec HP D.T.M. Alkyd Semi-Gloss #P24
      c. Sherwin-Williams: Metalastic DTM Alkyd Enamel, B55 Series

C. Paint MI-OP-2A - Ferrous Metals, Primed, Alkyd, 2 Coat:
   1. Touch-up with alkyd primer.
      a. Glidden Professional: Devoe Coatings 4360 Devguard Low VOC Multi-Purpose Tank & Structural Primer.
      b. Benjamin Moore: P06 Super Spec HP® Alkyd Metal Primer
      c. Sherwin-Williams: Kem Bond HS Metal Primer, B50WZ Series
   2. Gloss: Two coats of alkyd enamel.
      a. Glidden Professional: Devoe Coatings 4309 Devguard Rust Preventative Gloss Enamel.
      b. Benjamin Moore: Super Spec HP D.T.M. Alkyd Gloss Enamel #26
      c. Sherwin-Williams: ProIndustrial Industrial Urethane Alkyd Enamel, B54-150 Series
   3. Semi-gloss: Two coats of alkyd enamel.
      a. Glidden Professional: Devoe Coatings 4306 Devguard Rust Preventative Semi-Gloss Enamel.
      b. Benjamin Moore: Super Spec HP D.T.M. Alkyd Semi-Gloss #P24
      c. Sherwin-Williams: Metalastic DTM Alkyd Enamel, B55 Series

D. Paint GI-OP-3L - Gypsum Board/Plaster, Latex, 3 Coat:
   1. One coat of fast-drying latex primer sealer.
      a. Glidden Professional: 1000 High-Hiding Interior Primer.
      b. Benjamin Moore: Ultra spec 500 Interior flat finish N534
      c. Sherwin-Williams: ProMar 200 Interior Latex Primer, B28W8400
   2. Semi-gloss: Latex enamel.
      a. Glidden Professional: GP1416 Ultra-Hide 150 Interior Semi-Gloss Paint.
      b. Benjamin Moore: Super Spec Latex Eggshell Enamel #274
      c. Sherwin-Williams: ProMar 200 Interior Latex Semi-Gloss, B31-4450 Series
   3. Eggshell: Latex enamel.
      a. Glidden Professional: GP1412 Ultra-Hide 150 Interior Eggshell Paint.
      b. Benjamin Moore: Super Spec Latex Eggshell Enamel #274
      c. Sherwin-Williams: ProMar 200 Interior Latex EggShell, B20-4450 Series
   4. Flat: Latex enamel.
      a. Glidden Professional: GP1210 Ultra-Hide 150 Interior Flat Paint.
      b. Benjamin Moore: Ultra Spec 500 Interior Flat Finish N536
      c. Sherwin-Williams: ProMar 200 Interior Latex Flat, B30-4450 Series

## 2.5 ACCESSORY MATERIALS

A. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified; commercial quality.
B. Patching Material: Latex filler.
C. Fastener Head Cover Material: Latex filler.

# PART 3 – EXECUTION

## 3.1 EXAMINATION

A. Verify that surfaces are ready to receive Work as instructed by the product manufacturer.
B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
C. Test shop-applied primer for compatibility with subsequent cover materials.
D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces is below the following maximums:
   1. Plaster and Gypsum Board: 12 Percent
   2. Masonry, Concrete and Concrete Masonry Unit: 12 Percent
   3. Interior Wood: 15 Percent, measured in accordance with ASTM D 4442.
   4. Concrete Floors: 8 Percent.

## 3.2 PREPARATION

A. Surface Appurtenances: Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.
B. Surfaces: Correct defects and clean surfaces which affect work of this section. Remove or repair existing coatings that exhibit surface defects.
C. Marks: Seal with shellac those which may bleed through surface finishes.
D. Impervious Surfaces: Remove mildew by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
E. Concrete and Unit Masonry Surfaces to be Painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
F. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.
G. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.

H. Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.
I. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
J. Interior Wood Items 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.
K. Interior Wood Items 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.
L. Wood Doors to be Field Finished: Seal wood door top and bottom edge surfaces with clear sealer.
M. Metal Doors to be painted: Prime metal door top and bottom edge surfaces.

## 3.3 APPLICATION

A. Apply products in accordance with manufacturer's instructions.
B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
C. Apply each coat to uniform appearance. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.
D. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

## 3.4 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

A. Refer to Section 230553 and Section 260553 for schedule of color coding of equipment, duct work, piping, and conduit.
B. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
C. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

## 3.5 CLEANING

A. Collect waste material, which may constitute a fire hazard, place in closed metal containers, and remove daily from site.

## 3.6 SCHEDULE - SURFACES TO BE FINISHED

A. Do Not Paint or Finish the Following Items:
   1. Items fully factory-finished unless specifically noted.
   2. Fire rating labels, equipment serial number and capacity labels.
B. Paint the surfaces described below under Schedule - Paint Systems.
C. Mechanical and Electrical: Use paint systems defined for the substrates to be finished.
   1. Paint all insulated and exposed pipes occurring in finished areas to match background surfaces, unless otherwise indicated.
   2. Paint shop-primed items occurring in finished areas.
   3. Paint interior surfaces of air ducts and convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
   4. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.

## 3.7 SCHEDULE - PAINT SYSTEMS

A. Concrete, Concrete Block, Brick Masonry: Finish all surfaces exposed to view.
   1. Interior: CI-OP-3L, semi-gloss.
B. Gypsum Board: Finish all surfaces exposed to view.
   1. Interior Ceilings and Bulkheads: GI-OP-3L, flat.
   2. Interior Walls: GI-OP-3A, semi-gloss.
C. Steel Doors and Frames: Finish all surfaces exposed to view; MI-OP-3A, gloss.
D. Steel Fabrications: Finish all surfaces exposed to view.
   1. Exterior: ME-OP-3A, gloss; finish all surfaces, including concealed surfaces, before installation.
   2. Interior: MI-OP-3L, gloss.
E. Shop-Primed Metal Items: Finish all surfaces exposed to view.
   1. Finish the following items:
      a. Exposed surfaces of lintels.
      b. Mechanical equipment.
      c. Electrical equipment.

## 3.8 SCHEDULE – PAINT COLORS

A. Refer to Finish Legend on Architectural Drawings for schedule of paint colors and locations.

**END OF SECTION**

**SECTION 099601**

**EPOXY BROADCAST STANDARD FINISH**
**WITH URETHANE TOPCOAT**

## PART 1 – GENERAL

### 1.1 SUMMARY
A. This section includes the following:
   1. Flake/chip (Epoxy) flooring system as shown on the drawings and in schedules.

### 1.2 SYSTEM DESCRIPTION
A. The work shall consist of preparation of the substrate, the furnishing and application of an epoxy based multi roller applied flooring system with micro (1/16”) flake aggregate and aliphatic urethane topcoat. The system shall have the color and texture as specified by the Owner with a nominal thickness of 1/16 inch. It shall be applied to the prepared area(s) as defined in the plans strictly in accordance with the Manufacturer's recommendations.
B. 4” Cove base with cove strip to be applied where noted on plans and per manufacturers standard details unless otherwise noted.

### 1.3 SUBMITTALS
A. Product Data: Latest edition of Manufacturer's literature including performance data and installation procedures.
B. Manufacturer’s Material Safety Data Sheet (MSDS) for each product being used.
C. Samples: 3 inch square sample of the proposed system. Color, texture, and thickness shall be representative of overall appearance of finished system.

### 1.4 QUALITY ASSURANCE
A. The Manufacturer shall have a minimum of 10 years’ experience in the production, sales, and technical support of epoxy and urethane industrial flooring and related materials.
B. The Applicator shall have been approved in writing by the flooring system manufacturer in all phases of surface preparation and application of the product specified.
C. No requests for substitutions shall be considered that would change the generic type of the specified System, chemistry, number of layers etc.
D. System shall be in compliance with requirements of United States Department of Agriculture (USDA), Food, Drug Administration (FDA), and local Health Department.
E. System shall be in compliance with the Indoor Air Quality requirements of California section 01350 as verified by a qualified independent testing laboratory.
F. A pre-installation conference shall be held between Applicator, General Contractor and the Owner to review and clarification of this specification, application procedure, quality control, inspection and acceptance criteria and production schedule.

### 1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING
A. Packing and Shipping
   1. All components of the system shall be delivered to the site in the Manufacturer's packaging, clearly identified with the product type and batch number.
B. Storage and Protection
   1. The Applicator shall be provided with a storage area for all components. The area shall be between 60 F and 90 F, dry, out of direct sunlight and in accordance with the Manufacturer's recommendations and relevant health and safety regulations.
   2. Copies of Material Safety Data Sheets (MSDS) for all components shall be kept on site for review by the Engineer or other personnel.
C. Waste Disposal
   1. The Applicator shall be provided with adequate disposal facilities for non-hazardous waste generated during installation of the system.

**SECTION 099601**

**EPOXY BROADCAST STANDARD FINISH**
**WITH URETHANE TOPCOAT**

## 1.6 PROJECT CONDITIONS

A. Site Requirements
   1. Application may proceed while air, material and substrate temperatures are between 60 F and 90 F providing the substrate temperature is above the dew point. Outside of this range, installation should be temporarily halted and the Manufacturer shall be consulted.
   2. The relative humidity in the specific location of the application shall be less than 85 % and the surface temperature shall be at least 5 F above the dew point.
   3. The Applicator shall ensure that adequate ventilation is available for the work area.
   4. The Applicator shall be supplied with adequate lighting equal to the final lighting level during the preparation and installation of the system.

B. Conditions of new concrete to be coated with epoxy material.
   1. Concrete shall be moisture cured for a minimum of 7 days and have fully cured a minimum of twenty eight days in accordance with ACI-308 prior to the application of the coating system pending moisture tests.
   2. Concrete shall have a flat rubbed finish, float or light steel trowel finish (a hard steel trowel finish is neither necessary nor desirable).
   3. Sealers and curing agents should not to be used.
   4. Concrete surfaces on grade shall have been constructed with a vapor barrier to protect against the effects of vapor transmission and possible delamination of the system.

C. Safety Requirements
   1. All open flames and spark-producing equipment shall be removed from the work area prior to commencement of application.
   2. "No Smoking" signs shall be posted at the entrances to the work area.
   3. The Owner shall be responsible for the removal of foodstuffs from the work area.
   4. Non-related personnel in the work area shall be kept to a minimum.

D. Environmental Limitations: Comply with epoxy flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting epoxy flooring application.

E. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during epoxy flooring application.

F. Close spaces to traffic during epoxy flooring application and for 24 hours after application unless manufacturer recommends a longer period.

## 1.7 WARRANTY

A. Manufacture warrants that material shipped to buyers at the time of shipment substantially free from material defects and will perform substantially to published literature if used in accordance with the latest prescribed procedures and prior to the expiration date.

B. Manufacture liability with respect to this warranty is strictly limited to the value of the material purchase.

# PART 2 – PRODUCTS

## 2.1 FLOORING

A. **(EPY-1)** Basis of Design: Dur-A-Flex, Inc, Dur-A-Chip, Epoxy-(EPY-1) Based seamless flooring system.
   1. System Materials:
      a. Primer: Dur-A-Flex, Inc, Dur-A-Gard OPF resin and hardener.
      b. 1st Broadcast Coat: Dur-A-Flex, Inc, Dur-A-Glaze #4 resin and hardener.
      c. The flake/chip aggregate shall be Dur-A-Flex, Inc. Decorative Colored Chips.
      d. 2nd Broadcast coat: Dur-A-Flex, Inc. Dur-A-Glaze #4 resin and Water Clear hardener
      e. The flake/chip aggregate shall be Dur-A-Flex, Inc. Decorative Colored Chips; custom mix consisting of 4 colors, ¼" flakes – architect will provide sample.
      f. Grout coat: Dur-A-Flex, Inc. Dur-A-Glaze #4 resin and Water Clear hardener.

g. Topcoat: Dur-A-Flex, Inc. Armor Top resin and hardener.

2. Patch Materials
   a. Shallow Fill and Patching: Use Dur-A-Flex, Inc. Dur-A-Glaze #4 Cove Rez.
   b. Deep Fill and Sloping Material (over ¼ inch): Use Dur-A-Flex, Inc. Dur-A-Crete or Dur-A-Tex LM.
3. Thickness: 1/8 inch nominal.
4. Integral 4" cove base

B. Optional Vapor Control: For consideration of moisture mitigation, review the following options on a per project basis. For < 15lb or < 97% RH, Resuprime, General Polymers 3830. When a constant water source is present, AqauArmor Moisture Control will allow for a reservoir system.
   1. For moisture readings < 15lbs. or < 97% RH, 1st Coat: Resuprime MVT: applied at 20 mils WFT

C. System Components:
   1. Primer: 3579 Standard Primer/Binder.
   2. Body coat: 3561 Epoxy Resin with 19 pounds/1.25 working gallon mix of GP 5105 Trafficote Aggregate Blend.
   3. Chip Broadcast: Decorative Vinyl Chip Aggregate (Flake Color and Size TBD).
   4. Grout: 3746 Self-Leveling Epoxy.
   5. Seal Coat: 4685 Poly-Cote Urethane (with aluminum oxide 220 Mesh; 3-4 lb/working gallon)

D. Typical Physical Properties:
   1. Hardness at 24 hours Shore D, Resin Only, ASTM D 2240: 70/65.
   2. Compressive Strength, Mortar System, ASTM C 579: 12,000 psi.
   3. Tensile Strength, Mortar System, ASTM C 307: 2,500 psi.
   4. Tensile Strength, Resin Only, ASTM D 638: 6,000 psi.
   5. Abrasion Resistance, Resin Only, ASTM D 4060, CS-17 Wheel, 1,000 Cycles: 90-100 milligrams lost.
   6. Flexural Strength, Mortar System, ASTM C580: 4,500 psi.
   7. Flexural Strength, Resin Only, ASTM D 790: 10,000 psi.
   8. Adhesion, ACI 503R: 300 psi, concrete failure.
   9. Flammability: Self-extinguishing over concrete.
   10. Resistance Elevated Temperatures, MIL-D-3134J: No slip or flow at required temperature of 158 degrees F.
   11. Impact Resistance, MIL-D-3134J: Withstands 16 ft-lbs without cracking, delaminating or chipping.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. Examine substrates, areas and conditions, with Applicator present, for compliance with requirements for maximum moisture content, installation tolerances and other conditions affecting flooring performance.
   1. Verify that substrates and conditions are satisfactory for flooring installation and comply with requirements specified.

### 3.2 PREPARATION

A. General
   1. New and existing concrete surfaces shall be free of oil, grease, curing compounds, loose particles, moss, algae growth, laitance, friable matter, dirt, and bituminous products.
   2. Moisture Testing: Perform tests recommended by manufacturer and as follows.
      a. Perform relative humidity test using is situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75% relative humidity level measurement.

b. If the relative humidity exceeds 75% then Dur-A-Flex, Inc Dur-A-Glaze MVP Primer moisture mitigation system must be installed prior to resinous flooring installation. Slab-on grade substrates without a vapor barrier may also require the moisture mitigation system.

3. There shall be no visible moisture present on the surface at the time of application of the system. Compressed oil-free air and/or a light passing of a propane torch may be used to dry the substrate.
4. Mechanical surface preparation
   a. Shot blast all surfaces to receive flooring system with a mobile steel shot, dust recycling machine (Blastrac or equal). All surface and embedded accumulations of paint, toppings hardened concrete layers, laitance, power trowel finishes and other similar surface characteristics shall be completely removed leaving a bare concrete surface having a minimum profile of CSP 3-4 as described by the International Concrete Repair Institute.
   b. Floor areas inaccessible to the mobile blast machines shall be mechanically abraded to the same degree of cleanliness, soundness and profile using diamond grinders, needle guns, bush hammers, or other suitable equipment.
   c. Where the perimeter of the substrate to be coated is not adjacent to a wall or curb, a minimum 1/4 inch key cut shall be made to properly seat the system, providing a smooth transition between areas. The detail cut shall also apply to drain perimeters and expansion joint edges.
   d. Cracks and joints (non-moving) greater than 1/8 inch wide are to be chiseled or chipped-out and repaired per manufacturer's recommendations.
5. At spalled or worn areas, mechanically remove loose or delaminated concrete to a sound concrete and patch per manufactures recommendations.

**3.3 APPLICATION**

A. General **(EPY-1)**
   1. The system shall be applied in six distinct steps as listed below:
      a. Substrate preparation
      b. Priming
      c. First broadcast coat application with first chip broadcast
      d. Second broadcast coat with second chip broadcast
      e. Grout coat application,
      f. Topcoat application
      g. Provide Aluminum Oxide or Dur-A-Grip in areas indicated on Room finish schedule.
   2. Immediately prior to the application of any component of the system, the surface shall be dry and any remaining dust or loose particles shall be removed using a vacuum or clean, dry, oil-free compressed air.
   3. The handling, mixing and addition of components shall be performed in a safe manner to achieve the desired results in accordance with the Manufacturer's recommendations.
   4. The system shall follow the contour of the substrate unless pitching or other leveling work has been specified by the Architect.
   5. A neat finish with well-defined boundaries and straight edges shall be provided by the Applicator.

B. Primer
   1. The primer shall be Dur-A-Glaze #4 WB Primer that is mixed at the ratio of 1 part resin to 4 parts hardener per the manufacturer's instructions.
   2. The primer shall be applied by 1/8 inch notched squeegee and back rolled at the rate of 200 sf/gal to yield a dry film thickness of 4 mils.

C. Broadcast Coats
   1. The broadcast coat shall be applied as a double broadcast system as specified by the Architect.
   2. The broadcast coat shall be comprised of two components, a resin, and hardener as supplied by the Manufacturer and mixed in the ratio of 2 parts resin to 1 part hardener.

3. The resin shall be added to the hardener and thoroughly mixed by suitably approved mechanical means.
4. The first broadcast coat shall be applied over horizontal surfaces using the dip and roll, and back roll method at the rate of 300 sf/gal using the Dur-A-Gard OPF material.
5. Chips shall be broadcast to excess into the wet material.
6. Allow material to fully cure. Vacuum, sweep and/or blow to remove all loose aggregate.
7. Scrape the floor with a trowel or floor scraper. Sweep and vacuum the floor again.
8. Apply a second broadcast coat of resin shall be applied by flat squeegee then back rolled with a coverage rate of 150 sf/gal with the Dur-A-Glaze #4 Water Clear epoxy.
9. Chips shall be broadcast to excess.
10. Allow material to fully cure. Vacuum, sweep and/or blow to remove all loose chips.
11. Scrape the floor with a trowel or floor scraper. Sweep and vacuum the floor again.

D. Grout Coat
   1. The grout coat shall be comprised of a Dur-A-Glaze # 4 Water Clear epoxy that is mixed in the ratio of 1 part hardener to 2 parts resin and installed per the manufacturer's recommendations.
   2. The grout coat shall be squeegee applied and back rolled with a coverage rate of 100 sf/gal.
E. Topcoat
   1. The topcoat of Armor Top shall be roller applied at the rate of 500 sf/gal to yield a dry film thickness of 3 mils.
   2. The finish floor will have a nominal thickness of 60 mils.
F. Provide Aluminum Oxide or Dur-A-Grip in areas indicated on Room finish schedule.

## 3.4 APPLICATION (EPY-2)

A. Apply components of epoxy flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.
   1. Repair cracks and treat control joints in concrete substrate as recommended by manufacturer prior to start of application.
   2. Coordinate application of components to provide optimum adhesion of epoxy flooring system to substrate, and optimum intercoat adhesion.
   3. Cure epoxy flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.
   4. Install directly over non-moving control joints and cracks which have been treated with manufacturer's recommended epoxy. Epoxy flooring shall terminate at the edge of isolation and expansion joints.
   5. Sequence of installation is primer, first broadcast coat of resin glaze and colored quartz aggregate, second broadcast coat of resin glaze and colored quartz aggregate, seal coat.

## 3.5 FIELD QUALITY CONTROL

A. Tests, Inspection
   1. The following tests shall be conducted by the Applicator:
      a. Temperature
         1) Air, substrate temperatures and, if applicable, dew point.
      b. Coverage Rates
         1) Rates for all layers shall be monitored by checking quantity of material used against the area covered.

## 3.6 CLEANING AND PROTECTION

A. Cure flooring material in compliance with manufacturer's directions, taking care to prevent their contamination during stages of application and prior to completion of the curing process.
B. Remove masking. Perform detail cleaning at floor termination, to leave cleanable surface for subsequent work of other sections.

C. Protect epoxy flooring from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by epoxy flooring manufacturer.
D. Clean epoxy flooring prior to Substantial Completion, using materials and procedures as recommended by manufacturer.

**END OF SECTION**

**SECTION 101423**

**PLASTIC SIGNS**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Raised letter plastic signs.
B. Signs made of individual plastic letters.
C. Cash allowance for signs.

### 1.2 RELATED SECTIONS
A. Section 230553 – Identification for HVAC Piping and Equipment.
B. Section 260553 – Identification for Electrical Systems.

### 1.3 ALLOWANCES
A. See Section 012100 - Allowances, for cash allowances affecting this section.
B. Allowance includes purchase and delivery of plastic signs; installation is included in this section and is part of the Contract Sum.

### 1.4 REFERENCES
A. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 1998.

### 1.5 SUBMITTALS
A. See Section 013300 - Administrative Requirements, for submittal procedures.
B. Shop Drawings: Indicate sign styles, lettering font, foreground and background colors, locations, overall dimensions of each sign.
C. Samples: Submit two sample signs, full size illustrating type, style, letter font, and colors specified; method of attachment.
D. Manufacturer's Installation Instructions: Include installation template and attachment devices.

### 1.6 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.

### 1.7 REGULATORY REQUIREMENTS
A. Conform to applicable code and ANSI/CABO A117.1 for requirements for the physically handicapped.

### 1.8 DELIVERY, STORAGE, AND PROTECTION
A. Package signs, labeled in name groups.
B. Store adhesive attachment tape at ambient room temperatures.

### 1.9 ENVIRONMENTAL REQUIREMENTS
A. Do not install signs when ambient temperature is lower than recommended by manufacturer.
B. Maintain this minimum temperature during and after installation of signs.

## PART 2 – PRODUCTS

### 2.1 MANUFACTURERS
A. Plastic Signs:
1. Best Sign Systems; www.bestsigns.com
2. Mohawk Sign Systems, Inc.; www.mohawksign.com
3. ASI Sign Systems; www.asisignage.com
4. 290 Sign Systems; www.290signs.com
5. The Alphabet Shop; www.alphabetshop.com
6. Takeform Architectural Graphics; www.takeform.net

7. Substitutions: See Section 016000 - Product Requirements

## 2.2 RAISED LETTER SIGNS

A. Base Material: Acrylic plastic:
   1. Total Thickness: 1/8 inch
   2. Height: Per drawing
   3. Edges and Frames: Per drawing
   4. Color: to be chosen from manufacturer’s standard color
B. Raised Character Size and Style: Acrylic plastic, character adhered to base material:
   1. Comply with applicable provisions of ANSI/ICC A117.1, including Braille
   2. Character Color: to be chosen from manufacturer’s standard color
   3. Character Thickness: 1/8 inch
   4. Height: Per drawing
   5. Edges: Square
   6. Character Font: Helvetica
   7. Character Case: Upper case only

## 2.3 INDIVIDUAL GRAPHICS

A. Comply with applicable provisions of ANSI/ICC A117.1 for signs not required to be tactile.
B. Material: Acrylic plastic:
   1. Thickness: 1/8 inch
   2. Height: Per drawing
   3. Edges: Square
C. Character Style:
   1. Character Color: Manufacturer’s standard color
   2. Character Font: Helvetica
   3. Character Case: Upper case only
D. Graphic Style: Handicapped type

## 2.4 ACCESSORIES

A. Mounting Hardware: Chrome screws

# PART 3 – EXECUTION

## 3.1 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

## 3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions - **no double-sided tape allowed.**
B. Install signs in locations indicated.

## 3.3 SCHEDULES

A. Refer to drawings.

**END OF SECTION**

**SECTION 101433**

**EXTERIOR ALUMINUM SIGNS**

## PART 1 – GENERAL

### 1.1 SUMMARY
A. Related Documents: Provisions established within the General and Supplementary Conditions of the Contract, Division 1 - General Requirements, and the Drawings are collectively applicable to this Section.
B. Section Includes:
   1. Exterior sign, of aluminum construction, illuminated by LED light fixture.
C. Related Sections: Division 26: Electrical Requirements.

### 1.2 QUALITY ASSURANCE
A. Supplier: Obtain all products in this section from a single supplier.
B. Regulatory Requirements: Products shall meet requirements of the Americans With Disabilities Act Accessibility Guidelines (ADAAG) and local amendments and modifications.
C. Installer: Installation shall be performed by installer specialized and experienced in work similar to that required for this project.

### 1.3 SUBMITTALS
A. Submit in accordance with requirements of Division 1.
B. Product Data: Submit product data for specified products. Include material details for each sign specified.
C. Shop Drawings: Submit shop drawings showing layout, profiles, and product components, including dimensions, anchorage, and accessories.
D. Samples: Submit supplier’s standard color chart for selection purposes and selected colors for verification purposes.
E. Installation: Submit supplier’s installation instructions.
F. Closeout Submittals:
   1. Submit operation and maintenance data for installed products, including precautions against harmful cleaning materials and methods.
   2. Submit warranty documents specified herein.

### 1.4 DELIVERY, STORAGE, AND HANDLING
A. Comply with requirements of Division 1.
   1. Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.
   2. Deliver products in manufacturer's original, unopened, undamaged containers with identification labels intact.
   3. Store products protected from weather, temperature, and other harmful conditions as recommended by supplier.
   4. Handle products in accordance with manufacturer's instructions.

### 1.5 WARRANTY
A. Project Warranty: Comply with requirements of Division 1.
B. Manufacturer's Warranty: Submit manufacturer's standard warranty document executed by authorized company official.
   1. Warranty Period: One (1) year from product installation for enclosures.

## PART 2 – PRODUCTS

### 2.1 SIGNAGE SYSTEMS
A. Acceptable Manufacturers:
   1. Basis of Design: ASI, 3860 W. Northwest Highway, Suite 350, Dallas, TX 75220; (214) 352-9140 telephone; (214) 352-9741 facsimile; (800) ASI-SPEC [274-7732]
   2. Or one of the following:

a. ACE Sign Systems, Inc.
b. Advance Corporation; Braille-Tac Division.
c. Allen Industries Architectural Signage
d. Allenite Signs; Allen Marking Products, Inc.
e. APCO Graphics, Inc.
f. Best Sign Systems Inc.
g. Bunting Graphics, Inc.
h. Fossil Industries, Inc.
i. Gemini Incorporated.
j. Grimco, Inc.
k. Innerface Sign Systems, Inc.
l. InPro Corporation
m. Matthews International Corporation; Bronze Division.
n. Mills Manufacturing Company.
o. Mohawk Sign Systems.
p. Nelson-Harkins Industries.
q. Seton Identification Products.
r. Signature Signs, Incorporated.
s. Supersine Company (The)

3. Substitutions: Refer to Section 01600 for product requirements.

B. Exterior Wall Mount Cabinet Sign with push-thru translucent acrylic lettering.
1. Exterior aluminum wall mounted cabinet size: As indicated on Drawings.
2. Panel color: Custom to match to the Wall panels to which it is mounted on.
3. Text or graphic color: To be selected by the Architect from the Manufacturer's full range.
4. Letter style and letter size:
a. Depth of lettering: ½"
b. Height of letters: As indicated on Drawings.
c. Letter Style: To be selected by the Architect from the Manufacturer's standard range.
5. Graphic technique:
a. Computer cut panels with push through white acrylic lettering
b. Apply translucent vinyl over the face of the acrylic and leave the edges of the push-thru acrylic uncovered so it will illuminate white around the edges of the letters.
6. Text schedule: As indicated on Drawings.
7. Wall Attachment: As recommended by the manufacturer for mounting location indicated on the Drawings. Field verify conditions.

## 2.2 SIGNAGE MATERIALS / COMPONENTS

A. Materials and Components:
1. Aluminum: Extruded aluminum, alloys 6061, 6063, sheet aluminum, alloy 5052, 3003
2. Light Emitting Diodes (LED): LED illumination source shall meet the standards as outlined in LM-79 & LM-80; UL listed and IP 65 minimum rating; high brightness LEDs; 5,000 K minimum color temperature; 75 CRI minimum; 50,000 hour minimum rated life.
a. As manufacturered by Principal, AgiLight or Architect approved equal.
3. Electronic Controls: Power management system to be comprised of the following components; microprocessor-based charge controller / LED driver; fully programmable algorithmic load optimization utilizing Pulse-Width-Modulation (PWM); constant voltage control; dual-balanced independent PV panel inputs; multisource power inputs including both AC and DC supply; on-board temperature compensated voltage-controlled battery charging at automated full/slow/trickle charge rates; battery 20% depth of battery discharge and over/under charging voltage cutoff; real-time clock; logic can differentiate between daylight and environmental ambient light; on/off setpoint control for fixed time operation and/or seasonal dusk/dawn activation; look-ahead battery-load correlation routines for maximum off-grid survival operation; start-up self-test and status indication; terminal connector wire termination.

B. Painted Surface Treatment Finish: Manufacturer's standard two-phase finishing process. Colors as selected from manufacturer's full range.
   1. Phase One: Priming with 2u depth layer for optimum surface coat adhesion and weatherability.
   2. Phase Two: Painting process employing two component, acrylic polyurethane coating of 20-30u depth.

### 2.3 FABRICATION – GENERAL

A. General: Comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.
B. Allow for thermal movement resulting from a maximum ambient temperature change (range) of 100 deg F (38 deg C). Design, fabricate, and install sign assemblies to prevent buckling, opening up of joints, and over-stressing of welds and fasteners.
C. Mill joints to a tight, hairline fit. Form joints exposed to the weather to exclude water penetration.
D. No light leaks.
E. Preassemble signs in the shop to the greatest extent possible to minimize field assembly. Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in a location not exposed to view after final assembly.
F. Conceal fasteners if possible; otherwise, locate countersunk fasteners to appear inconspicuous.
G. Form panels to required size and shape. Comply with requirements indicated for design, dimensions, finish, color, and details of construction.
H. Coordinate dimensions and attachment methods to produce message panels with closely fitting joints. Align edges and surfaces with one another in the relationship indicated.
I. Increase material thickness or reinforce with concealed stiffeners or backing materials as required to produce surfaces without distortion, buckles, warp, or other surface deformations.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. Site Verification of Conditions: Verify installation conditions previously established under other sections are acceptable for product installation in accordance with manufacturer's instructions.
B. Scheduling of installation by Contractor implies that substrate and conditions are prepared and ready for product installation. Proceeding with installation implies installer’s acceptance of substrate and conditions.

### 3.2 INSTALLATION

A. Install product in accordance with supplier’s instructions.
B. Install product in locations indicated using mounting methods recommended by sign manufacturer and free from distortion, warp, or defect adversely affecting appearance.
C. Install product level, plumb, and at heights indicated.
D. Install product at locations to conform with applicable local ordinances, amendments and regulations.
E. Install signs within the following tolerances and in accordance with manufacturer's recommendations:
   1. Within 1 inch vertically and horizontally of intended location.

### 3.3 CLEANING, PROTECTION, AND REPAIR

A. Repair scratches and other damage which might have occurred during installation. Replace components where repairs were made but are still visible to the unaided eye from a distance of 10 feet.
B. Remove temporary coverings and protection to adjacent work areas. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance. Remove construction debris from project in accordance with provisions in Division 1.

### 3.4 SIGN SCHEDULE

A. Schedule: Refer to Drawings for sizes, locations, and layout of signage types, sign text copy, and graphics.

**END OF SECTION**

**SECTION 102100**

**TOILET COMPARTMENTS (HDPE)**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Solid plastic partitions.

### 1.2 REFERENCES
A. ASTM International: ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
B. National Fire Protection Association: NFPA 286 - Standard Methods of Fire Test for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.
C. United States Green Building Council (USGBC): LEED Green Building Rating System.

### 1.3 SUBMITTALS
A. Submit under provisions of Section 013300.
B. [ Product Data ]: Manufacturer's data sheets on each product to be used, including:
   1. Literature indicating typical panel, pilaster, door, hardware and fastening.
   2. Preparation instructions and recommendations.
   3. Storage and handling requirements and recommendations.
   4. Installation methods.
C. Shop Drawings:
   1. Dimensioned plans indicating layout of toilet compartments.
   2. Dimensioned elevations indicating heights of doors, pilasters, separation partitions, and other components; indicate locations and sizes of openings in compartment separation partitions for toilet and bath accessories to be installed in partitions; indicate floor and ceiling clearances.
   3. Details indicating anchoring components (bolt layouts) and methods for project conditions; indicate components required for installation, but not supplied by toilet compartment manufacturer.
D. Selection Samples: For each finish product specified, one complete set of color selection guides representing manufacturer's full range of available colors, textures and patterns.
E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, texture and pattern.
F. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

### 1.4 DELIVERY, STORAGE, AND HANDLING
A. Deliver, store and handle materials and products in strict compliance with manufacturer's instructions and recommendations and industry standards.
B. Store products indoors in manufacturer's or fabricator's original containers and packaging, with labels clearly identifying product name and manufacturer. Protect from damage.
C. Lay cartons flat, with adequate support to ensure flatness and to prevent damage to pre-finished surfaces.
D. Do not store where ambient temperature exceeds 120 degrees F (49 degrees C).

### 1.5 PROJECT CONDITIONS
A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
B. Do not deliver materials or begin installation until building is enclosed, with complete protection from outside weather, and building temperature maintained at a minimum of 60 degrees F (15.6 degrees C).

### 1.6 WARRANTY
A. Manufacturers Standard Warranty: For Solid Plastic HDPE Material: Against breakage, corrosion, and delamination for 15 years.

**SECTION 102100**

**TOILET COMPARTMENTS (HDPE)**

## 1.7 COORDINATION

A. Coordinate Work with placement of support framing and anchors in walls and ceilings.

## PART 2 – PRODUCTS

## 2.1 MANUFACTURERS

A. Acceptable Manufacturer:
   1. Accurate Partitions Corp., Lyons, IL; www.accuratepartitions.com
   2. Scranton Products, Scranton, PA; www.scrantonproducts.com
   3. Bradley Corp., Menominee Falls, WI 53052; www.bradleycorp.com
   4. Substitutions: Section 016000 - Product Requirements.

## 2.2 SOLID PLASTIC TOILET COMPARTMENTS

A. Doors, Panels, Screens, and Pilasters: Single sheet solid, homogenous HDPE plastic material formed from waterproof, non-absorbent, high-density polyethylene resins; mark-resistant self-lubricating surface; edges finished smooth.
   1. Material: Solid, homogenous HDPE; 1 inch (25 mm) thick.
   2. Edges: 1/4 inch (6 mm) radius machined edges.
   3. Heat Sink: Aluminum heat sink, to dissipate heat from incendiary devices used by vandals, attached to bottom of doors and panels.
   4. Provide optional continuous stainless steel brackets in lieu of stirrup brackets.

B. Finish: Pebble-textured homogenous color throughout material.
   1. Color: Selected from full line of manufacturers standard colors.

## PART 3 – EXECUTION

## 3.1 EXAMINATION AND PREPARATION

A. Inspect and prepare substrates using the methods recommended by the manufacturer for achieving best result for the substrates under project conditions. Clean surfaces thoroughly prior to installation.

B. Do not proceed with installation until substrates have been prepared using the methods recommended by the manufacturer and deviations from manufacturer's recommended tolerances are corrected. Commencement of installation constitutes acceptance of conditions.

C. If preparation is the responsibility of another installer, notify Architect in writing of deviations from manufacturer's recommended installation tolerances and conditions.
   1. Verify dimensions of areas to receive compartments.
   2. Verify locations of built-in framing, anchorage, bracing, and plumbing fixtures.

## 3.2 INSTALLATION

A. Install in accordance with approved shop drawings and manufacturer's instructions.

B. Fasten components to adjacent materials and to other components using purpose-designed fastening devices. Provide anodized aluminum continuous brackets.

C. Adjust pilaster anchors for substrate variations; conceal anchors with pilaster shoes.

D. Equip each compartment door with top and bottom hinges and door latch.

E. Install door strike keeper on pilasters in alignment with door latch.

F. Equip each compartment door with one coat hook and bumper.

G. Installation Tolerances:
   1. Maximum variations from plumb or level: 1/8 inch (3 mm).
   2. Clearance between wall surface and panels or pilasters: 1-1/2 inch (38 mm) maximum.

### 3.3 ADJUSTING

A. Adjust and align hardware to uniform clearance at vertical edge of doors.
B. Adjust adjacent components for consistency of line or plane.

### 3.4 PROTECTION

A. Protect installed products until completion of project.
B. Touch-up, repair or replace damaged products before Substantial Completion.
C. Remove factory protective coverings and clean finish surfaces in accordance with manufacturer's instructions before substantial completion.

**END OF SECTION**

**SECTION 102800**

**TOILET ACCESSORIES**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Accessories for toilet rooms.
B. Grab bars.

### 1.2 RELATED SECTIONS
A. Section 102113.19 - Toilet Compartments (HDPE).

### 1.3 REFERENCES
A. ASTM A 666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2000.
B. ASTM C 1036 - Standard Specification for Flat Glass; 2001.
C. GSA CID A-A-3002 - Mirrors, Glass; U.S. General Services Administration; 1996.

### 1.4 SUBMITTALS
A. See Section 013300 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data on accessories describing size, finish, details of function, attachment methods.

### 1.5 COORDINATION
A. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

## PART 2 – PRODUCTS

### 2.1 MANUFACTURERS
A. Toilet Accessories:
   1. Georgia-Pacific, Atlanta, GA 30002
   2. A and J Washroom Accessories, New Windsor, NY 12553
   3. American Dryer, Livonia, MI. 48150.
   4. American Specialties, Inc., Yonkers, NY 10701
   5. Bradley Corp., Menominee Falls, WI 53052
   6. Excel Dryer, Inc., East Longmeadow, MA 01028.
   7. McKinney Parker, Essex Industries, Scranton, PA 18505
   8. World Dryer, Berkeley, IL 60163
   9. Substitutions: Section 016000 - Product Requirements.
B. All items of each type to be made by the same manufacturer.

### 2.2 MATERIALS
A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
   1. Grind welded joints smooth.
   2. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.
B. Keys: Provide 3 keys for each accessory to Owner; master key all lockable accessories.
C. Stainless Steel Sheet: ASTM A 666, Type 304.
D. Mirror Glass: Float glass, ASTM C 1036 Type I, Class 1, Quality Q2, with silvering, copper coating, and suitable protective organic coating to copper backing in accordance with GSA CID A-A-3002.
E. Fasteners, Screws and Bolts: Hot dipped galvanized, tamper-proof, security type.

### 2.3 FINISHES
A. Stainless Steel: No. 4 satin brushed finish, unless otherwise noted.

## 2.4 TOILET ROOM ACCESSORIES

A. Mirrors: Stainless steel framed, 6 mm thick float glass mirror.
   1. Size: As indicated on Drawings
   2. Frame: 0.5 inch angle shapes, with mitered and welded and ground corners, and tamper-proof hanging system; No. 4 finish.
   3. Backing: Full-mirrored sized, minimum 0.03 inch galvanized steel sheet and non-absorptive filler material.
   4. Product:
      a. ADA Mirror: 0535 manufactured by American Specialties
      b. Mirror: 0600 manufactured by American Specialties

B. Grab Bars: Stainless steel, 1-1/4 inches outside diameter, minimum 0.05 inch wall thickness, non-slip grasping surface finish, concealed flange mounting; 1-1/2 inches clearance between wall and inside of grab bar.
   1. Length and Configuration: As indicated on Drawings
   2. Product: Open

C. Toilet Tissue Dispensers:
   1. Product:
      a. Surface Mounted Dual Twin Roll: MFP Part# 56784A (Black) manufactured by Georgia-Pacific

D. Paper Towel Dispenser:
   1. Product:
      a. Surface mounted: MFP Part# 59537 (Stainless) manufactured by Georgia-Pacific

E. Waste Receptacle: Stainless steel.
   1. Product:
      a. Recessed: 0458-DX manufactured by American Specialties

F. Liquid Soap Dispenser:
   1. Product:
      a. Surface mounted: MFP Part# 53057 (Black) manufactured by Georgia-Pacific

G. Baby Changing Station: Stainless steel.
   1. Product:
      a. Recessed: 9013 manufactured by American Specialties

# PART 3 – EXECUTION

## 3.1 EXAMINATION

A. Verify existing conditions before starting work.
B. Verify exact location of accessories for installation.
C. Verify that field measurements are as indicated on drawings.

## 3.2 PREPARATION

A. Deliver inserts and rough-in frames to site for timely installation.
B. Provide templates and rough-in measurements as required.

## 3.3 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions.
B. Install plumb and level, securely and rigidly anchored to substrate.
C. Mounting Heights and Locations: As required by accessibility regulations, as indicated on drawings, and as follows:

**END OF SECTION**

**SECTION 104413**

**FIRE EXTINGUISHERS, CABINETS AND ACCESSORIES**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Fire extinguishers.
B. Fire extinguisher cabinets.
C. Accessories.

### 1.2 RELATED SECTIONS
A. Section 042000 – Unit Masonry Assemblies
B. Section 061053 – Wood Blocking and Curbing: Wood blocking and shims.

### 1.3 REFERENCES
A. NFPA 10 - Standard for Portable Fire Extinguishers; National Fire Protection Association; 2002.
B. UL (FPED) - Fire Protection Equipment Directory; Underwriters Laboratories Inc.; current edition.

### 1.4 PERFORMANCE REQUIREMENTS
A. Comply with NFPA 10.
B. Provide extinguishers classified and labeled by Underwriters Laboratories Inc. for the purpose specified and indicated.

### 1.5 SUBMITTALS
A. See Section 013300 - Administrative Requirements, for submittal procedures.
B. Shop Drawings: Indicate cabinet physical dimensions, rough-in measurements for recessed cabinets, wall bracket mounted measurements and location.
C. Product Data: Provide extinguisher operational features, color and finish and anchorage details.
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.

### 1.6 ENVIRONMENTAL REQUIREMENTS
A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS
A. Fire Extinguishers, Cabinets and Accessories:
1. Johns Fire Extinguisher, Berne, IN 46711
2. Potter-Roemer, Wooddale, Il 60191
3. Larsen's Manufacturing Co., Lombard, IL 60148.
4. Substitutions: See Section 016000 - Product Requirements.

### 2.2 FIRE EXTINGUISHERS
A. Dry Chemical Type (Ammonium Phosphate): Stainless steel tank, with pressure gauge.
1. Class 4A-60B:C.
2. Size 10.
3. Finish: Baked enamel, color as selected.

### 2.3 FIRE EXTINGUISHER CABINETS
A. Metal: Formed stainless steel sheet; 0.036 inch thick base metal.
B. Cabinet Configuration: Recessed type.
1. Sized to accommodate accessories.
2. Trim: Returned to wall surface, with 5/8” projection, 1 ¼” wide face.

3. Form cabinet enclosure with right angle inside corners and seams. Form perimeter trims and door styles.

C. Door: 0.036 inch thick, reinforced for flatness and rigidity; latch. Hinge doors for 180 degree opening with continuous piano hinge. Provide nylon roller type catch.
D. Door Glazing: Glass, clear, 1/8" thick tempered. Set in resilient channel gasket glazing.
E. Cabinet Mounting Hardware: Appropriate to the cabinet. Pre-drill for anchors.
F. Weld, fill and grind components smooth.
G. Finish of cabinet exterior trim and door: Baked enamel.
H. Finish of cabinet interior: White enamel.

**2.4 ACCESSORIES**

A. Extinguisher Brackets: Formed steel, chrome-plated.
B. Cabinet Signage: "Fire Extinguisher" identified on cabinet glazing in red letters vertically along hinge side of door.

## PART 3 – EXECUTION

**3.1 EXAMINATION**

A. Verify existing conditions before starting work.
B. Verify rough openings for cabinet are correctly sized and located.

**3.2 INSTALLATION**

A. Install in accordance with manufacturer's instructions.
B. Secure rigidly in place.
C. Place extinguishers and accessories in cabinets.

**END OF SECTION**

**SECTION 105126**

**HDPE LOCKERS**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Standard-duty HDPE lockers

### 1.2 RELATED SECTIONS
A. Section 061000 - Rough Carpentry: Wood blocking and nailers.

### 1.3 REFERENCES
A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
C. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

### 1.4 SUBMITTALS
A. See Section 013300 - Administrative Requirements for submittal procedures.
B. Product Data: Manufacturer's published data on locker construction, sizes, and accessories for each product used.
   1. Care and maintenance information.
C. Shop Drawings: Indicate locker plan layout, including minimum required dimensions for installation, elevations of locker with numbering pattern.
D. Samples: Two, 3 by 3 inches (76 by 76 mm) in size, indicating color and finish of locker material.
E. Manufacturer's Instructions: Indicate installation of each configuration indicated.
F. Manufacturer's qualification statement.

### 1.5 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

### 1.6 DELIVERY, STORAGE, AND PROTECTION
A. See Section 017419 - Construction Waste Management and Disposal for packaging waste requirements.
B. Protect locker finish and adjacent surfaces from damage.
C. Inspect lockers and benches upon receipt of delivery, and store in secure area until ready for assembly or installation.

## PART 2 – PRODUCTS

### 2.1 MANUFACTURERS
A. ASI Storage Solutions, located at 2171 Liberty Hill Road, Eastanollee, GA 30538. Tel: 706-827-2700. Web: www.asi-storage.com – pgrangeon@americanspeciatlies.com – 901 283 0531
B. Substitutions: Section 016000 - Product Requirements.

### 2.2 PERFORMANCE REQUIREMENTS
A. Accessibility: Comply with and ICC A117.1, ADA Standards, Accessibility Guidelines.

### 2.3 STANDARD-DUTY HDPE LOCKERS
A. Locker Configuration: Six tier.
B. Width: 12 inches
C. Depth: 12 inches
D. Enclosed Locker Height: 72 inches
E. Interior Color: Manufacturer's standard, homogeneous, natural color throughout.
F. Exterior Color: To be selected from manufacturer's standard colors

G. Ventilation Type: Standard Horizontal slotted door
H. Locker Body Components: Made of solid plastic panels of the following type and minimum thicknesses:
I. Solid, High-Density Polyethylene (HDPE): Tested in accordance with ASTM E84, Class B; homogeneous color throughout.
J. Smoke Developed Index: Not to exceed 450.
K. Flame Spread Index: Not to exceed 75.
L. HDPE Component Thickness:
    1. Door and Door Frame: 1/2 inch (13 mm).
    2. Back: 3/8 inch (9.5 mm), minimum.
    3. Side: 3/8 inch (9.5 mm), minimum.
    4. Top: 3/8 inch (9.5 mm), minimum.
    5. Shelf: 3/8 inch (9.5 mm), minimum.
    6. Bottom: 3/8 inch (9.5 mm), minimum.
M. Door Frame: Manufactured from single sheet of high-density polyethylene. Separate horizontal and vertical frame members will not be approved.
N. Door Latching: Multipoint with a full height, spring loaded latch bar manufactured of 1/2-inch (13 mm) thick sheet of high-density polyethylene and securely mounted on interior face of locker door. Latch bar engages door frame at a minimum of two locations per door.
O. Hinges: Full height, continuous type, 16 gauge, A-coated steel, black finish.
P. Handle: One piece, recessed cup formed from black HDPE and securely mounted to interior of each door for smooth operation with integral latch bar. Capable of accepting various locking mechanisms.
Q. Latching Type: Positive, automatic-type locking device allowing locker door to be locked when open, then closed without unlocking.
R. Locking Type: Hasps for combination locks provided by owner.
S. Number Plates: Polished aluminum number plate with black numerals 3/8 inch (9.5 mm) high. Attached to door with rivets.
T. Accessories:
    1. Base: 4-inch (100 mm) high, 1-inch (25 mm) thick, black HDPE base
    2. Top: Flat Top
    3. Trim: finished end panels
        a. Material: 1/2-inch (13 mm) thick HDPE; color to match lockers.
U. Interior Equipment:
    1. Interior Shelf: None
    2. Wall Hook: Two single-prong hooks.
    3. Double-Prong Ceiling Hook: None
    4. Coat Rod: None

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. Verify existing conditions and field dimensions meet manufacturer's requirements before starting work.
B. Verify prepared bases specified in Section 033000 are in correct position and configuration.

### 3.2 INSTALLATION

A. Install in accordance with manufacturer's written instructions.
B. Place and secure on prepared base.
C. Install lockers plumb and square.
D. Secure lockers with anchor devices to suit substrate materials.
    1. Minimum Pullout Force: 100 lb.
E. Bolt adjoining locker units together to provide rigid installation.
F. Install end panels, tops and miscellaneous panels.

## 3.3 ADJUSTING

A. Adjust moving parts for smooth operation
   1. Adjust doors and latches to operate without binding.
   2. Verify latches are operating properly
   3. Adjust built-in locks to prevent binding.

## 3.4 CLEANING AND PROTECTION

A. See Section 017000 - Execution and Closeout Requirements for additional requirements.
B. Clean interior and exterior surfaces of lockers.
C. Protect finishes until completion of project.
D. Touch up damaged finishes after Substantial Completion.

**END OF SECTION**

**SECTION 107316.13**

**METAL CANOPIES**

## PART 1 – GENERAL

### 1.1 DESCRIPTION OF WORK

A. Work in this section includes furnishing and installation of extruded aluminum overhead hanger rod style canopies.

B. Related Items and Considerations

1. Flashing of various designs may be required. Generic flashing supplied by manufacturer. Specialty flashing to be supplied by installer.
2. Determine wall construction, make-up and thickness.
3. Ensure adequate wall condition to carry canopy loads where required.
4. Consider water drainage away from canopy where necessary.
5. Any necessary removal or relocation of existing structures, obstructions or materials.

### 1.2 QUALITY ASSURANCE

A. Products meeting these specifications established standard of quality required as manufactured by fabricator.

### 1.3 FIELD MEASUREMENT

A. Confirm dimensions prior to preparation of shop drawings when possible.

B. If requested, supply manufacturer's standard literature and specifications for canopies.

C. Submit shop drawings showing structural component locations/positions, material dimensions and details of construction and assembly.

### 1.4 PERFORMANCE REQUIREMENTS

A. Canopy must conform to local building codes.

B. PE Stamped calculations are required and must be signed and sealed by an engineer licensed within the state canopy is installed.

### 1.5 DELIVERY, STORAGE, AND PROTECTION

A. Deliver and store all canopy components in protected areas.

## PART 2 – PRODUCTS

### 2.1 MANUFACTURERS

A. Mapes Canopies, Lincoln, Nebraska, mapescanopies.com

B. ASL Metal Fabricators Inc., Chicago IL, aslmetalfabricators.com

C. Substitution

### 2.2 MATERIALS

A. Decking shall consist of 3" extruded flat soffit .078 decking.

B. Intermediate framing members shall be extruded aluminum, alloy 6063-T6, in profile.

C. Hanger rods and attachment hardware shall be a standard finish.

D. Fascia shall be standard extruded 8" J style.

### 2.3 FINISHES

A. Finish type shall be 2-Coat Kynar Finish.

### 2.4 FABRICATION

A. Extruded aluminum canopies are shipped with the materials precut to size for field assembly

B. All connections shall be mechanically assembled utilizing 3/16 fasteners with a minimum shear stress of 350 lb. Pre-welded or factory-welded connections are not acceptable.

C. Concealed drainage. Water shall drain from covered surfaces into intermediate trough and be directed to Rear Gutter - Leader By Others.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. Confirm that surrounding area is ready for the canopy installation.
B. Installer shall confirm dimensions and elevations to be as shown on drawings provided by Manufacturer.
C. Erection shall be performed by an approved installer and scheduled after all concrete, masonry and roofing in the area is completed.

### 3.2 INSTALLATION

A. Installation shall be in strict accordance with manufacturer's shop drawings. Particular attention should be given to protecting the finish during handling and erection.

### 3.3 CLEANING AND PROTECTION

A. After installation, entire system shall be left in a clean condition.

**END OF SECTION**

**SECTION 107516**

**GROUND-SET FLAGPOLES**

## PART 1 – GENERAL

### 1.1 SUMMARY
A. Provide aluminum flagpole(s) as shown on drawing and as specified herein, with components as needed for a complete installation.
B. Related Sections:
   1. Section 033000 – Cast-in-Place Concrete

### 1.2 REFERENCES
A. ASTM International:
   1. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
   2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
   3. ASTM A312/A312M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipes.
   4. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
   5. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
   6. ASTM B241/B241M - Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube.
B. Copper Development Association Inc.:
   1. CDA - Cooper Brass Bronze Design Handbook: Architectural Applications.
C. National Electrical Manufacturers Association:
   1. NEMA MG 1 - Motors and Generators.

### 1.3 SUBMITTALS
A. Only request submittals needed to verify compliance with Project requirements.
B. Shop Drawings: Indicate detailed dimensions, details, anchor requirements, and imposed loads.
C. Product Data: For each type of flagpole required, submit manufacturer’s technical data and standard installation instructions.

### 1.4 QUALITY ASSURANCE
A. Source: Obtain each flagpole as a complete unit from Concord American Flagpole or approved equal, including fittings, accessories, bases, and anchorage devices.

### 1.5 QUALIFICATIONS
A. Design flagpole foundation under direct supervision of Professional Engineer experienced in design of this Work and licensed in the State of Illinois.

### 1.6 DELIVERY, STORAGE, AND HANDLING
A. General: Spiral wrap flagpoles with a heavy Kraft paper or other lightweight wrapping and enclose in a hard fiber tube or other protective means. Store bare flagpoles in a dry location, protected from the weather and moisture, as recommended by the manufacturer.
B. Shipping: Ship to project site in one piece or as specified. If more than one piece is necessary, provide snug fitting precision joints with self-aligning, internal splicing sleeve arrangements for weather tight, hairline field joints
C. Protect flagpole and accessories from damage or moisture.

## PART 2 – PRODUCTS

### 2.1 MANUFACTURERS

A. Manufacturers: Concord American Flagpole, 4150 Kellway Circle, Addison, TX 75001; 1.800.527.3902 (telephone)
B. Manufacturers: Ameritex Flag and Flagpole, Inc., O: 877-598-3524

### 2.2 FLAGPOLE TYPE AND CONSTRUCTION

A. Aluminum Flagpole Construction: Fabricate from seamless, extruded tubing complying with ASTM B 221, alloy 6063-T6, having a tensile strength not less than 30,000 psi with a yield point of 25,000 psi. Heat treat after fabrication to comply with ASTM B 597, temper T6.
   1. Provide cone-tapered flagpoles, per manufacturer's standard rate of taper.
B. Assembly Construction: Internal Revolving with Cam Cleat - Rope Halyard - Ground Set Foundation.
C. Ameritex Flag and Flagpole, Inc.: IRC30D62-ABL
D. See Specification Drawings for Mounting Height, Set Depth, Wall Thickness, Butt Diameter, Shaft Pieces, Maximum Wind Speeds, and Maximum Flag Size Specifications.

### 2.3 MOUNTING

A. Foundation Tube: Galvanized corrugated steel foundation tube, .0635"-16 Gauge (1.6 mm) minimum wall thickness, sized to suit flagpole and installation. Provide with 3/16" (4.8 mm) steel bottom plate and steel centering wedges. Furnish with 3/16" (4.8mm) support plate, ¾" (19 mm) diameter x 18" long steel ground lightning spike. Foundation tube will consist of all welded construction.

### 2.4 FITTINGS

A. Finial (Ornament): Finial sized as indicated or, if not indicated, to match pole butt diameter. See Specification Drawing for Type and Size of Finial Specified.
B. Internal Revolving Truck Assembly: Cast aluminum revolving truck with sealed stainless-steel bearing assemblies, aluminum spindle, cast brass exit bushing and removable hood.
C. Internal Halyard Cam Cleat System: Provide one (1) complete internal halyard cam cleat rope assembly with a plastic coated, dual attachment point counterweight and beaded sling assembly. A manually operated cam cleat mechanism will be installed inside the flagpole behind a reinforced handhole frame and flush access door having a cylinder lock.
D. Halyard Flag Snaps: Provide two (2) stainless steel swivel flagsnaps with neoprene covers.
E. Flash Collar: Provide Spun Aluminum Collar to match flagpole. See Specification Drawing for Collar Specification.

### 2.5 FINISHES

A. Metal Finishes, General: Comply with National Association of Architectural Manufacturers' (NAAMM) "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
B. Finish: See Specification Drawing for Finish Specification
C. Finish Specifications (Satin, Anodized, and Powder Paint Finishes): Aluminum Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.
   1. Natural Satin Finish: Provide directional-sanded satin finish (AA-M33); buff complying with AAM20.
   2. Anodized Finishes: Provide Class 1 finish complying with AA M32-C22-A41 (Clear Anodized) or AA M32-C22-A42 (Color Anodized Finishes) in thicknesses ranging from 1 to 3 mils.
      a. Anodized - Clear (ACL)
      b. Anodized - Dark Bronze (ADB)
      **c. Anodized - Black (ABL)**

3. Powder Coated Finish: Thermo-set Polyester Powder Coated Finish, with a minimum thickness of 1-½ mils. Application shall be in a closed loop automated powder coating system to insure uniformity and quality of finish.
   a. Powder Paint – Clear (CLR)
   b. Powder Paint – Dark Bronze (BZT)
   c. Powder Paint – Black (BLK)
   d. Powder Paint – White (WHT)
   e. Powder Paint – Specify (XXX)

## PART 3 – EXECUTION

### 3.1 PREPARATION

A. Excavation: For foundations, excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete.

B. Foundation: Provide forms where required due to unstable soil conditions and for perimeter of flagpole base at grade. Secure forms and galvanized steel ground sleeve foundation tube in position, braced to prevent displacement during concreting. Place concrete immediately after mixing. Compact concrete in place using vibrators. Moist-cure exposed concrete for not less than 7 days or use a non-staining curing compound. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks and uniform in texture and appearance. Provide positive slope for water runoff to base perimeter.

### 3.2 FLAGPOLE INSTALLATION

A. General: Install flagpoles where shown and according to shop drawings and manufacturer's written instructions.

B. Foundation Tube Installation: Install flagpole in foundation tube, seated on bottom plate between steel centering wedges. Plumb flagpole and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube to within 2" of the top of tube. Remove hardwood wedges and seal top of foundation tube with a 2-inch (50 mm) layer of elastometric sealant or cement and cover with flashing collar.

**END OF SECTION**

**SECTION 111400**

**FOOD SERVICE EQUIPMENT**

## PART 1 – GENERAL

### 1.1 WORK INCLUDED

A. Contractor will furnish all labor, materials, and services required for the provision and installation of food service related equipment in strict accordance with the contract documents, including that which is reasonably inferred to provide for the successful completion and operation of the facility.
B. Where quantities differ between written specifications and drawings the contractor will notify the architect immediately for written clarification. Where no notification is received, the larger quantity shall be provided.

### 1.2 RELATED WORK

A. Provide stands and/or supports for all equipment requiring them.
B. Locate wall reinforcement or backing, to be provided by the G.C.
C. Cut holes in equipment for pipes, drains, electric outlets, etc., as required for installation. This also includes welded sleeves, collars, ferrules, and/or escutcheons.
D. Repair any damage as a result of this installation.
E. Remove all debris resulting from this installation.
F. Clean and prepare equipment for operation by the time the project is turned over to the OWNER.
G. Provide appurtenance required for the successful installation and operation of all equipment items.

### 1.3 REGULATORY REQUIREMENTS

A. All work and materials shall comply with all state and federal laws, municipal ordinances, regulations and directions of inspectors having jurisdiction.
B. Work and material shall be in full accord with the latest rules of U.S. Public Health Service, National Board of Fire Underwriters, O.S.H.A., local or state ordinances, State Accident Commission's safety orders, regulations of the State Fire Marshall, and with all prevailing rules and regulations.
C. All applicable items shall conform to latest Standards and revisions established by the National Sanitation Foundation, Ann Arbor Michigan.
D. Electric equipment and components shall conform to the latest standards of National Electric Manufacturer's Association code and Local standards.
E. Standard steam heated equipment shall be manufactured in accordance with A.S.M.E. code requirements and carry the A.S.M.E. stamp, where required.
F. Gas heated equipment shall be equipped with automatic igniters and automatic safety pilots, to conform to A.G.A standards, and carry the A.G.A seal.
G. Exhaust hoods/ventilators, ducts, fans materials, construction and installation shall conform to the latest edition of the N.F.P.A.-096 and local standards.
H. Fire suppression systems installation and configuration shall conform to N.F.P.A. Bulletins 13, 17, and 96.
I. All electrical, mechanical, and/or refrigeration work required under this section shall be performed in accordance with Applicable Building Specifications as relevant.
J. The drawings and specifications shall govern whenever they require larger sizes and higher standards than are required by regulations. The regulations shall govern whenever drawings and specifications require something, which will violate the regulations. No extra charge will be paid for furnishing items required by the regulations, but not specified or shown on the drawings.

## 1.4 FIRST YEAR GUARANTEE

A. All items furnished by the Contractor shall be fully guaranteed against defects in workmanship and material for one full year after owner's acceptance. All repairs and replacements shall be made by the Contractor without charge to the owner. This guarantee period shall commence with the first usage of equipment for its intended purpose.
B. Provide extended four (4) year extended warranty on all refrigeration compressor/ condensers

## 1.5 PRE-INSTALLATION CONDITIONS

A. The Contractor shall obtain and pay for all approvals, permits, certificates, and licenses required for the performance of his work and shall post all notices required by the law.
B. The Contractor shall take field dimensions and verify conditions at the building, particularly door openings and passages, to assure access and installation for all equipment. Equipment shall be provided in sections as required to insure passage to installations point at no additional charge to the OWNER. Any pieces too bulky for existing facilities shall be hoisted or otherwise handled with the apparatus as required. All special handling equipment charges shall be paid by the Contractor.

## 1.6 ROUGH-IN DRAWINGS/SUBMITTALS

A. Submit 1/4" (1:50) scale rough in drawings for review in electronic format. These drawings shall be dimensioned, showing location of ducts, stubs, and floor and wall sleeves, for ventilation, plumbing, steam, electrical and refrigeration lines. Contractor shall also submit concrete base and curb dimensions required for equipment so supported. Do not include with Product Data submittals.
B. Contractor shall site-verify mechanical, electrical and ventilating rough-in and sleeve locations and advise the architect of any discrepancies from their plans.
C. Submit shop drawings for the items of custom fabrication included in this contract in electronic format. Shop drawings shall be submitted at 3/4" (1:20) scale for plan and elevations, and 1-1/2" (1:10) scale for details and sections, and shall show dimensions, material, details of construction, installation, and relation of adjoining work requiring cutting or close fitting. Shop drawings shall also indicate reinforcements, anchorage, and related work required for the complete installation of fixtures. Do not include with Product Data submittals.
D. Before proceeding with the fabrication of any item, the Contractor shall submit prints, which reflect verified dimensions and conditions.
E. Product Data Books of manufacturer's specifications sheets with complete information, including all options and accessories, on all items of standard manufacture, shall be submitted electronically separate from roughing-in and shop drawings files.

## 1.7 OPERATION AND MAINTENANCE DATA

A. Service and parts manuals, shall be submitted electronically for items of standard manufacture before final acceptance of installation by OWNER.
B. Submit with the service and parts manuals, a complete list of local service agencies for all included manufacturers, complete with telephone numbers.
C. Three (3) copies of a maintenance schedule for all appropriate equipment items shall be provided before final acceptance installation by OWNER.
D. Review of drawings, shop details and equipment brochures by the CONSULTANT is provided for design and concept only and does not relieve the Contractor of responsibility for full compliance with original drawings, specifications, and details, or for conformity and location, verification of all dimensions of equipment and building conditions, and reasonable adjustments for construction deviations.

## 1.8 DELIVERY, STORAGE AND HANDLING

A. Manufacturer's directions shall be followed in all cases, unless noted in item specifications or drawings.
B. Contractor is to guarantee all materials, equipment, and manpower, to permit overall completion of the entire project on schedule.

## 1.9 START-UP AND DEMONSTRATION

A. Contractor shall provide a competent representative to be present when installation is put into operation for start up and demonstration, return within two weeks after opening to further instruct employees and check equipment, lubricate and put into proper operation all equipment, and instruct the OWNER'S employees in the proper use and maintenance of all items in this contract.

## 1.10 QUALITY ASSURANCE

A. The Food Service Equipment Contractor will be referred to in the specifications and on the drawings as the "KEC" or the Kitchen Equipment Contractor, or the Food Service Equipment Contractor "FEC". Kitchen Equipment Contractor shall carefully read all the Contract Documents and furnish the equipment to conform to the construction limitations of the building as set forth in all of the Contract Documents.

B. All custom-fabricated equipment shall be made by one manufacturer and shall be uniform throughout as to method and type of construction used. All equipment shall carry a nameplate identifying the manufacturer.

C. The Food Service Equipment Contractor shall have been regularly engaged in this work for the past five years, and use only skilled craftsmen completely familiar with the methods and materials called for herein. The Contractor, upon demand, shall submit to Architect written evidence of having executed contracts of a comparable size and evidence of sufficient financial resources, which will enable him to perform the work in an expeditious manner, without delay to the project or to other trades.

D. Fabrication of items other than standard catalog items shall be fabricated by a food service equipment fabricator, which has the plant, personnel, and engineering facilities to properly design, detail, and fabricate high quality equipment. The fabricator shall be acceptable to the Architect and the Owner. Furthermore, all work in above category shall be standard unit assembly manufactured by one manufacturer and of uniform design, material, and finish equal to the specification as written.

E. The Contractor shall furnish equipment in strict accordance with the Specifications. If there is any deviation in any detail, such deviation shall be set out by item number and the variations specifically identified along with the reason for the change and submitted per the contract document substitution procedure. The request must be supported with written documentation along with scaled drawings that identify the reason for the changes.

F. Any and all substitutes shall be in strict accordance with the conditions and procedures of the division one contract documents. Any request not meeting the qualification and procedures as written will be cause for rejection by the Owner and or the Architect.

G. All requests for substitution of a named manufacturer must be submitted, along with all supporting data, to the Architect 15 days prior to the bid opening date for the review by the Owner and Architect. If the Owner and Architect accept the proposed substitute the Architect will release an addendum to allow all bidders to use the proposed alternate. Substitution after the bid opening will not be accepted.

H. Contractor's using alternate or substituted equipment shall assume full responsibility that the equipment will fit the space as planned and meet the planned M.E.P. conditions and bare all costs relating to changes initiated by them.

I. All standard catalog items shall be furnished as specified in regard to brand name, item type, accessories, scheduled options and quantities and shall be new and of the latest current model. All equipment shall be delivered to the job site in the manufacturer's original shipping container or packaging, sealed and unopened.

## PART 2 – PRODUCTS

### 2.1 SERVICEABILITY

A. All components of equipment, which may require periodic service as part of normal operation, shall be accessible without disassembling or removing major components of the unit or adjacent units. Lubrication points must be accessible without the use of tools.

### 2.2 QUIETNESS OF OPERATION

A. Quietness of operation of food service and related equipment is a requirement, and the Contractor will be required to remove or repair any equipment producing objectionable noise or vibration. This also includes providing and installing bumpers and/or gaskets for doors/drawers on fabricated and/or standard manufactured items.

### 2.3 INSERT PANS

A. All cutouts, openings, drawers, or equipment specified or detailed to hold stainless steel insert pans shall be provided with a full complement or pans as follows:
   1. One stainless steel, 20 gauge (.95mm) minimum, solid insert pan for each space, size per plans, details, or specifications.
   2. Where pan sizes are not indicated in plans, details or specifications provide on one full size pan for each opening.
   3. Provide maximum depth pan to suit application and space.
   4. Provide 18 gauge (1.27 mm) removable stainless steel adapter bars where applicable.

### 2.4 TRAY SLIDES

A. Before fabrication of counters with tray slides, verify:
   1. Configuration of all corners, turns and shape of tray slides for proper support and safe guidance of trays.
   2. Size and shape of trays.

### 2.5 DISPENSERS (Self leveling)

A. Verify make of ware, dimensions, and weight and submit to the dispenser manufacturer so that units may be properly calibrated and sized as required.

### 2.6 HOODS AND VENTILATORS

A. Verify size and location of all duct connections required in this contract before fabrication.
B. Provide stainless steel formed duct collars at ceiling or wall duct connections, where exposed.
C. Furnish all exposed ducts to walls or ceiling.
D. Verify all building conditions prior to fabrication or purchase.

### 2.7 WATER FILTER-PURIFIERS

A. Furnish in-line water filter-purifiers to remove materials, taste and odor for beverage system, coffee urns, and ice makers.
B. For all steam generators, provide water conditioners similar to Superior by Kemtune.

### 2.8 CUSTOM FABRICATION

A. All fabrication shall conform with applicable standards of the National Sanitation Foundation, latest editions and revisions.
B. Items of specially fabricated equipment must be in the judgment of the CONSULTANT:
   1. Fabricated by one manufacturer who is acceptable and of consistent high quality, and be suitable for sustained commercial use.
   2. Finished in an approved and satisfactory manner.
   3. Structurally sound, without rattle, wobble, buckles or warp.

C. WELDING AND SOLDERING
   1. Material 18 gauge (1.27 mm) or heavier, shall be welded.
   2. Welding shall be of the Heliarc method with rod of the same composition as the material being welded.
   3. Welds must be complete, ground smooth, and polished to match original finish.
   4. Where galvanizing has been burned off, the weld shall be cleaned and touched up with high grade aluminum paint.
   5. Spot welding, for other than temporary alignment, is unacceptable.
   6. Tack welds shall be a minimum of 1/4" long and 6" apart.
   7. Soldering is not acceptable as a means of fastening, only as a filler.

D. FASTENERS AND JOINTS
   1. The following will not be accepted:
      a. Exposed screw or bolt heads; exposed threads, including those which may come in contact during cleaning.
      b. Rivets of any type.
      c. Butt joints made by riveting scraps under seams and then and then filling with solder.
      d. Overlapping materials, including at miters or filled corners.
   2. Finishing
      a. Break bends shall be smooth and unblemished.
      b. Sheared edges shall be finished without burrs or sharp projections.
      c. Butt joints shall be close-fitting, maximum 1/32" gap, requiring no filler.
      d. The grain of polishing shall be consistent.
   3. Fasteners shall generally be of the same material as the material being fastened. With dissimilar materials, the higher grade prevails.

E. Rolled edges shall be standard bull-nosed, 180 degrees radius or other N.S.F. approved shape, with corners filled, ground and polished.

F. All stainless steel food service equipment shall have 1/4" (13 mm) or larger radius coves in all horizontal and vertical corners and intersections per N.S.F. standards. Sinks shall have 3/4" coves in compartments.

G. Where ends of fixtures, splashbacks, shelves, etc., are open, fill by forming the metal, or welding sections, if necessary, to close entire opening flush to walls or adjoining fixtures.

H. Controls and switches should be located out of heat zones, easily accessible, securely mounted, and in locations that preclude accidental contact by employees.

## 2.9 MATERIALS

A. Stainless Steel
   1. Shall be U.S. standard gauge, 18-8, type 302, No.4 finish and be appearance throughout.
   2. Tubing shall be welded or seamless, 16 gauge, 18-8, type 302 with a No.4 finish.

B. Galvanized Steel
   1. Shall be electro-galvanized.
   2. Framework of galvanized steel shall be of welded construction.

C. Laminated Plastic
   1. Shall be Formica, Parkwood, LaminArt, or ARCHITECT approved equal.
   2. Shall be veneered with approved waterproof and heat-proof cement. Rubber cement base adhesives are not acceptable.
   3. Shall be applied directly over close-grained plywood, such as mahogany or solid birch, of selected smooth, sanded stock to ensure a smooth ripple-free laminated surface.
   4. If specified plywood is unavailable, submit specifications and sample of alternate material for approval.
   5. Exposed faces and edges shall be faced with 1/16" (1.6 mm) thick material. Corresponding backs are to be covered with approved backing and balancing sheet material.

D. Insulation
   1. For low temperature applications, such as ice bins, cold pans or fabricated under counter freezers, use urethane rigid board, foam or foam-in-place, not less than 2" (50 mm) thick, except that vertical surfaces of cold pans and ice bins may be 1" (25 mm) thick. Insulation shall be bonded at joints to prevent condensation on exterior.
   2. For normal temperature applications such as fabricated undercounter refrigerators, use urethane material 1" (25 mm) thick, bonded at all joints.
   3. For heated-type applications, such as warming cabinets, use block-type rock wool minimum 1" (25 mm) thick Johns-Manville Marinite 36, or ARCHITECT approved equal, to insulate underside of top.
   4. At counter tops, subject to heat from cooking equipment and/or refrigeration compressors, use 1" (25 mm) thick Johns-Manville Marinite 36, or ARCHITECT approved equal.
   5. All temperature-controlled areas of equipment shall be isolated from adjacent construction. Marinite or other breaker strip material shall be added.
E. Sealant
   1. Shall be Component Hardware #M90-1010 (clear), #901012 (aluminum) or CONSULTANT approved equal.

## 2.10 METAL TOP CONSTRUCTION

A. Metal tops shall be 14 gauge stainless steel of one piece welded construction, including field joints. Secure to a full perimeter 14 gauge galvanized steel channel frame cross braced not farther than 30" (760 mm) one center. Fasten top with stud bolts and stainless steel cap nuts with lock washers. Enclose channel ends where exposed. Framing for drainboards and dish tables shall be all stainless steel.
B. Properly designed draw fastening, trim strip or commercial joint material to suit requirement shall be used only if specified.
C. Coat underside of tops with a minimum 1/16" (1.6 mm) thick N.S.F. approved, hard drying, sound deadening, mastic material. Apply by spreading after top has been secured to frame, such that top and frame are covered and sealed.
D. Provide additional bracing under legs of counter top equipment.
E. Backsplashes shall be integral with top, turned up 4" and back on a 45 degree angle for an additional 2" in height and then down 1" against all adjacent vertical surfaces, or as shown on other drawings or details, secured to adjacent walls with "Z" clips, and be fully closed where exposed to view on sides or rear.

## 2.11 ENCLOSED CABINET BASES

A. Bases shall be made of 18 gauge (1.27 mm) steel sheets reinforced by forming the metal.
B. Ends, partitions and sleeves are stainless steel.
C. Unexposed backs and structural members are galvanized.
D. Vertical ends and partitions are single wall with 2" (50 mm) face.
E. Sides and through partitions are flush with bottom rail, welded at intersections.
F. Shelves are removable, except bottom shelf of cabinet mounted on legs. Maximum shelf depth equals 24". All shelves are 16 gauge stainless steel.
G. Unit supported with channel frame work below. Weld legs to frame.

## 2.12 LEGS AND CROSS RAILS

A. Equipment legs and cross rails shall be 1-5/8" (41mm), 16 gauge (1.59 mm) stainless steel tubing.
B. All welds at cross rails shall be continuous and ground smooth. Tack welds are not acceptable.
C. Bottom of legs shall be welded inward and fitted with a stainless steel bullet type foot with not less than 2" adjustment.
D. Free standing legs shall be pegged to floor with 1/4" (6 mm) stainless steel rod.
E. Where specified, flange feet to be securely bolted to floor in a waterproof and sanitary manor with stainless steel bolts.

F. Components:
   1. Stainless steel gussets shall be Component Hardware, #A20-0206 with set screws for securing legs. Fully weld gussets to channels or gusset plates.
   2. Stainless steel counter legs shall be Component Hardware, #A72-0811.
   3. Stainless steel adjustable foot shall be Component Hardware, #A10-0851 Bullet Foot.
G. Legs shall be fastened to equipment with gussets, as follows:
   1. Sinks: Gusset welded to 14 gauge stainless steel triangular plate, fully welded to underside of bowl.
   2. Sink drainboards and dishtables: Welded to stainless steel channels, 14 gauge (1.98 mm) or heavier, anchored to top with welded studs through slotted holes.
   3. Metal top tables: Welded to framework.

## 2.13 SHELVES

A. All undershelves shall be 16 gauge stainless steel.
B. In fixture with enclosed bases, turn up shelves 2" on back and sides with 1/4" (6 mm minimum) radius and feather slightly to ensure a tight fit to enclosure panels.
C. In fixture with open bases, turn up shelves 2"on back and sides with 1/4" radius, notch shelve around legs and continuously weld to leg.
D. Undershelves exceeding 4'-6" length to have 14 gauge stainless steel channel reinforcement full length of shelf.
E. Fixture overshelves shall be 16 gauge stainless steel construction supported by 1-1/4" O.D. 16 gauge stainless steel tubing, secured to framework. Provide suitable 14 gauge stainless steel support brackets, fully welded to uprights and bolted to shelf. Overshelves exceeding 15" depth to be reinforced with longitudinal channel.
F. Wall shelves to be 16 gauge stainless steel, turned up 2" at rear and inaccessible ends with 16 gauge stainless steel brackets to wall. Provide 2" spacing all around to facilitate cleaning.
G. Shelf support brackets shall be 14 gauge stainless steel, but triangular, have horizontal to vertical ratio of 10/6.

## 2.14 SINKS, STEAMTABLES, AND BAIN MARIES

A. Sink construction shall be of 14 gauge stainless steel, all coved 3/4" and fully welded with 10" high back splash and 3" raised, 190 degree rolled rim. 16" deep bowls at pot sinks and 14" deep bowls at prep sinks. Bottom of sinks shall pitch positively to drain.
B. Partitions between compartments shall be double thickness, continuously welded where sheets joined at top.
C. Multiple compartments shall be continuous on the exterior with out applied facing strips or panels. Bottoms of each compartment shall be creased such as to ensure complete drainage to waste opening.
D. Steamtable and bain marie construction shall be similar to sinks.
E. Drainboards shall be 14 gauge stainless steel and fully integral with sink bowls including rim and backsplash. Provide 1" tubular bracing to sink bowl for 24"-36" lengths and legs and cross bracing for longer. All supported with stainless steel channel bracing. Provide additional bracing around suspended disposer and control panel, etc. Provide all drainboards with positive pitch to drain.
F. Worktop inset shall be deep drawn or fabricated, 10" deep of 16 gauge (1.59 mm) or heavier polished stainless steel, welded to tops as an integral part of the installation.
G. Drains, Wastes, and Faucets
   1. Furnish and install Component Hardware, #D53-7215 rotary waste outlets in deep drawn or fabricated inset-type sinks. Furnish with basket and connected overflow or CONSULTANT approved equal.
   2. Other custom fabricated sinks shall be furnished with heavy duty lever type waste outlets with connected overflow. Valves shall be 2" (50 mm). Furnish Component Hardware, #D52-7215 rotary waste.
   3. Water pans for steam tables shall be fitted with Component Hardware, #E16-4051, 1 1/2" (38 mm) drains with chrome plated brass stand pipes.

4. Water pans for bain maries shall have a 2" (50 mm) waste, as sinks with strainer basket and connected overflow and adapter to connect to 1-1/2" (38 mm) drain line; (Component Hardware #D63-4590 and #E30-7744 1 1/2" adaptor).
5. Furnish T & S Brass and Bronze Works, Inc. faucets or equal on sinks, bain maries, water stations and other fixtures. Provide one (1) master repair kit. All faucets shall be of one manufacturer.

## 2.15 MISCELLANEOUS COMPONENTS

A. Disherwells shown on drawings or specified shall be Component Hardware #K22-3100.
B. Casters
   1. Shall be heavy-duty type, ball bearing, solid or disc wheel with neoprene or polyurethane tire as manufactured by Component Hardware.
   2. Wheels to be 5" (127 mm) diameter, minimum width of tread 1-3/16" (30 mm) minimum capacity per caster 250 lbs. (113.4 kg).
   3. Solid material wheels to be provided with stainless steel rotating wheel guard.
   4. Shall be sanitary, have sealed wheel and swivel bearings and polish (per N.S.F.).
C. Doors
   1. Metal doors shall be double cased stainless steel. Outer pans shall be 18 gauge (1.27 mm) stainless steel with corners welded ground smooth and polished. Inner pan shall be 20 gauge (.95 mm) stainless steel fitted tightly into outer pan with a sound deadening material such as Celotex used as a core. The two pans shall be tack-welded together and joints solder-filled. Doors shall finish approximately 3/4" (19 mm) thick, and be fitted with flush recessed type stainless steel door pulls, Component Hardware #P62-1010.
   2. Sliding doors shall be mounted on large, quiet ball bearing rollers in 14 gauge (1.98 mm) overhead tracks to be Component Hardware #B57-0048 and be removable without the use of tools. Bottom of cabinet shall have stainless steel guide-pins Component Hardware #B56-1096 and not channel tracks for doors.
   3. Wood doors shall be fabricated as detailed. If formica or other plastic surfaces are used, all sides must be laminated.
D. Hardware
   1. Shall be solid, heavy-duty type, chrome plated brass or stainless steel.
   2. Door hardware shall be locking type, keyed and mastered keyed.
   3. Shall be identified with manufacturer's name and number so that broken or worn parts may be replaced.
   4. Submit samples for approval, when requested.
   5. Pulls shall be Component Hardware #P62-1010 or equal.
E. Drawer Assemblies
   1. Assemblies shall consist of removable drawer body mounted in a ball bearing slide assembly.
   2. Slide assembly consists of one pair of roller bearing full extension slides with stainless steel side and back enclosure panels, front spacer angle, two stainless steel drawer carrier angles, secured to slides and stainless steel front.
   3. Slides are to be Component Hardware #S52-0022 (200 lb. capacity) per pair or equal.
   4. Drawer bodies for general storage are to be 20"x 20" (508 mm x 508 mm) with removable stainless steel pan.
   5. Drawers intended to hold food products shall be removable type with 12" x 20" (305 mm x 508 mm) stainless steel food pans in a stainless steel assembly.
   6. Drawer fronts are double cased, 3/4" (19 mm) thick, with 18 gauge (1.27 mm) stainless steel welded and polished front pan. Steel back pan is tightly fitted and tack welded. Sound deaden with rigid insulation material. Drawer handles to be Component Hardware #P62-1010.
   7. All drawers shall be provided with replaceable soft neoprene bumpers or, for refrigerated drawers, a full perimeter soft gasket.

## 2.16 ELECTRIC WORK

A. Before ordering equipment, the Contractor shall confirm the service electric with the utility and project engineers, and all pertinent electrical requirements such as actual voltages available, number of phases and number of wires in the system.
B. Electrical work for fabricated equipment shall be completely wired by Contractor to a junction or pull box, wholly accessible, mounted on the equipment. Wiring shall be labeled for outlet or item served.
C. Components and assemblies shall bear the U.L. label or be approved by the prevailing authority.
D. Custom fabricated and standard refrigerator units shall be provided with vaportight light fixtures, shatterproof lamps and automatic switches. All wiring shall be concealed.
E. All electrically heated equipment shall be wired to a thermostatic control with on/off switch and indicator light.
F. All wiring for walk in box lights, switches, heaters, coils, etc., shall be on the exterior of the box with the shortest possible run to the actual connection.

## 2.17 INTERNAL WIRING OF FIXTURES AND EQUIPMENT

A. Contractor shall be responsible for internal wiring of electrical devices, built into or forming an integral part of fabricated equipment items. Wiring to be in metal conduit to a pull box tagging for intended use.
B. Each standard item shipped in sections shall be properly connected internally and verified by Contractor. Examples: Ovens, dishwasher, conveyors, broilers, etc..
C. Provide dishwashers and conveyors internally wired to junction box or distribution panel as specified, including push button switches, motors, immersion heaters, solenoids, etc..
D. Where light fixtures are specified or detailed as part of counters or case fixtures, light fixtures and lamps shall be provided and installed by the Contractor and be Component Hardware #L75-3200 series fixtures with #T76 safety shields. Warm white lamps shall be provided unless otherwise specified. If fluorescent light fixture are specified, all ballasts shall be included.
E. Wiring for built-in strip heaters or immersion type elements shall be provided as follows:
    1. In heat zone, shall have U.L. approved insulation and be not less than 300 volt rated nickel wire, covered with fiberglass sleeving.
    2. Connection wiring extended in raceway or conduit to junction or pull box shall be not less than 600 volt rated A.V.A. insulation covered wire, U.L. approved or equal.
F. Wiring for fabricated refrigerator and freezer cabinets shall be U.L. approved, insulated, cable from exterior junction box to internal components within insulation, unless code requires metallic conduit.
    1. Conduit shall be electrical metallic tubing, rigid or flexible (Greenfield). For freezer applications, Seal-Tite flex or approved equal shall be used.
    2. Internal wiring shall be U.L. approved, rubber covered 600 volt rated conductor except door heaters, which shall be nichrome wire with silicone braided jacket having resistance of 10.4 watts per linear foot.
    3. Convenience outlets, lighting receptacles, (rubber or porcelain) and door switches shall be mounted in U.L. approved boxes. Convenience outlets for evaporators shall be twist lock type. Solid connections as for freezer evaporators shall be made vapor tight.
G. Exposed flexible steel conduit on kitchen equipment shall be neoprene-jacketed "Seal-Tite" conduit equal to Anaconda type "UA", U.L. approved, complete with approved liquid-tight connectors on each end, designed to provide electrical ground in continuity.
H. Exposed electrical conduit used in kitchen wet area applications, except for flexible connections, shall be rigid galvanized steel. Thinwall conduit (EMT) will not be permitted for wet areas. Exposed outlet boxes shall be liquid tight with thread hubs.

## 2.18 CONVENIENCE AND POWER OUTLETS

A. Contractor shall make cut outs and install appropriate boxes or outlets in fabricated fixtures complete with wiring, conduit, outlet and cover plate.
B. All outlets and plugs shall conform to NEMA standards.
C. All electrical outlets and devices shall be first quality "Specified Grade".

## 2.19 PLUGS AND CORDS

A. Provide cords and plugs in accordance with the specifications and/or the spot connection drawings. Where a receptacle is shown or noted as the connection point, a cord and plug of suitable size is required.
B. Where cords and plugs are required, they shall be provided to comply with National Electrical Manufacturers' Association (N.E.M.A) requirements.

## 2.20 HEATING EQUIPMENT

A. Electric and heating equipment shall be so installed as to be readily cleanable or removable for cleaning.
B. Steam heated custom fabricated equipment shall be a self contained assembly complete with control valves located in an accessible position.

## 2.21 STARTERS, SWITCHES AND CONTROLS

A. The Contractor shall furnish all starters, motor controls, remote controls and transformers as noted in item specifications.
B. All switches shall be located out of heat zone.

## 2.22 REFRIGERATION

A. Refrigeration systems shall include start up and one year service contract in addition to the regular one year guarantee as stated in the general conditions, plus additional four year guarantee on compressors. This includes refrigerators, ice cream cabinets, ice makers, freezers, dispensers or any other refrigerated item.

## 2.23 COLD PANS

A. Ice pans, refrigerated pans and cabinets shall be provided with breaker strips where adjoining top or cabinet face materials, to prevent transfer of cold.
B. All mechanically refrigerated cold pans, refrigerated bases or similar devices shall have a normally closed liquid line electric solenoid valve installed before the expansion valve and wired to a silent type toggle switch complete with an on/off red neon light indicator and both mounted in a terminal box on a removable access panel. This switch shall be fed by a separate control circuit and shall not be wired into the compressor circuit so that it shall stop the flow of refrigerant to the cold pan and not turn off the compressor. The compressor shall then pump down and turn off through the action of the pressure control.
C. Refrigeration system for cold pans, frost-tops, etc., shall be capable of providing 1 BTU per square inch of surface area at 0 degree F. Entire surface must be refrigerated using pre-manufactured evaporator plates or by soldering 1/2" O.D. type K refrigeration tubing to outside and pan, maximum 3" on center in loops and coils. Imbed the tubing in thermal mastic and apply waterproof membrane under insulation.

## 2.24 VENTILATION OF REFRIGERATED EQUIPMENT

A. Adequate air supply and exhaust shall be provided for self-contained refrigeration condensing units, both fabricated and standard, as required for proper operation.
B. The Contractor shall provide adequate ventilation to insure proper operation.

## 2.25 COMPONENTS

A. Coils for standard and fabricated refrigerators shall have vinyl plastic coating, housings and shall be installed in such a manner as to be replaceable.
B. Standard reach in refrigerators and freezers for remote refrigeration system shall be complete with thermostatic expansion valves at the evaporator.
C. Thermometers
   1. Refrigerated compartments, fabricated and standard shall be fitted with flush dial-type thermometer with chrome plated bezels.
   2. Thermometer shall be adjustable and shall be calibrated after installation and have an accuracy of + 2 degree F (1 degree C).
   3. Thermometer sensing bulbs shall be located in the air stream entering the coil for accurate reading.
D. Hardware
   1. Refrigerator hardware for standard and fabricated refrigerator compartments shall be heavy-duty components.
   2. Hinges shall be self closing.
   3. Latches to be magnetic edgemount-type unless specified or detailed otherwise.
E. Doors and drawers for reach in refrigerated compartments, both fabricated and standard, shall be fitted with cylinder locking type latches and provide with master keys.
F. Custom fabricated reach in refrigerator and freezer to have shelving of plastic coated or stainless steel wire.

## 2.26 REFRIGERATION SYSTEMS

A. All refrigeration systems shall be complete, charged, started, and operating properly, including but not limited to Compressors including low ambient controls and weather enclosures as applicable, racks, coils, vibration eliminator, sight glasses (moisture indicating type), expansion valves, filters, oil separators, thermostats, defrost time clocks, all controls and control wiring, liquid line driers, piping and refrigeration grade copper tubing (with as few joints as possible). Liquid and suction lines shall be provided with a minimum of 1/2" of "Armaflex" insulation, or approved equal. Evaporator coil drain (consolidate) lines shall be extended outside the compartment(s) to the building floor drains by the KEC. Provide electric drain line heater for the freezer coil drain line. All refrigeration work to be performed to meet the minimum standards as set by the 1995 Montreal Convection.
B. Each refrigeration item specification is written to provide minimum specifications and scope work. All refrigeration equipment shall be designed and installed to maintain the following general temperatures unless otherwise specified.

| TYPE | REFRIGERATORS | FREEZERS |
|---|---|---|
| Walk in | 35 F/1.7 C | -10 F/-23.3 C |
| Reach in | 35 F/1.7 C | -10 F/-23.3 C |
| Undercounter | 35 F/1.7 C | 0 F/-23.3 C |
| Fabricated | 35 F/1.7 C | 0 F/-23.3 C |
| Cold pans | 0 F/-17.8 C | |
| Work rooms | 50 F/-10 C | |

C. Provide (including payment if sub-contracted) all electrical and refrigeration components needed by the completed system and complete (or have completed by the respective trades) all connections of and to all components.
D. An evaporation coil defrost system shall be provided and installed by the Contractor on all refrigeration systems designed to operated at an evaporator coil temperature of less than 35 degree F. Evaporator coil units provided without electric defrost feature shall be installed with a solenoid valve in the liquid line, controlled by the time clock so as to shut off the flow of refrigerant and allow the compressor to pump down and shut off by activation of the pressure control switch.

E. Verify and provide manufacturer's certification (or certification by manufacturer's authorized agent) that the equipment selection specified for each refrigeration system is properly sized and shall meet the operating requirements, conditions and location set forth for each system regarding maintaining specified operating temperature, hours of compressor running time, and system pressures and velocities as recommended by the equipment manufacturer(s). Provide any additional components and/or specialties recommended by the manufacturer.
F. All refrigeration systems shall be installed and wired in strict conformance with the manufacture's instructions and recommendations. Wiring for coils, controls, lights, etc., shall be run outside of the refrigerated compartment wherever possible.
G. Include enclosure panels from the top of the walk-in box to the finished ceiling of the same material as the exterior of the walk-in box.
H. Additional field installed lights shall be two-tube, vapor-proof, fluorescent fixtures, quantity per the plans, suitable for cold temperature operation.

## PART 3 – EXECUTION

### 3.1 SUPERVISION
A. A competent superintendent, shall be present during progress of the Contractor's work.

### 3.2 TRIMMING AND SEALING
A. Any space between equipment and walls, ceiling, floors and adjoining units, not portable, shall be completely sealed against entrance of food particles or varmint by means of trim strips, appropriately welded and finished, or commercial sealant, suitable to the nature of the equipment.
B. Sealant, when not exposed to extreme heat, shall be food grade silicone sealant, suitable to the nature of the equipment.
C. Ends of hollow sections or the rear of exposed backsplashes shall be closed with stainless steel panels.
D. Enclosed fixtures without legs mounted on masonry bases or floor shall be sealed water tight to base or floor.
E. Remove all protective coverings from equipment and clean residue from all packaging materials.

### 3.3 CUTTING AND FITTING
A. Contractor shall do all cutting and fitting required on the equipment by sub-contractors to make their work fit.
B. No cutting, notching, drilling or altering of any kind shall be done to the building by any contractor without first obtaining permission from the ARCHITECT/ENGINEER.

### 3.4 PROTECTION
A. The Contractor is responsible, during the progress of the project, to protect his equipment against theft and/or damage until final acceptance by the OWNER.
B. Pre-fabricated walk in boxes, on site and installed in advance of the rest of the equipment, are not to be used for general storage by other trades and should be locked by the Contractor before leaving the site. Damage and/or theft resulting from Contractors' failure to secure boxes will be repaired/replaced at his expense.

### 3.5 ORIENTATION
A. All equipment exposed to public view shall be provided and installed, wherever possible, with operating controls facing the work side, not facing the public.

**PART 4 – LINE ITEM SPECIFICATION**

A. KEC shall install all equipment, provide all field modifications to the equipment to achieve level and plumb installation. KEC shall comply with all applicable codes and (NSF) sanitation requirements. KEC to verify make, model, dimensions and utility requirements of all purveyor, vendor and owner provided equipment to include on the rough-in plans.

B. General Contractor to disconnect and disassemble, as necessary, all existing kitchen equipment. Existing equipment not scheduled for re-use to be removed from the premises by the General Contractor. Existing equipment scheduled for re-use is to be stored by the General Contractor and relocated to the kitchen area for installation as shown on drawing FS.1

**ITEM NO. 1 STOREROOM SHELVING**

Mfg.: Metro NC Series
Quantity: Elven (11)

- Field verify all dimensions prior to ordering the units to ensure no obstruction and proper installation. Plan view is only used for size, quantity, and layout for quoting purposes. It is the responsibility of the KEC to verify correct sizes.
- Five (5) tiers each section
- 86” H posts
- Provide common posts at interior corners to eliminate any obstructions as necessary

**ITEM NO. 2 WALK-IN BEER COOLER**

Mfg.: Kolpak Custom
Quantity: One (1)

- Size and shape as per plan-8’-6” H
- Exterior finish- stainless steel where exposed and aluminum natural embossed- remaining
- Interior finish- smooth white interior ceiling / aluminum- natural embossed
- 4” coved vinyl screeds
- One (1) 42” x 78” swing, self-closing, with door closer, flush mount doors with LED light, viewport, third hinge, Kason # 944 deadbolt lock, 36” high diamond tread plate on the exterior and interior of each door
- Enclosure panels from the top of the unit to the finished ceiling where exposed
- Trim angles to finish off unit to adjacent walls
- Modularm model 75lc alarm system
- Six (6) additional 48” LED light fixtures

**ITEM NO. 3 GLYCOL POWER PACK**

Mfg.: Micro Matic # MMPP4307-PKG-4
Quantity: One (1)

- Micro Matic project # PRD33387, contact Patrick Deinhammer, 352-544-1081
- Provide all labor to install and material not limited to; trunk lines, fittings, line sets, glycol etc. required for a complete system to the dispensing heads
- Provide start-up on the units and calibration
- Refer to food service plan FS4 for proposed line runs

**ITEM NO. 3.1 GLYCOL POWER PACK**

Mfg.: Micro Matic # MMPP4303-PKG
Quantity: One (1)

- Micro Matic project # PRD33387, contact Patrick Deinhammer, 352-544-1081
- Provide all labor to install and material not limited to; trunk lines, fittings, line sets, glycol etc. required for a complete system to the dispensing heads
- Provide start-up on the units and calibration
- Refer to food service plan FS4 for proposed line runs

**ITEM NO. 4 KEG SHELVING**

Mfg.: New Age # 31842TT7/ NS475
Quantity: Twenty One (21)

- Field verify all dimensions prior to ordering the units to ensure no obstruction and proper installation. Plan view is only used for size, quantity, and layout for quoting purposes. It is the responsibility of the KEC to verify correct sizes
- Provide “U” brace/ wall protectors for each level of the shelving

**ITEM NO. 5/ 5.1/ 5.2 REFRIGERATION SYSTEM- BEER COOLER**

Mfg.: Kolpak
Quantity: One (1) each

- Provide Kolpak # PC198MZOP-2E Condenser and a Kolpak # AM36-141-1ECAFOEM-PR-8 Evaporator Coil sized accordingly. Condenser to be installed outside on the roof of the building- verify exact location with Architect
- Provide all necessary tubing fittings, controls, copper piping etc. to complete refrigeration circuit
- Start-up units to ensure proper working order

**ITEM NO. 6 WALK-IN COOLER/ FREEZER**

Mfg.: Kolpak Custom
Quantity: One (1)

- Size and shape as per plan-8’-6” H
- Exterior finish- stainless steel where exposed and aluminum natural embossed- remaining
- Interior finish- smooth white interior ceiling / aluminum- natural embossed
- Aluminum 4”, standard 1000# ERA manufactured insulated floor recessed into a 4 1/2” pit in both compartments
- Two (2) 36” x 78” swing, self-closing with door closer, flush mount doors with LED light, viewport (heated on freezer) third hinge, Kason # 944 deadbolt lock, 36” high diamond tread plate on the exterior and interior of each door
- Enclosure panels from the top of the unit to the finished ceiling where exposed
- Trim angles to finish off unit to adjacent walls
- Modularm model 75lc alarm system
- Additional four (4) 48” LED light fixtures in each compartment

**ITEM NO. 7 COOLER SHELVING**

Mfg.: Metro NK3 Series
Quantity: Eleven (11)

- Shape as per plan- Interior dimensions from the walk-in shop drawings must be used to determine all sizes of the units to ensure no obstruction and proper installation. Sizes shown on plan are for quoting purposes only
- Four (4) tiers each section
- 74” H posts
- Provide common posts to eliminate any obstructions as necessary

**ITEM NO. 8/ 8.1/ 8.2 REFRIGERATION SYSTEM- BEER COOLER**

Mfg.: Kolpak
Quantity: One (1) each

- Provide Kolpak # PC98MZOP-2E Condenser and a Kolpak # AM26-094-1ECAFOEM-PR-8 Evaporator Coil sized accordingly. Condenser to be installed outside on the roof of the building- verify exact location with Architect
- Provide all necessary tubing fittings, controls, copper piping etc. to complete refrigeration circuit
- Start-up units to ensure proper working order

**ITEM NO. 9 FREEZER SHELVING**

Mfg.: Metro NK3 Series
Quantity: Eleven (11)

- Shape as per plan- Interior dimensions from the walk-in shop drawings must be used to determine all sizes of the units to ensure no obstruction and proper installation. Sizes shown on plan are for quoting purposes only
- Four (4) tiers each section
- 74” H posts
- Provide common posts to eliminate any obstructions as necessary

**ITEM NO. 10/ 10.0/ 10.2 REFRIGERATION SYSTEM- FREEZER**

Mfg.: Kolpak
Quantity: One (1) each

- Provide Kolpak # PC298LZOP-2E Condenser and Kolpak # EL26-077-2ECAFOEM-PR-8 Evaporator Coil sized accordingly. Condenser to be installed outside on the roof of the building - verify exact location with Architect
- Provide all necessary tubing fittings, controls, copper piping etc. to complete refrigeration circuit
- Start-up units to ensure proper working order

**ITEM NO. 11 HAND SINKS**

Mfg.: Advance/ Tabco # 7-PS-66-NF
Quantity: Four (4)

- Upgrade to T&S Brass model # B-1146-04 faucet with wrist blades

**ITEM NO. 12 SMOKER**

Mfg.: Alto-Shaam # 1200 SK
Quantity: One (1)

- Door hinged right

**ITEM NO. 13 GLASS DOOR MERCHANDISERS- EXISTING/ RELOCATED**

Mfg.: Existing/ Relocated
Quantity: Three (3)

- These items are existing/ relocated and are not part of this section-Coordinate with GC
- Coordinate MEP requirements with the owner and show on KEC's rough-in plan

**ITEM NO. 14 ICE MACHINE WITH BIN**

Mfg.: Hoshizaki # KM-1301SAJ
Quantity: One (1)

- Bin Follett # SG1175S-48
- Water filtration # H9320-51 and pre-filter # 9795-80- coordinate with water sample for proper filtration unit
- Ice scoop with wall mounting bracket

**ITEM NO. 15 1-DOOR REFRIGERATOR- EXISTING/ RELOCATED**

Mfg.: Existing/ Relocated
Quantity: Four (4)

- These items are existing/ relocated and are not part of this section-Coordinate with GC
- Coordinate MEP requirements with the owner and show on KEC's rough-in plan

**ITEM NO. 16 HOT FOOD WELLS**

Mfg.: Wells # TMPT
Quantity: Four (4)

- 120 volt

**ITEM NO. 17 OPEN NUMBER**

**ITEM NO. 18 HEATED CABINETS**

Mfg.: Lockwood # CA67-PFIN-34IDD-L
Quantity: Two (2)

- Dutch doors
- Doors hinged right
- 1” bumper system around base

**ITEM NO. 19 WORKTOP REFRIGERATORS**

Mfg.: Beverage Air # WTR60AHC
Quantity: Two (2)

- Stainless steel back
- Provide 15” deep, 18 gauge, all stainless steel double overshelf mounted on pipe legs at the back of the unit . Coordinate overall size and heights to match Item # 45, Worktable
- Mount Heat Lamp, Item # 48, to the underside of the top shelf

**ITEM NO. 20 MOP SINK- (BY PLUMBER)**

Mfg.: By Plumber
Quantity: One (1)

- This item is being provided by the plumber and is not part of this section
- Coordinate MEP requirements with GC and show on KEC’s rough-in plan

**ITEM NO. 20.1 CHEMICAL SHELF WITH MOP HANGER**

Mfg.: Advance/ Tabco # K-245
Quantity: One (1)

**ITEM NO. 21 SALAD TOP REFRIGERATOR- EXISTING/ RELOCATED**

Mfg.: Existing/ Relocated
Quantity: two (2)

- These items are existing/ relocated and are not part of this section-Coordinate with GC
- Coordinate MEP requirements with the owner and show on KEC’s rough-in plan

**ITEM NO. 22 HEATED DRAWERS**

Mfg.: Hatco # HDW-2
Quantity: Four (4)

- 5” diameter casters with locks
- Coordinate clearance with Item # 45, Worktable

**ITEM NO. 23 DOUBLE OVERSHELF**

Mfg.: Various Manufacturers
Quantity: One (1)-Lot

- These are included in item # 19, Worktop Refrigerator and Item # 45, Worktable

**ITEM NO. 24 EXHAUST HOOD-TYPE I**

Mfg.: Captive-Aire # 6024ND-2-PSP-F (Drawing # 6636878)
Quantity: One (1)

- Refer to drawing FS-5 thru FS-10 for further details
- ETL and UL 710 listed and to comply with NSF, NFPA 96, and all local codes and authorities
- Secure to structural members with threaded rod hangars
- Stainless steel enclosure from the top of the hood to the finished ceiling
- LED recessed, light fixtures
- Stainless steel utility cabinet on the left and right end
- Electrical package # DCV-1111
- 20 gauge, 80” H stainless steel wainscot panels to the underside of the exhaust hood secured with stainless steel screws and adhesive with clean and tight knockouts for all the utilities. Provide escutcheon trim plates at utility penetrations

**ITEM NO. 25 FIRE SUPPRESSION SYSTEM**

Mfg.: Captive Aire # Tank FS
Quantity: One (1)

- Complete surface, and duct protection to comply with UL, NFPA 17 and 96 and all local codes/ authorities
- Two (2) manual activation device
- Electrical gas line shut off valve- verify size required
- Test, re-charge and certify system
- Locate tanks in utility stainless steel utility cabinet on Item No. 9, Exhaust Hood

**ITEM NO. 26 FRYERS WITH FILTERS**

Mfg.: Pitco # SG14RS-4FD
Quantity: One (1)

- Natural gas
- Dump station on the right # BNB-SG14
- Standard accessories
- Casters with locks

**ITEM NO. 27 DUMP STATION**

Mfg.: Pitco # BNB-SG14
Quantity: One (1)

- Included in Item # 26, Fryers

**ITEM NO. 28 OPEN NUMBER**

**ITEM NO. 29 GRIDDLE WITH STAND**

Mfg.: Garland # GTGG48-GT48M
Quantity: One (1)

- Natural gas
- Stainless steel equipment stand # A4528798
- Set of casters with brakes
- T&S Brass model # HG-4D-48SK quick disconnect hose with swivels

**ITEM NO. 30 FLOOR TROUGH**

Mfg.: Custom, NSF
Quantity: Size and shape per plan

- Unit to be construct as per detail shown on special condition plans. Unit to be heavy duty 14 gauge stainless steel type 304, completely welded and coved. Trough to have built in pitch towards wastes for complete drainage and anchor straps for securing. Trough to be fitted with special stainless steel waste cup with removable perforated stainless steel basket to accommodate up to 4” waste pipe.
- Provide Chem-grate grating

**ITEM NO. 31 CHARBROILER WITH STAND**

Mfg.: Garland # GD-36RBFF
Quantity: One (1)

- Natural gas
- Stainless steel equipment stand # SS-CSD-36
- Set of casters with brakes
- T&S Brass model # HG-4D-48SK quick disconnect hose with swivels

**ITEM NO. 32 4- BURNER RANGE**

Mfg.: Garland # G24-4L
Quantity: One (1)

- Natural gas
- Set of casters with brakes
- T&S Brass model # HG-4D-48SK quick disconnect hose with swivels

**ITEM NO. 33 DOUBLE COMBI OVEN COMBI OVEN- STACKED**

Mfg.: Convotherm # C4 ET 6.20GB
Quantity: Two (2) Units Stacked

- Natural gas
- Hinge door per plan
- Disappearing door # DD-TT
- Hands free cleaning system
- Stacking kit # 3456277
- Filter system

**ITEM NO. 34 HEATED DRAWERS**

Mfg.: Hatco # HDW-3
Quantity: Three (3)

- 5” diameter casters with locks

**ITEM NO. 34 HEATED DRAWERS**

Mfg.: Hatco # HDW-3
Quantity: Three (3)

- 5” diameter casters with locks

**ITEM NO. 35 3 DOOR DIRECT DRAW REFRIGERATOR**

Mfg.: Perlick # DDS84
Quantity: Two (2)

- Stainless steel top
- One (1) condensing unit right/ One (1) condensing unit left
- Solid black vinyl doors- hinged per plan
- Stainless steel back and sides
- Set of adjustable legs 6” to 9”
- Coordinate installation requirements for Item # 46, Draft Tower

**ITEM NO. 36 CHURRO WARMERS**

Mfg.: By Owner
Quantity: two (2)

- This item is being provided by the owner and is not part of this section
- Coordinate MEP requirements with the owner and show on KEC’s rough-in plan

**ITEM NO. 37 BEVERAGE COUNTER**

Mfg.: Advance/Tabco # BEV30-48-Modified
Quantity: One (1)

- Remove sink section and all components associated with the sink
- Extend trough and midshelf the length of the counter

**ITEM NO. 38 OPEN NUMBER**

**ITEM NO. 39 OPEN NUMBER**

**ITEM NO. 40 DISHMACHINE-VENTLESS**

Mfg.: Champion # DH-6000T-VHR
Quantity: One (1)

- Electric heat
- 208 volt/ 3 phase
- Straight design
- Single point connection
- Drain water tempering kit- factory installed
- Detergent and rinse aid pumps

**ITEM NO. 41 OPEN NUMBER**

**ITEM NO. 42 OPEN NUMBER**

**ITEM NO. 43 OPEN NUMBER**

**ITEM NO. 44 WORKTABLE**

Mfg.: Advance/ Tabco # SS-304-Modified
Quantity: One (1)

- 1” stainless steel single thickness turn up backsplash

**ITEM NO. 45 WORKTABLES**

Mfg.: Advance/ Tabco # TSS-306
Quantity: One (1)

- Coordinate clearance requirements for Item # 22, Heated Drawers
- Provide 18 gauge, all stainless steel construction double overshelf # ODS-15-72 mounted at the rear of the table. Coordinate overall size and heights to match Item # 19, Worktop Refrigerator
- Mount Heat Lamp, Item # 48, to the underside of the top shelf

**ITEM NO. 46 8-HEAD BEVERAGE DISPENSER WITH DRIP PANS**

Mfg.: Micro Matic # METRO-T-8PSSKR
Quantity: One (1)

- Micro Matic project # PRD33387, contact Patrick Deinhammer, 352-544-1081
- Drain pan # DP-MET-T-24-Z
- Provide all labor to install and material not limited to; trunk lines, fittings, line sets, glycol etc.. required for a complete system to the dispensing heads
- Provide start-up on the units and calibration
- Coordinate installation requirements with Item # 35, Keg Coolers

**ITEM NO. 47 FRONT COUNTER**

Mfg.: Custom Fabricated, NSF
Quantity: Four (4)

- Size and shape as per plan-field verification required- 34” H
- All stainless steel construction with 14 gauge tops
- General construction per details 1, and 2
- Stainless steel top to extend thru the openings of the service window 3” out to the exterior with the leading edge turned down 1” and welded closed ends . Coordinate requirements with roll down doors manufacturer requirements.
- Rim per detail 3d on worker side
- Backsplash per detail 4e and 5a against all adjacent building walls- coordinate at window sections overall height. Coordinate service window requirements with manufacturer
- Legs, feet and cross rails per details 6 and 7. Pipe legs to be spaced to accommodate beer lines coming from the floor up to the counters
- Coordinate installation requirements for Item # 60, Beer Head with drip pan. Provide hole for beer lines are required. Additional channels on the underside of the top to support Item #60.
- Provide three (3) 2” ferruled holes with grommets for Items # 53, POS Systems

**ITEM NO. 48 HEAT LAMPS**

Mfg.: Hatco # GRAH-54 (2)/ GRAH-66 (2)
Quantity: Four (4) Total

- 120 volt
- Mounting brackets
- Mount to the bottom of the top shelf of Item # 23, Double Overshelves
- Provide infinite control and indicator lights mounted to a chase at each end of the line up
- Provide 18 gauge stainless steel box chase 6” x 6” with removable panel from the ceiling above to the top shelf of Item # 23, Double Overshelf on each end of the line up. Mount infinite control and indicator light for Heat Lamps in each. Two (2) heat lamps are wired to the left side and the remaining to the right

**ITEM NO. 49 3-DOOR PASS THRU BACK BAR REFRIGERATOR**

Mfg.: Perlick # PTS84
Quantity: Two (2)

- Stainless steel top
- Stainless steel ends
- Black vinyl doors
- Hinge doors per plan
- Set of adjustable legs 6” to 9”

**ITEM NO. 50 SOILED DISHTABLE WITH PRE-RINSE**

Mfg.: Advance/ Tabco # DTS-S30-60L
Quantity: One (1)

- Removable perforated stainless steel basket with rack guides
- Lever waste bracket
- One (1) T&S Brass # B-0133-CR-BJ-SK Pre-Rinse at scrap sink
- One (1) T & S Brass # B-3950 twist waste

**ITEM NO. 51 MONITORS- BY OWNER**

Mfg.: By Owner
Quantity: Four (4)

- These items are being provided by the owner and are not part of this section
- Coordinate MEP requirements with the owner and show on KEC’s rough-in plan

**ITEM NO. 52 FRONT COUNTER**

Mfg.: Custom Fabricated, NSF
Quantity: Four (4)

- Size and shape as per plan-field verification required- 34” H
- One (1) counter is “L” shaped. Provide field weld if required on this counter
- All stainless steel construction with 14 gauge tops
- General construction per details 1, and 2
- Stainless steel top to extend thru the openings of the service window 3” out to the exterior with the leading edge turned down 1” and welded closed ends . Coordinate requirements with roll down doors manufacturer requirements.
- Rim per detail 3d on worker side
- Backsplash per detail 4e and 5a against all adjacent building walls- coordinate at window sections overall height. Coordinate service window requirements with manufacturer
- Legs, feet and cross rails per details 6 and 7. Pipe legs to be spaced to accommodate beer lines coming from the floor up to the counters
- Coordinate installation requirements for Item # 55, Beer Head with drip pan. Provide hole for beer lines are required. Additional channels on the underside of the top to support Item # 55
- Verify clearance requirements for Item # 54, Undercounter Refrigerators on two (2) of the counters. Provide only side crossbracing with no rear crossbracing allowing the Undercounter Refrigerator to be installed against the wall
- Provide three (3) 2” ferruled holes with grommets for Items # 53, POS Systems

**ITEM NO. 53 POS SYSTEMS- BY OWNER**

Mfg.: By Owner
Quantity: Eighteen (18)

- These items are being provided by the owner and are not part of this section
- Coordinate MEP requirements with the owner and show on KEC's rough-in plan

**ITEM NO. 54 UNDERCOUNTER REFRIGERATORS**

Mfg.: Beverage-Air # UCR72AHC
Quantity: Two (2)

- Low profile casters
- Coordinate installation requirements with Front Counters, Item # 52

**ITEM NO. 55 8-HEAD BEVERAGE DISPENSER WITH DRIP PANS**

Mfg.: Micro Matic # METRO-T-8PSSKR
Quantity: Two (2)

- Micro Matic project # PRD33387, contact Patrick Deinhammer, 352-544-1081
- Drain pan # DP-MET-T-24-Z
- Provide all labor to install and material not limited to; trunk lines, fittings, line sets, glycol etc.. required for a complete system to the dispensing heads
- Provide start-up on the units and calibration
- Coordinate installation requirements with Item # 52, Front Counters

**ITEM NO. 56 THREE COMPARTMENT SINK**

Mfg.: Advance/ Tabco # 94-23-60-18RL
Quantity: One (1)

- Twist waste brackets under each sink
- Three (3) T&S Brass # B-3950 twist wastes

**ITEM NO. 57 PRE-RINSE WITH ADD A FAUCET**

Mfg.: T&S Brass # B-0133-18DJCRBC
Quantity: One (1)

- Add a faucet with 18" double jointed spout

**ITEM NO. 58 WALL SHELVES**

Mfg.: Advance/ Tabco # WS-12-36-16
Quantity: Two (2)

**ITEM NO. 59 CLEAN DISHTABLE**

Mfg.: Advance/ Tabco # DTC-S30-48R
Quantity: One (1)

**ITEM NO. 60 8-HEAD DOUBLE TIER BEVERAGE DISPENSER WITH DRIP PANS**

Mfg.: Micro Matic # Custom-57460
Quantity: Four (4)

- Micro Matic project # PRD33387, contact Patrick Deinhammer, 352-544-1081
- Drain pan # Custom-57461
- 8- heads double stacked for 16 total each dispenser
- Provide all labor to install and material not limited to; trunk lines, fittings, line sets, glycol etc. required for a complete system to the dispensing heads
- Provide start-up on the units and calibration
- Coordinate installation requirements with Item # 47, Front Counters

**END OF SECTION**

## SECTION 220517

## SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

### PART 1 – GENERAL

#### 1.1 SECTION INCLUDES
A. Pipe sleeves.
B. Pipe sleeve-seals.

#### 1.2 REFERENCE STANDARDS
A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2023a.

#### 1.3 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

### PART 2 – PRODUCTS

#### 2.1 PIPE SLEEVES
A. Manufacturers:
   1. Flexicraft Industries; Pipe Wall Sleeve: www.flexicraft.com/#sle.
   2. Substitutions: See Section 016000 - Product Requirements.
B. Vertical Piping:
   1. Sleeve Length: 1 inch (25 mm) above finished floor.
   2. Provide sealant for watertight joint.
C. Plastic or Sheet Metal: Pipe passing through interior walls, partitions, and floors, unless steel or brass sleeves are specified below.
D. Clearances:
   1. Provide allowance for insulated piping.
   2. Wall, Floor, Partitions, and Beam Flanges: 1 inch (25 mm) greater than external pipe diameter.
   3. All Rated Openings: Caulked tight with fire stopping material complying with ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases.

#### 2.2 PIPE-SLEEVE SEALS
A. Manufacturers:
   1. Advance Products & Systems, LLC; Innerlynx: www.apsonline.com/#sle.
   2. American Polywater Corporation; PGKD Modular Seals: www.polywater-haufftechnik.com/#sle.
   3. Flexicraft Industries; PipeSeal: www.flexicraft.com/#sle.
   4. Substitutions: See Section 016000 - Product Requirements.
B. Modular Mechanical Sleeve-Seal:
   1. Elastomer-based interlocking links continuously fill annular space between pipe and wall-sleeve, wall or casing opening.
   2. Watertight seal between pipe and wall-sleeve, wall or casing opening.
   3. Size and select seal component materials in accordance with service requirements.
   4. Glass-reinforced plastic pressure end plates.
C. Sealing Compounds:
   1. Provide packing and sealing compound to fill pipe to sleeve thickness.
   2. Combined packing and sealing compounding to match partition fire-resistance hourly rating.
D. Pipe Sleeve Material:
   1. Bearing Walls: Steel, cast iron, or terra-cotta pipe.
   2. Masonry Structures: Sheet metal or fiber.

E. Wall Sleeve: PVC material with waterstop collar, and nailer end-caps.
F. Sleeve-Forming Disk: Non-conductive plastic-based material, 3 inch (76.2 mm) thick.

## PART 3 – EXECUTION

### 3.1 PREPARATION

### 3.2 INSTALLATION

A. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
B. Install piping to conserve building space, to not interfere with use of space and other work.
C. Install piping and pipe sleeves to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
D. Inserts:
   1. Provide inserts for placement in concrete formwork.
E. Provide sleeves when penetrating footings, floors, walls, and partitions. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.
F. Manufactured Sleeve-Seal Systems:
   1. Install manufactured sleeve-seal systems in sleeves located in grade slabs and exterior concrete walls at piping entrances into building.
   2. Provide sealing elements of the size, quantity, and type required for the piping and sleeve inner diameter or penetration diameter.
   3. Locate piping in center of sleeve or penetration.
   4. Install field assembled sleeve-seal system components in annular space between sleeve and piping.
   5. Tighten bolting for a water-tight seal.
   6. Install in accordance with manufacturer's recommendations.
G. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

### 3.3 CLEANING

A. Upon completion of work, clean all parts of the installation.
B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

**END OF SECTION**

## SECTION 220519

## METERS AND GAUGES FOR PLUMBING PIPING

### PART 1 – GENERAL

#### 1.1 SECTION INCLUDES
A. Water meters.
B. Gas meters.

#### 1.2 REFERENCE STANDARDS
A. AGA/ANSI B109 Set - INCLUDES ANSI B109.1, ANSI B109.2, ANSI B109.3, ANSI B109.4; 2000.
B. AWWA C702 - Cold-Water Meters -- Compound Type; 2019.
C. AWWA M6 - Water Meters -- Selection, Installation, Testing, and Maintenance; 2012, with Addendum (2018).
D. NSF 61 - Drinking Water System Components - Health Effects; 2022, with Errata.
E. NSF 372 - Drinking Water System Components - Lead Content; 2022.

#### 1.3 ADMINISTRATIVE REQUIREMENTS
A. Utility Service Metering: Coordinate and apply Utility Service Provider requirements in terms of meter type, size, physical location, pipe size, upstream/downstream pipe lengths required, and other installation details.

### PART 2 – PRODUCTS

#### 2.1 WATER METERS
A. Compound Water Meters:
1. Utility Connection Size: 3 inch (80 mm, DN) flanged.
2. Maximum Unidirectional Water Flow Capacity: As indicated on drawings.
3. Lead-free bronze alloy case, polymer-based cap, and hermetically sealed register.
4. Pressure and Temperature: Up to 150 psi (10 bar) and 100 degrees F (38 degrees C).
5. AWWA C702, with lead content below 0.25 percent when using non-lead-free materials on wetted surfaces according to NSF 61 and NSF 372.

#### 2.2 GAS METERS
A. Diaphragm Gas Meters:
1. Maximum Operating Line Pressure: 10 psi (0.7 bar).
2. Gas Flow Rate: Natural gas with flow rate as indicated on drawings.
3. Rangeability and Accuracy: 100 to 1 at plus or minus 1 percent.
4. Temperature Compensation: -30 to 140 degrees F (-34 to 60 degrees C).
5. B109.1/B109.2 of AGA/ANSI B109 Set, coated aluminum case with security seals, female threaded piping connection, and hermetically sealed register.

### PART 3 – EXECUTION

#### 3.1 EXAMINATION
A. Verification of Conditions: Verify Utility Service Provider piping readiness to receive meter.
B. Do not install instrumentation when areas are under construction, except for required rough-in, taps, supports, and test plugs.

#### 3.2 INSTALLATION
A. Install metering products in accordance with manufacturer's instructions for intended fluid type and service.
B. Install water meters with inlet isolation valve in compliance with AWWA M6.
C. Install gas meters in accordance with Utility Service Provider instructions with required appurtenances.

**SECTION 220519**

**METERS AND GAUGES FOR PLUMBING PIPING**

**END OF SECTION**

**SECTION 220523**

**GENERAL-DUTY VALVES FOR PLUMBING PIPING**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Angle valves.
B. Ball valves.
C. Lubricated plug valves.

### 1.2 REFERENCE STANDARDS

A. ASME B16.34 - Valves — Flanged, Threaded, and Welding End; 2020.
B. ASTM A48/A48M - Standard Specification for Gray Iron Castings; 2022.
C. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings; 2004 (Reapproved 2019).
D. ASTM A536 - Standard Specification for Ductile Iron Castings; 1984, with Editorial Revision (2019).
E. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings; 2017.
F. MSS SP-72 - Ball Valves with Flanged or Butt-Welding Ends for General Service; 2010a.
G. MSS SP-78 - Gray Iron Plug Valves, Flanged and Threaded Ends; 2011.
H. MSS SP-80 - Bronze Gate, Globe, Angle, and Check Valves; 2019.
I. MSS SP-85 - Gray Iron Globe and Angle Valves, Flanged and Threaded Ends; 2011.
J. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010, with Errata .

## PART 2 – PRODUCTS

### 2.1 APPLICATIONS

A. Listed pipe sizes shown using nominal pipe sizes (NPS) and nominal diameter (DN).
B. Provide the following valves for the applications if not indicated on drawings:
    1. Shutoff: Provide ball or plug valve.
    2. Throttling: Provide angle valve.
C. Substitutions of valves with higher CWP classes or WSP ratings for same valve types are permitted when specified CWP ratings or WSP classes are not available.
D. Domestic, Hot and Cold Water Valves:
    1. 2 inch (50 mm, DN) and Smaller:
        a. Bronze Angle: Class 125, bronze disc.
        b. Ball: One piece, full port, brass with brass trim.
    2. 2-1/2 inch (65 mm, DN) and Larger:
        a. Iron Ball: Class 150.
E. Sanitary Waste Water Valves:
    1. 2 inch (50 mm, DN) and Smaller:
        a. Ball: One piece, full port, brass with brass trim.
    2. 2-1/2 inch (65 mm, DN) and Larger:
        a. Iron Ball: Class 150.

### 2.2 GENERAL REQUIREMENTS

A. Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.
B. Valve Sizes: Match upstream piping unless otherwise indicated.
C. Valve Actuator Types:
D. Insulated Piping Valves: With 2 inch (50 mm, DN) stem extensions and the following features:
    1. Ball Valves: Extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
E. Valve-End Connections:
F. General ASME Compliance:

## 2.3 BRONZE, ANGLE VALVES

A. Class 125; CWP Rating: 200 psi (1380 kPa):
   1. Comply with MSS SP-80, Type 1.
   2. Body: Bronze; ASTM B62, with integral seat and screw in bonnet.
   3. End Connections: Pipe thread.
   4. Stem: Bronze.
   5. Disc: Bronze.
   6. Packing: Asbestos free.
   7. Handwheel: Bronze or aluminum.

## 2.4 BRASS, BALL VALVES

A. One Piece, Full Port with Brass Trim and Push-to-fit or Threaded Connections:
   1. Comply with MSS SP-110.
   2. CWP Rating: 200 psi (1379 kPa).
   3. Body: Forged brass.
   4. Seats: PTFE.
   5. Stem: Brass.
   6. Ball: Chrome-plated brass.
   7. Operator: Handle.

## 2.5 BRONZE, BALL VALVES

A. General:
   1. Fabricate from dezincification resistant material.
   2. Copper alloys containing more than 15 percent zinc are not permitted.
B. One Piece, Reduced Port with Bronze Trim:
   1. Comply with MSS SP-110.
   2. WSP Rating: 400 psi (2760 kPa).
   3. CWP Rating: 600 psi (4140 kPa).
   4. Body: Bronze.
   5. End Connections: Pipe press.
   6. Seats: PTFE.

## 2.6 CARBON STEEL, BALL VALVES

A. One Piece, Standard Port, Fire Safe, Class 150, Flanged with Stainless Steel Trim:
   1. WSP Rating: 150 psi (1035 kPa), fire safe.
   2. Seats: TFM.
   3. Stem: Stainless steel, blowout proof.
   4. Ball: Stainless steel, vented.
   5. Operator: Lockable handle with actuator-mounting pad.
   6. Pressure and Temperature Rating: ASME B16.34.

## 2.7 STAINLESS STEEL, BALL VALVES

A. One Piece, Standard Port with Stainless-Steel Trim:
   1. Comply with MSS SP-110.
   2. WSP Rating: 150 psi (1035 kPa).
   3. CWP Rating: 1,000 psi (6895 kPa).
   4. Seats: PTFE.
   5. Stem: Stainless steel, blowout proof.
   6. Ball: Stainless steel.
   7. End Connections: Threaded.
   8. Operator: Lockable handle.

### 2.8 IRON, BALL VALVES

A. Class 125, Full Port, Stainless Steel Trim:
   1. Comply with MSS SP-72.
   2. CWP Rating: 200 psi (1380 kPa).
   3. Body: ASTM A536, Grade 65-45-12, ductile iron.
   4. End Connections: Flanged.
   5. Seats: PTFE.
   6. Operator: Lever with locking handle.

### 2.9 LUBRICATED PLUG VALVES

A. Regular Gland with Flanged Ends:
   1. Comply with MSS SP-78, Type II.
   2. Body: ASTM A48/A48M or ASTM A126, cast iron with lubrication sealing system.
   3. Pattern: Regular or short.
   4. Plug: Cast iron or bronze with sealant groove.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. Discard all packing materials and verify that valve interior, including threads and flanges are completely clean without signs of damage or degradation that could result in leakage.
B. Verify valve parts to be fully operational in all positions from closed to fully open.
C. Confirm gasket material to be suitable for the service, to be of correct size, and without defects that could compromise effectiveness.
D. Should valve is determined to be defective, replace with new valve.

### 3.2 INSTALLATION

A. Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.
B. Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.

**END OF SECTION**

## SECTION 220529

## HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

### PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Prefabricated trapeze-framed systems.
B. Strut systems for pipe or equipment support.
C. Beam clamps.
D. Pipe hangers.
E. Pipe supports, guides, shields, and saddles.
F. Anchors and fasteners.

### 1.2 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Concrete equipment pads.
B. Section 055000 - Metal Fabrications.

### 1.3 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
C. ASTM A181/A181M - Standard Specification for Carbon Steel Forgings, for General-Purpose Piping; 2023.
D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
E. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999, with Editorial Revision (2022).
F. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2018.
G. ASTM A395/A395M - Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures; 1999 (Reapproved 2022).
H. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
I. 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; 2023.
J. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2023.
K. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2022.
L. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023b.
M. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).
N. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
O. UL (DIR) - Online Certifications Directory; Current Edition.

### 1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
   2. Coordinate the work with other trades to provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
   4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.

5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 033000.

## PART 2 – PRODUCTS

### 2.1 GENERAL REQUIREMENTS

A. Provide required hardware to hang or support piping, equipment, or fixtures with related accessories as necessary to complete installation of plumbing work.
B. Provide hardware products listed, classified, and labeled as suitable for intended purpose.
C. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
D. Materials for Metal Fabricated Supports: Comply with Section 055000.
1. Zinc-Plated Steel: Electroplated in accordance with ASTM B633 unless stated otherwise.
2. Galvanized Steel: Hot-dip galvanized in accordance with ASTM A123/A123M or ASTM A153/A153M unless stated otherwise.
E. Corrosion Resistance: Use corrosion-resistant metal-based materials fully compatible with exposed piping materials and suitable for the environment where installed.
1. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.

### 2.2 PREFABRICATED TRAPEZE-FRAMED SYSTEMS

A. Prefabricated Trapeze-Framed Metal Strut Systems:
1. Manufacturers:
a. Anvil International, LLC; _____: www.asc-es.com/#sle.
b. Custom Strut and Roll Forming, LLC; _____: www.customstrut.com/#sle.
c. Gripple, Inc; Fast Track - Standard: www.gripple.com/#sle.
d. Unistrut, a brand of Atkore International, Inc; _____: www.unistrut.com/#sle.
e. Substitutions: See Section 016000 - Product Requirements.
f. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
2. Strut Channel or Bracket Material:
a. Indoor Dry Locations: Use zinc-plated steel or galvanized steel.
3. Accessories: Provide bracket covers, cable basket clips, cable tray clips, clamps, conduit clamps, fire-retarding brackets, j-hooks, protectors, and vibration dampeners.
B. Prefabricated Trapeze-Framed Fiberglass Strut Systems:
1. Manufacturers:
a. Enduro Composites; _____: www.endurocomposites.com/#sle.
b. Unistrut, a brand of Atkore International, Inc; _____: www.unistrut.com/#sle.
c. Substitutions: See Section 016000 - Product Requirements.
d. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
2. MSS SP-58 type 59, prefabricated continuous-slot fiberglass strut channel, associated fittings, and related accessories.
3. Flammability: Fire retardant with NFPA 101, Class A flame spread index (maximum of 25) when tested in accordance with ASTM E84; self-extinguishing in accordance with ASTM D635.

### 2.3 STRUT SYSTEMS FOR PIPE OR EQUIPMENT SUPPORT

A. Strut Channels:
1. Manufacturers:
a. ABB Installation Products; _____: electrification.us.abb.com/#sle.

b. Gripple, Inc; Universal Bracket: www.gripple.com/#sle.
c. Unistrut, a brand of Atkore International Inc; _____: www.unistrut.com/#sle.
d. Substitutions: See Section 016000 - Product Requirements.
e. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.

2. ASTM A653/A653M galvanized steel bracket with clamps for surface mounting of piping or plumbing equipment support.
3. Channel or Bracket Kits: Include rods, brackets, end-fixed fittings, covers, clips, and other related hardware required to complete sectional trapeze section for piping or other support.

B. Hanger Rods:
1. Threaded zinc-plated steel unless otherwise indicated.
2. Minimum Size, Unless Otherwise Indicated or Required:
a. Equipment Supports: 1/2 inch (13 mm, DN) diameter.
b. Piping up to 1 inch (25 mm, DN): 1/4 inch (6 mm, DN) diameter.
c. Piping larger than 1 inch (25 mm, DN): 3/8 inch (10 mm, DN) diameter.
d. Trapeze Support for Multiple Pipes: 3/8 inch (10 mm) in length.

C. Channel Nuts:
1. Manufacturers:
a. B-Line, a brand of Eaton Corporation; _____: www.eaton.com/#sle.
b. FNW; 7821: www.fnw.com/#sle.
c. Unistrut, a brand of Atkore International, Inc; _____: www.unistrut.com/#sle.
d. Substitutions: See Section 016000 - Product Requirements.
e. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
2. Provide carbon steel channel nut with epoxy copper or zinc finish and long, regular, or short spring as indicated on drawings.

D. Cable Hanging System Kits:
1. Manufacturers:
a. B-Line, a brand of Eaton Corporation; _____: www.eaton.com/#sle.
b. Ductmate Industries, Inc; _____: ductmate.com/#sle.
c. Gripple, Inc; _____: www.gripple.com/#sle.
d. Substitutions: See Section 016000 - Product Requirements.
e. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
2. Provide cable-wire in bulk or pre-cut lengths with respective cable hangers as required to hold minimum weight of 120 lb (54.4 kg).
3. Accessories: Provide brackets, clip or c-clip hangers, covers, and y-hook hangers.

## 2.4 BEAM CLAMPS

A. Manufacturers:
1. B-Line, a brand of Eaton Corporation; _____: www.eaton.com/#sle.
2. FNW; 7201: www.fnw.com/#sle.
3. Unistrut, a brand of Atkore International, Inc; _____: www.unistrut.com/#sle.
4. Substitutions: See Section 016000 - Product Requirements.
5. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.

B. Provide clamps with hardened steel cup-point set screws and lock-nuts for anchoring in place.
C. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.

## 2.5 PIPE HANGERS

A. Band Hangers, Adjustable:
1. Manufacturers:
a. B-Line, a brand of Eaton Corporation; _____: www.eaton.com/#sle.
b. Gripple, Inc; Universal Clamp (Threaded): www.gripple.com/#sle.
c. Substitutions: See Section 016000 - Product Requirements.

d. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.

2. MSS SP-58 type 7 or 9, zinc-plated ASTM A1011/A1011M steel or ASTM A653/A653M carbon steel.

B. Clevis Hangers, Adjustable:

1. Manufacturers:
   a. B-Line, a brand of Eaton Corporation; _____: www.eaton.com/#sle.
   b. FNW; 7005: www.fnw.com/#sle.
   c. nVent Caddy, a brand of nVent; _____: www.erico.com/#sle.
   d. Substitutions: See Section 016000 - Product Requirements.
   e. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.

## 2.6 PIPE CLAMPS

A. Riser Clamps:

1. Manufacturers:
   a. B-Line, a brand of Eaton Corporation; _____: www.eaton.com/#sle.
   b. FNW; 7020: www.fnw.com/#sle.
   c. nVent Caddy, a brand of nVent; _____: www.erico.com/#sle.
   d. Substitutions: See Section 016000 - Product Requirements.
   e. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
2. For insulated pipe runs, provide two bolt-type clamps designed for installation under insulation.
3. MSS SP-58 type 1 or 8, carbon steel or steel with epoxy plated, plain, stainless steel, or zinc plated finish.
4. UL (DIR) listed: Pipe sizes 1/2 to 8 inch (15 to 200 mm, DN).

## 2.7 ANCHORS AND FASTENERS

A. Manufacturers - Mechanical Anchors:

1. FNW; 7502: www.fnw.com/#sle.
2. Hilti, Inc; _____: www.us.hilti.com/#sle.
3. ITW Red Head, a division of Illinois Tool Works, Inc; _____: www.itwredhead.com/#sle.
4. Powers Fasteners, Inc; _____: www.powers.com/#sle.
5. _____.
6. Substitutions: See Section 016000 - Product Requirements.

B. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

C. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.

D. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.

E. Hollow Masonry: Use toggle bolts.

F. Hollow Stud Walls: Use toggle bolts.

G. Steel: Use beam ceiling clamps, beam clamps, machine bolts, or welded threaded studs.

H. Beam Ceiling Flanges: ASTM A47/A47M Grade 32510, malleable iron or stainless steel with copper, plain, stainless steel, or zinc finish.

I. Preset Concrete Inserts: Continuous metal strut channel and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.

1. Channel Material: Use galvanized steel.
2. Manufacturer: Same as manufacturer of metal strut channel framing system.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. Verify that field measurements are as indicated.
B. Verify that mounting surfaces are ready to receive support and attachment components.
C. Verify that conditions are satisfactory for installation prior to starting work.

### 3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions.
B. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.
C. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
D. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
E. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
F. Equipment Support and Attachment:
    1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
    2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
    3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
    4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
G. Preset Concrete Inserts: Use manufacturer-provided closure strips to inhibit concrete seepage during concrete pour.
H. Secure fasteners according to manufacturer's recommended torque settings.
I. Remove temporary supports.

### 3.3 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements for additional requirements.
B. Inspect support and attachment components for damage and defects.
C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
D. Correct deficiencies and replace damaged or defective support and attachment components.

**END OF SECTION**

## SECTION 220553

## IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

### PART 1 – GENERAL

#### 1.1 SECTION INCLUDES
A. Nameplates.
B. Tags.
C. Pipe markers.
D. Ceiling tacks.

#### 1.2 RELATED REQUIREMENTS
A. Section 099123 - Interior Painting: Identification painting.

#### 1.3 REFERENCE STANDARDS
A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2020.

### PART 2 – PRODUCTS

#### 2.1 PLUMBING COMPONENT IDENTIFICATION GUIDELINE
A. Nameplates:
   1. Pumps, tanks, filters, water treatment devices, and other plumbing equipment products.
B. Tags:
   1. Piping: 3/4 inch (20 mm) diameter and smaller.
C. Pipe Markers: 3/4 inch (20 mm) diameter and higher.

#### 2.2 NAMEPLATES
A. Description: Laminated piece with up to three lines of text.
   1. Letter Color: White.
   2. Letter Height: 1/4 inch (6 mm).
   3. Background Color: Black.

#### 2.3 TAGS
A. Flexible: Vinyl with engraved black letters on light contrasting background color with up to three lines of text. Minimum tag size 1-1/2 inch (40 mm) in diameter.
B. Metal: Brass, 19 gauge 1-1/2 inch (40 mm) in diameter with smooth edges, blank, smooth edges, and corrosion-resistant ball chain. Up to three lines of text.
C. Piping: 3/4 inch (20 mm) diameter and smaller. Include corrosion resistant chain. Identify service, flow direction, and pressure.

#### 2.4 PIPE MARKERS
A. Flexible Marker: Factory fabricated, semi-rigid, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid conveyed.
B. Flexible Tape Marker: Flexible, vinyl film tape with pressure-sensitive adhesive backing and printed markings.
C. Identification Scheme, ASME A13.1:
   1. Primary: External Pipe Diameter, Uninsulated or Insulated.
      a. 3/4 to 1-1/4 inches (19 to 32 mm): Use 8 inch (203 mm) field-length with 1/2 inch (13 mm) text height.
      b. 1-1/2 to 2 inches (38 to 51 mm): Use 8 inch (203 mm) field-length with 3/4 inch (19 mm) text height.
      c. 2-1/2 to 6 inches (64 to 152 mm): Use 12 inch (305 mm) field-length with 1-1/4 inch (32 mm) text height.
   2. Secondary: Color scheme per fluid service.
      a. Owner Defined No. 1: White text on purple background.
      b. Owner Defined No. 2: Black text on white background.
      c. Owner Defined No. 3: White text on gray background.

d. Water; Potable, Cooling, Boiler Feed, and Other: White text on green background.

3. Tertiary: Other Details.
   a. Directional flow arrow.

## 2.5 CEILING TACKS

A. Description: Steel with 3/4 inch (20 mm) diameter color coded head.
B. Color code as follows:
   1. Plumbing Equipment: Yellow.
   2. Plumbing Valves: Green.
   3. Heating/Cooling Valves: Blue.

# PART 3 – EXECUTION

## 3.1 INSTALLATION

A. Install flexible nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
B. Install tags in clear view and align with axis of piping
C. Install plastic pipe markers in accordance with manufacturer's instructions.
D. Install plastic tape pipe marker around pipe in accordance with manufacturer's instructions.
E. Apply ASME A13.1 Pipe Marking Rules:
   1. Place pipe marker adjacent to changes in direction.
   2. Place pipe marker adjacent each valve port and flange end.
   3. Place pipe marker at both sides of floor and wall penetrations.
   4. Place pipe marker every 25 to 50 feet (7.6 to 15.2 m) interval of straight run.
F. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

**END OF SECTION**

## SECTION 220719

## PLUMBING PIPING INSULATION

### PART 1 – GENERAL

#### 1.1 SECTION INCLUDES
A. Glass fiber insulation.

#### 1.2 RELATED REQUIREMENTS
A. Section 078400 - Firestopping.

#### 1.3 REFERENCE STANDARDS
A. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2019, with Editorial Revision (2023).
B. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2022a.
C. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2023).
D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023b.
E. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

### PART 2 – PRODUCTS

#### 2.1 REGULATORY REQUIREMENTS
A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

#### 2.2 GLASS FIBER INSULATION
A. Manufacturers:
   1. CertainTeed Corporation; _____: www.certainteed.com/#sle.
   2. Johns Manville Corporation; _____: www.jm.com/#sle.
   3. Knauf Insulation; Earthwool 1000 Degree Pipe Insulation: www.knaufinsulation.com/#sle.
B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
   1. K (Ksi) Value: ASTM C177, 0.24 at 75 degrees F (0.035 at 24 degrees C).
   2. Maximum Service Temperature: 850 degrees F (454 degrees C).
   3. Maximum Moisture Absorption: 0.2 percent by volume.

### PART 3 – EXECUTION

#### 3.1 INSTALLATION
A. Install in accordance with manufacturer's instructions.
B. Install in accordance with North American Insulation Manufacturers Association (NAIMA) National Insulation Standards.
C. For hot piping conveying fluids over 140 degrees F (60 degrees C), insulate flanges and unions at equipment.
D. Glass fiber insulated pipes conveying fluids above ambient temperature:
   1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure-sensitive adhesive. Secure with outward clinch expanding staples.
   2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
E. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, see Section 078400.

## 3.2 SCHEDULES

A. Plumbing Systems:
   1. Domestic Cold Water Supply:
      a. Glass Fiber Insulation
         1) Pipe Size Range: [1] inch ([25] mm) and smaller.
         2) Thickness: [1/2] inch ([13] mm.
         3) Pipe Size Range: Larger than [1] inch ([25] mm) and smaller.
         4) Thickness: [1] inch ([25] mm.
   2. Domestic Hot Water Supply:
      a. Glass Fiber Insulation:
         1) Pipe Size Range:  1-1/2 inch (38 mm) and smaller.
         2) Thickness:  1 inch (25 mm).
         3) Pipe Size Range: Larger than [1-1/2] inch ([38] mm).
         4) Thickness: [1-1/2] inch ([38] mm.
   3. Domestic Hot Water Recirculation:
      a. Glass Fiber Insulation:
         1) Pipe Size Range: [1-1/2] inch ([38] mm) and smaller.
         2) Thickness:  1 inch (25 mm).
         3) Pipe Size Range: Larger than [1-1/2] inch ([38] mm).
         4) Thickness: [1-1/2] inch ([38] mm.
   4. Storm Leaders (Including Drain Body and Horizontal Pipe):
      a. Glass Fiber Insulation
         1) Pipe Size Range: All sizes.
         2) Thickness: [1/2] inch ([13] mm).

**END OF SECTION**

## SECTION 220719.11

## UNDER-LAVATORY PIPE AND SUPPLY COVERS - PLUMBEREX

### PART 1 – GENERAL

#### 1.1 SECTION INCLUDES
A. Under-lavatory pipe and supply covers.

#### 1.2 REFERENCE STANDARDS
A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

#### 1.3 SUBMITTALS
A. See Section 013300 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide catalog illustrations of covers, sizes, and finishes.

### PART 2 – PRODUCTS

#### 2.1 UNDER-LAVATORY PIPE AND SUPPLY COVERS
A. Manufacturers:
   1. Substitutions: Not permitted.
B. General:
   1. Insulate exposed drainage piping including hot, cold, and tempered water supplies under lavatories or sinks per ADA Standards.

### PART 3 – EXECUTION

#### 3.1 EXAMINATION
A. Verify that walls, floor finishes, lavatories, and piping are prepared and ready for installation of under-lavatory guards.
B. Confirm location and size of fixtures and piping before installation.

#### 3.2 INSTALLATION
A. Install under-lavatory guards according to manufacturer's written instructions.

#### 3.3 CLEANING
A. Clean installed under-lavatory guards.

#### 3.4 PROTECTION
A. Protect installed products from damage due to subsequent construction operations.
B. Repair or replace damaged products before Date of Substantial Completion.

**END OF SECTION**

**SECTION 221005**

**PLUMBING PIPING**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Sanitary waste piping, buried within 5 feet (1500 mm) of building.
B. Sanitary waste piping, above grade.
C. Domestic water piping, buried within 5 feet (1500 mm) of building.
D. Domestic water piping, above grade.
E. Storm drainage piping, buried within 5 feet (1500 mm) of building.
F. Storm drainage piping, above grade.
G. Natural gas piping, buried within 5 feet (1500 mm) of building.
H. Natural gas piping, above grade.
I. Pipe flanges, unions, and couplings.
J. Pipe hangers and supports.
K. Pipe sleeve-seal systems.
L. Ball valves.

### 1.2 RELATED REQUIREMENTS

A. Section 083100 - Access Doors and Panels.
B. Section 220529 - Hangers and Supports for Plumbing Piping and Equipment.
C. Section 220553 - Identification for Plumbing Piping and Equipment.
D. Section 220719 - Plumbing Piping Insulation.
E. Section 330110.58 - Disinfection of Water Utility Piping Systems.

### 1.3 REFERENCE STANDARDS

A. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2021.
B. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.
C. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2021.
D. ASME B31.1 - Power Piping; 2022.
E. ASME B31.9 - Building Services Piping; 2020.
F. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999, with Editorial Revision (2022).
G. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.
H. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings; 2021.
I. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2023a.
J. ASTM B32 - Standard Specification for Solder Metal; 2020.
K. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2022.
L. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2020.
M. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2016.
N. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2016.
O. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2020a.
P. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2020.
Q. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2020.
R. ASTM D2855 - Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets; 2020.
S. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2021.

T. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023b.
U. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; 2018.
V. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings; 2023.
W. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast; 2017, with Errata (2018).
X. AWWA C606 - Grooved and Shouldered Joints; 2022.
Y. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2021.
Z. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2020.
AA. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements; 2018, with Editorial Revision (2020).
BB. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry; 2018, with Editorial Revision (2020).
CC. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2017, with Editorial Revision (2020).
DD. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements; 2023.
EE. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).
FF. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010, with Errata .
GG. NSF 61 - Drinking Water System Components - Health Effects; 2022, with Errata.
HH. NSF 372 - Drinking Water System Components - Lead Content; 2022.
II. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

### 1.4 QUALITY ASSURANCE

A. Perform work in accordance with applicable codes.

## PART 2 – PRODUCTS

### 2.1 GENERAL REQUIREMENTS

A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.
B. Plenum-Installed Acid Waste Piping: Flame-spread index equal or below 25 and smoke-spread index equal or below 50 according to ASTM E84 or UL 723 tests.

### 2.2 SANITARY WASTE PIPING, BURIED WITHIN 5 FEET (1500 MM) OF BUILDING

A. Cast Iron Pipe: ASTM A74 extra heavy weight.
   1. Fittings: Cast iron.
   2. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets or lead and oakum.
B. PVC Pipe: ASTM D2665 or ASTM D3034.
   1. Fittings: PVC.
   2. Joints: Solvent welded, with ASTM D2564 solvent cement.

### 2.3 SANITARY WASTE PIPING, ABOVE GRADE

A. Cast Iron Pipe: ASTM A74, service weight.
   1. Fittings: Cast iron.
   2. Joint Seals: ASTM C564 neoprene gaskets, or lead and oakum.
B. Cast Iron Pipe: CISPI 301, hubless, service weight.
   1. Fittings: Cast iron.
   2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.

C. PVC Pipe: ASTM D2665.
   1. Fittings: PVC.
   2. Joints: Solvent welded, with ASTM D2564 solvent cement.

**2.4 DOMESTIC WATER PIPING, BURIED WITHIN 5 FEET (1500 MM) OF BUILDING [2-1/2 INCH AND SMALLER]**

A. Copper Pipe: ASTM B88 (ASTM B88M), Type K (A), Drawn (H).
   1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
   2. Joints: ASTM B32, alloy Sn95 solder.

**2.5 DOMESTIC WATER PIPING, BURIED WITHIN 5 FEET (1500 MM) OF BUILDING [3 INCH AND LARGER]**

A. Ductile Iron Pipe: AWWA C151/A21.51.
   1. Fittings: Ductile or gray iron, standard thickness.
   2. Joints: AWWA C111/A21.11, styrene butadiene rubber (SBR) or vulcanized SBR gasket with 3/4 inch (19 mm) diameter rods.

**2.6 DOMESTIC WATER PIPING, ABOVE GRADE**

A. Copper Pipe: ASTM B88 (ASTM B88M), Type L (B), Drawn (H).
   1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
   2. Joints: ASTM B32, alloy Sn95 solder.

**2.7 STORM DRAINAGE PIPING, BURIED WITHIN 5 FEET (1500 MM) OF BUILDING**

A. Cast Iron Pipe: ASTM A74 extra heavy weight.
   1. Fittings: Cast iron.
   2. Joint Seals: ASTM C564 neoprene gaskets, or lead and oakum.
B. PVC Pipe: ASTM D2665 or ASTM D3034.
   1. Fittings: PVC.
   2. Joints: Solvent welded, with ASTM D2564 solvent cement.

**2.8 STORM DRAINAGE PIPING, ABOVE GRADE**

A. Cast Iron Pipe: ASTM A74 extra heavy weight.
   1. Fittings: Cast iron.
B. PVC Pipe: ASTM D2665.
   1. Fittings: PVC.
   2. Joints: Solvent welded, with ASTM D2564 solvent cement.

**2.9 NATURAL GAS PIPING, BURIED WITHIN 5 FEET (1500 MM) OF BUILDING**

A. Steel Pipe: ASTM A53/A53M, Grade B, Type F, Schedule 40 black.
   1. Fittings: ASTM A234/A234M, wrought steel welding type.
   2. Joints: ASME B31.1, welded.
   3. Jacket: AWWA C105/A21.5 polyethylene jacket or double layer, half-lapped 10 mil (0.25 mm) polyethylene tape.

**2.10 NATURAL GAS PIPING, ABOVE GRADE**

A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
   1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought steel welding type.
   2. Joints: Threaded or welded to ASME B31.1.

**2.11 PIPE FLANGES, UNIONS, AND COUPLINGS**

A. Unions for Pipe Sizes 3 inch (80 mm, DN) and Under:
B. Flanges for Pipe Sizes Over 1 inch (25 mm, DN):
C. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to secure and compress gasket.

1. Dimensions and Testing: In accordance with AWWA C606.
2. Housing Material: Provide ASTM A47/A47M malleable iron, ductile iron, or _____, galvanized.
3. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.
4. When pipe is field grooved, provide coupling manufacturer's grooving tools.

## 2.12 PIPE HANGERS AND SUPPORTS

A. See Section 220529 for additional requirements.
B. Provide hangers and supports that comply with MSS SP-58.
   1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
   2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
   3. Trapeze Hangers: Welded steel channel frames attached to structure.
   4. Vertical Pipe Support: Steel riser clamp.
C. Plumbing Piping - Drain, Waste, and Vent:
   1. Hangers for Pipe Sizes 1/2 to 1-1/2 inch (15 to 40 mm, DN): Malleable iron, adjustable swivel, split ring.
   2. Hangers for Pipe Sizes 2 inch (50 mm, DN) and Over: Carbon steel, adjustable, clevis.
   3. Wall Support for Pipe Sizes to 3 inch (80 mm, DN): Cast iron hook.
D. Plumbing Piping - Water:
   1. Hangers for Pipe Sizes 1/2 to 1-1/2 inch (15 to 40 mm, DN): Malleable iron, adjustable swivel, split ring.
   2. Hangers for Cold Pipe Sizes 2 inch (50 mm, DN) and Over: Carbon steel, adjustable, clevis.
   3. Hangers for Hot Pipe Sizes 2 to 4 inch (50 to 100 mm, DN): Carbon steel, adjustable, clevis.
E. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
   1. Concrete Wedge Expansion Anchors: Comply with ICC-ES AC193.
   2. Masonry Wedge Expansion Anchors: Comply with ICC-ES AC01.
   3. Concrete Screw Type Anchors: Comply with ICC-ES AC193.
   4. Masonry Screw Type Anchors: Comply with ICC-ES AC106.
   5. Concrete Adhesive Type Anchors: Comply with ICC-ES AC308.
   6. Other Types: As required.
   7. Manufacturers:

## 2.13 PIPE SLEEVE-SEAL SYSTEMS

A. Manufacturers:
   1. BMW Company; _____: www.bmwcompany.com/#sle.
   2. GPT, a company of Enpro Industries, Inc; _____: www.gptindustries.com/#sle.
   3. The Metraflex Company; MetraSeal: www.metraflex.com/#sle.
   4. Substitutions: See Section 016000 - Product Requirements.
B. Modular Mechanical Seals:
   1. Elastomer-based interlocking links continuously fill annular space between pipe and wall-sleeve, wall or casing opening.
   2. Watertight seal between pipe and wall-sleeve, wall or casing opening.
   3. Size and select seal component materials in accordance to service requirements.
   4. Glass reinforced plastic pressure end plates.
C. Wall Sleeve: PVC material with water-stop collar, and nailer end-caps.

## 2.14 BALL VALVES

A. Manufacturers:
   1. Anvil International; _____: www.anvilintl.com/#sle.
   2. Apollo Valves; _____: www.apollovalves.com/#sle.
   3. Grinnell Products; _____: www.grinnell.com/#sle.

4. Nibco, Inc; _____: www.nibco.com/#sle.
5. SharkBite, a brand of Reliance Worldwide Corporation; _____: www.sharkbite.com/#sle.
6. Substitutions: See Section 016000 - Product Requirements.

B. Construction, 4 inch (100 mm, DN) and Smaller: MSS SP-110, Class 150, 400 psi (2760 kPa) CWP, bronze or ductile iron body, 304 stainless steel or chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, threaded or grooved ends with union.

## PART 3 – EXECUTION

### 3.1 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
B. Remove scale and dirt, on inside and outside, before assembly.
C. Prepare piping connections to equipment with flanges or unions.

### 3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
C. Install piping to maintain headroom, conserve space, and not interfere with use of space.
D. Group piping whenever practical at common elevations.
E. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
   1. See Section 220719.
F. Provide access where valves and fittings are not exposed.
   1. Coordinate size and location of access doors with Section 083100.
G. Provide support for utility meters in accordance with requirements of utility companies.
H. Install valves with stems upright or horizontal, not inverted. See Section 220523.
I. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.
J. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.
K. Sleeve pipes passing through partitions, walls, and floors.
L. Inserts:
   1. Provide inserts for placement in concrete formwork.
   2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
M. Pipe Hangers and Supports:
   1. Install in accordance with ASME B31.9.
   2. Support horizontal piping as indicated.
   3. Install hangers to provide minimum 1/2 inch (15 mm) space between finished covering and adjacent work.
   4. Place hangers within 12 inches (300 mm) of each horizontal elbow.
   5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
N. Pipe Sleeve-Seal Systems:
   1. Install manufactured sleeve-seal systems in sleeves located in grade slabs and exterior concrete walls at piping entrances into building.
   2. Provide sealing elements of the size, quantity, and type required for the piping and sleeve inner diameter or penetration diameter.
   3. Locate piping in center of sleeve or penetration.
   4. Install field assembled sleeve-seal system components in annular space between sleeve and piping.
   5. Tighten bolting for a watertight seal.

6. Install in accordance with manufacturer's recommendations.

## 3.3 APPLICATION

A. Use grooved mechanical couplings and fasteners only in accessible locations.
B. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
C. Provide flow controls in water recirculating systems where indicated.

## 3.4 TOLERANCES

A. Drainage Piping: Establish invert elevations within 1/2 inch (10 mm) vertically of location indicated and slope to drain at minimum of 1/4 inch per foot (1:50) slope.

## 3.5 FIELD TESTS AND INSPECTIONS

A. Verify and inspect systems according to requirements by the Authority Having Jurisdiction. In the absence of specific test and inspection procedures proceed as indicated below.
B. Domestic Water Systems:
   1. Perform hydrostatic testing for leakage prior to system disinfection.
   2. Test Preparation: Close each fixture valve or disconnect and cap each connected fixture.
   3. General:
      a. Fill the system with water and raise static head to 10 psi (345 kPa) above service pressure. Minimum static head of 50 to 150 psi (345 to 1,034 kPa). As an exception, certain codes allow a maximum static pressure of 80 psi (551.6 kPa).
C. Gas Distribution Systems:
   1. Test Preparation: Close each appliance valve or disconnect and cap each connected appliance.
   2. General Systems:
      a. Inject a minimum of 10 psi (68.9 kPa) of compressed air into the piping system for a duration of 15 minutes and verify with a gauge that no perceptible pressure drop is measured.
      b. Ensure test pressure gauge has a range of twice the specific pressure rate selected with an accuracy of 1/10 of 1 pound (0.45 kg).
D. Test Results: Document and certify successful results, otherwise repair, document, and retest.

## 3.6 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Disinfect water distribution system in accordance with Section 330110.58.
B. Prior to starting work, verify system is complete, flushed, and clean.

## 3.7 SERVICE CONNECTIONS

A. Provide new sanitary sewer services. Before commencing work, check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.
B. Provide new water service complete with approved reduced pressure backflow preventer and water meter with by-pass valves.

**END OF SECTION**

**SECTION 221006**

**PLUMBING PIPING SPECIALTIES**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Drains.
B. Cleanouts.
C. Refrigerator valve and recessed box.
D. Backflow preventers.
E. Sanitary waste interceptors.
F. Mixing valves.
G. Air vents.
H. Floor drain trap seals.

### 1.2 REFERENCE STANDARDS
A. NSF 61 - Drinking Water System Components - Health Effects; 2022, with Errata.
B. NSF 372 - Drinking Water System Components - Lead Content; 2022.

### 1.3 SUBMITTALS
A. See Section 013300 - Administrative Requirements for submittal procedures.
B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.

### 1.4 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years documented experience.

## PART 2 – PRODUCTS

### 2.1 GENERAL REQUIREMENTS
A. Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and NSF 372 for maximum lead content.

### 2.2 MODELS / MANUFACTURERS
A. Refer to plumbing fixture schedules.

## PART 3 – EXECUTION

### 3.1 INSTALLATION
A. Install in accordance with manufacturer's instructions.
B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.
C. Encase exterior cleanouts in concrete flush with grade.
D. Install floor cleanouts at elevation to accommodate finished floor.
E. Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, fire sprinkler systems, premise isolation, irrigation systems, flush valves, interior and exterior hose bibbs.
F. Pipe relief from backflow preventer to nearest drain.
G. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to lavatory sinks.

**END OF SECTION**

**SECTION 223000**

**PLUMBING EQUIPMENT**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Commercial gas-fired water heaters.
B. Diaphragm-type compression tanks.
C. Point-of-use water filters.
D. In-line circulator pumps.

### 1.2 REFERENCE STANDARDS
A. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
B. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1: Rules for Construction of Pressure Vessels; 2023.

### 1.3 SUBMITTALS
A. See Section 013300 - Administrative Requirements for submittals procedures.
B. Product Data:
   1. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.

### 1.4 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

## PART 2 – PRODUCTS

### 2.1 WATER HEATERS
A. Manufacturers:
   1. A.O. Smith Water Products Co; _____: www.hotwater.com/#sle.
   2. Bradford White Corporation; _____: www.bradfordwhite.com/#sle.
   3. Rheem Manufacturing Company; _____: www.rheem.com/#sle.
   4. Substitutions: See Section 016000 - Product Requirements.
B. Commercial Gas-Fired Water Heaters:
   1. Type: Automatic, natural gas-fired, vertical storage.
   2. Minimum Efficiency Required: ASHRAE Std 90.1 I-P.
   3. Performance:
      a. Refer to plumbing schedules.
   4. Tank: Glass-lined, welded steel,; multiple flue passages, 4-inch (100 mm) diameter inspection port, thermally insulated with minimum 2 inches (50 mm) glass fiber, encased in corrosion-resistant steel jacket; baked-on enamel finish; floor shield and legs.
   5. Accessories:
      a. Water Connections: Brass or stainless steel.
      b. Dip Tube: Brass or stainless steel.
      c. Drain valve.
      d. Temperature and Pressure Relief Valve.
   6. Applications:
      a. Automatic storage water heater.
   7. Controls: Automatic water thermostat with temperature range adjustable from 120 to 180 degrees F (49 to 82 degrees C), automatic reset high temperature limiting thermostat factory set at 195 degrees F (90 degrees C), gas pressure regulator, multi-ribbon or tubular burner, 100 percent safety shut-off pilot and thermocouple, flue baffle and draft hood.

## 2.2 DIAPHRAGM-TYPE COMPRESSION TANKS

A. Manufacturers:
   1. Amtrol Inc; _____: www.amtrol.com/#sle.
   2. Substitutions: See Section 016000 - Product Requirements.
B. Construction: Welded steel, tested and stamped in accordance with ASME BPVC-VIII-1; supplied with National Board Form U-1, rated for working pressure of 125 psig (860 kPa), with flexible EPDM diaphragm sealed into tank, and steel legs or saddles.
C. Accessories: Pressure gauge and air-charging fitting, tank drain; precharge to 12 psig (80 kPa).

## 2.3 POINT-OF-USE WATER FILTERS

A. Point-of-Use Application: Provide for All fixtures with filtered water connections as required by kitchen designer.
B. Type: As specified by kitchen designer.

## 2.4 IN-LINE CIRCULATOR PUMPS

A. Manufacturers:
   1. Armstrong Fluid Technology; _____: www.armstrongfluidtechnology.com/#sle.
   2. Bell & Gossett, a brand of Xylem, Inc; _____: www.bellgossett.com/#sle.
   3. Sterling SIHI GmbH; _____: www.sterlingsihi.com/#sle.
   4. Taco, Inc; [_____]: www.taco-hvac.com/#sle.
   5. Substitutions: See Section 016000 - Product Requirements.
B. Casing: Bronze, rated for 125 psig (860 kPa) working pressure, with stainless steel rotor assembly.
C. Impeller: Bronze.
D. Shaft: Alloy steel with integral thrust collar and two oil lubricated bronze sleeve bearings.
E. Seal: Carbon rotating against a stationary ceramic seat.
F. Drive: Flexible coupling.

# PART 3 – EXECUTION

## 3.1 INSTALLATION

A. Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions required for applicable certifications.
B. Coordinate system, equipment, and piping work with applicable electrical, fuel, gas, vent, drain, and waste support interconnections as included or provided by other trades.
C. Domestic Water Storage Tanks:
   1. Provide steel pipe support, independent of building structural framing members.
   2. Clean and flush prior to delivery to site. Seal until pipe connections are made.
D. Pumps:
   1. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

**END OF SECTION**

# SECTION 224000

# PLUMBING FIXTURES

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Flush valve water closets.
B. Wall hung urinals.
C. Lavatories.
D. Sinks.
E. Under-lavatory pipe supply covers.
F. Mop sinks.

### 1.2 REFERENCE STANDARDS
A. NSF 61 - Drinking Water System Components - Health Effects; 2022, with Errata.
B. NSF 372 - Drinking Water System Components - Lead Content; 2022.

### 1.3 SUBMITTALS
A. See Section 013300 - Administrative Requirements for submittal procedures.
B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.

### 1.4 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

## PART 2 – PRODUCTS

### 2.1 GENERAL REQUIREMENTS
A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

### 2.2 REGULATORY REQUIREMENTS
A. Comply with applicable codes for installation of plumbing systems.

### 2.3 MODELS / MANUFACTURERS
A. Refer to plumbing fixture schedules.

## PART 3 – EXECUTION

### 3.1 EXAMINATION
A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.
B. Verify that electric power is available and of the correct characteristics.

### 3.2 PREPARATION
A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

### 3.3 INSTALLATION
A. Install components level and plumb.
B. Install and secure fixtures in place with wall carriers and bolts.

### 3.4 ADJUSTING
A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

## 3.5 CLEANING

A. Clean plumbing fixtures and equipment.

## 3.6 PROTECTION

A. Protect installed products from damage due to subsequent construction operations.
B. Repair or replace damaged products before Date of Substantial Completion.

**END OF SECTION**

## SECTION 230517

## SLEEVES AND SLEEVE SEALS FOR HVAC PIPING

### PART 1 – GENERAL

#### 1.1 SECTION INCLUDES
A. Pipe sleeves.
B. Pipe-sleeve seals.

#### 1.2 RELATED REQUIREMENTS
A. Section 078400 - Firestopping.
B. Section 230523 - General-Duty Valves for HVAC Piping.
C. Section 230553 - Identification for HVAC Piping and Equipment: Piping identification.

#### 1.3 REFERENCE STANDARDS
A. ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type); 2022a.
B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2023a.
C. FM (AG) - FM Approval Guide; Current Edition.
D. UL (DIR) - Online Certifications Directory; Current Edition.

#### 1.4 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
B. Installer Qualifications: Company specializing in performing work of the type specified this section.
C. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

#### 1.5 WARRANTY
A. See Section 017700 - Closeout Submittals, for additional warranty requirements.
B. Correct defective Work within a five year period after Date of Substantial Completion.

### PART 2 – PRODUCTS

#### 2.1 PIPE SLEEVES
A. Manufacturers:
   1. Flexicraft Industries; Pipe Wall Sleeve: www.flexicraft.com/#sle.
   2. Substitutions: See Section 016000 - Product Requirements.
B. Vertical Piping:
   1. Sleeve Length: 1 inch (25 mm) above finished floor.
   2. Provide sealant for watertight joint.
C. Plastic or Sheet Metal: Pipe passing through interior walls, partitions, and floors, unless steel or brass sleeves are specified below.
D. Clearances:
   1. Provide allowance for insulated piping.
   2. Wall, Floor, Partitions, and Beam Flanges: 1 inch (25 mm) greater than external pipe diameter.
   3. All Rated Openings: Caulked tight with fire stopping material in compliance with ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases.

#### 2.2 PIPE-SLEEVE SEALS
A. Manufacturers:
   1. Advance Products & Systems, LLC; Innerlynx: www.apsonline.com/#sle.
   2. American Polywater Corporation; PGKD Modular Seals: www.polywater-haufftechnik.com/#sle.
   3. Flexicraft Industries; PipeSeal: www.flexicraft.com/#sle.

4. Substitutions: See Section 016000 - Product Requirements.

B. Modular Mechanical Sleeve-Seal:
   1. Elastomer-based interlocking links continuously fill annular space between pipe and wall-sleeve, wall or casing opening.
   2. Watertight seal between pipe and wall-sleeve, wall or casing opening.
   3. Size and select seal component materials in accordance with service requirements.
   4. Glass-reinforced plastic pressure end plates.

C. Sealing Compounds:
   1. Provide packing and sealing compound to fill pipe to sleeve thickness.
   2. Combined packing and seal compound is to match partition fire-resistance hourly rating.

D. Pipe Sleeve Material:
   1. Bearing Walls: Steel, cast iron, or terra-cotta pipe.
   2. Masonry Structures: Sheet metal or fiber.

E. Wall Sleeve: PVC material with waterstop collar, and nailer end-caps.

## PART 3 – EXECUTION

### 3.1 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
B. Remove scale and foreign material, from inside and outside, before assembly.

### 3.2 INSTALLATION

A. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
B. Install piping to conserve building space, to not interfere with use of space and other work.
C. Install piping and pipe sleeves to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
D. Provide sleeves when penetrating footings, floors, walls, and partitions. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.
   1. Aboveground Piping:
      a. Pack solid using mineral fiber in compliance with ASTM C592.
      b. Fill space with an elastomer caulk to a depth of 0.50 inch (15 mm) where penetrations occur between conditioned and unconditioned spaces.
   2. All Rated Openings: Caulk tight with fire stopping material in compliance with ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases.
   3. Caulk exterior wall sleeves watertight with lead and oakum or mechanically expandable chloroprene inserts with mastic-sealed components.
E. Manufactured Sleeve-Seal Systems:
   1. Install manufactured sleeve-seal systems in sleeves located in grade slabs and exterior concrete walls at piping entrances into building.
   2. Provide sealing elements of the size, quantity, and type required for the piping and sleeve inner diameter or penetration diameter.
   3. Locate piping in center of sleeve or penetration.
   4. Install field assembled sleeve-seal system components in annular space between sleeve and piping.
   5. Tighten bolting for a water-tight seal.
   6. Install in accordance with manufacturer's recommendations.
F. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

## 3.3 CLEANING

A. Upon completion of work, clean all parts of the installation.
B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.
C. See Section 017419 - Construction Waste Management and Disposal, for additional requirements.

**END OF SECTION**

## SECTION 230523

## GENERAL-DUTY VALVES FOR HVAC PIPING

### PART 1 – GENERAL

#### 1.1 SECTION INCLUDES
A. Ball valves.

#### 1.2 RELATED REQUIREMENTS
A. Section 230553 - Identification for HVAC Piping and Equipment.
B. Section 230719 - HVAC Piping Insulation.

#### 1.3 ABBREVIATIONS AND ACRONYMS
A. CWP: Cold working pressure.
B. EPDM: Ethylene propylene copolymer rubber.
C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
D. NRS: Nonrising stem.
E. OS&Y: Outside screw and yoke.
F. PTFE: Polytetrafluoroethylene.
G. RS: Rising stem.
H. TFE: Tetrafluoroethylene.
I. WOG: Water, oil, and gas.

#### 1.4 REFERENCE STANDARDS
A. ASME B1.20.1 - Pipe Threads, General Purpose, Inch; 2013 (Reaffirmed 2018).
B. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; 2020.
C. ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard; 2020.
D. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.
E. ASTM A216/A216M - Standard Specification for Steel Castings, Carbon, Suitable for Fusion Welding, for High-Temperature Service; 2021.
F. AWWA C606 - Grooved and Shouldered Joints; 2022.
G. MSS SP-72 - Ball Valves with Flanged or Butt-Welding Ends for General Service; 2010a.
H. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010, with Errata .

#### 1.5 QUALITY ASSURANCE
A. Manufacturer:
   1. Obtain valves for each valve type from single manufacturer.
   2. Company must specialize in manufacturing products specified in this section, with not less than three years of documented experience.

### PART 2 – PRODUCTS

#### 2.1 APPLICATIONS
A. Listed pipe sizes shown using nominal pipe sizes (NPS) and nominal diameter (DN).
B. Provide the following valves for the applications if not indicated on drawings:
   1. Isolation (Shutoff): Ball.

#### 2.2 GENERAL REQUIREMENTS
A. Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.
B. Valve Sizes: Match upstream piping unless otherwise indicated.
C. Valve Actuator Types:
   1. Handwheel: Valves other than quarter-turn types.
D. Valves in Insulated Piping: Provide 2 inch (50 mm, DN) stem extensions and the following features:

1. Ball Valves: Extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.

E. Valve-End Connections:
1. Threaded End Valves: ASME B1.20.1.
2. Flanges on Iron Valves: ASME B16.1 for flanges on iron valves.
3. Pipe Flanges and Flanged Fittings 1/2 inch (15 mm, DN) through 24 inch (600 mm, DN): ASME B16.5.
4. Solder Joint Connections: ASME B16.18.
5. Grooved End Connections: AWWA C606.

## 2.3 BRASS, BALL VALVES

A. One Piece, Full Port with Brass Trim and Push-to-fit or Threaded Connections:
1. Comply with MSS SP-110.
2. CWP Rating: 200 psi (1,379 kPa).
3. Body: Forged brass.
4. Ends: Threaded.
5. Seats: PTFE or TFE.
6. Stem: Brass.
7. Ball: Chrome-plated brass.

## 2.4 BRONZE, BALL VALVES

A. General:
1. Fabricate from dezincification resistant material.
2. Copper alloys containing more than 15 percent zinc are not permitted.

B. One Piece, Reduced Port with Bronze Trim:
1. Comply with MSS SP-110.
2. CWP Rating: 400 psi (2,758 kPa).
3. Ends: Threaded.
4. Seats: PTFE.

## 2.5 STAINLESS STEEL, BALL VALVES

A. One-Piece, Standard Port with Stainless-Steel Trim:
1. Comply with MSS SP-110.
2. WSP Rating: 150 psi (1,035 kPa).
3. CWP Rating: 1,000 psi (6,895 kPa).
4. Seats: PTFE.
5. Stem: Stainless steel, blowout proof.
6. Ball: Stainless steel.

## 2.6 CARBON STEEL, BALL VALVES

A. Class 150, Full Port, Stainless Steel Trim, Flanged:
1. Comply with MSS SP-72.
2. WOG Rating: 300 psi (2,068 kPa).
3. WSP Rating: 150 psi (1,034 kPa).
4. Body: Carbon steel, ASTM A216/A216M, Type WCB.
5. Seats: PTFE.
6. Stem: Stainless steel.
7. Ball: Stainless steel, vented.
8. Size: 1/2 to 12 inches (15 to 300 mm, DN).

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. Discard all packing materials and verify that valve interior, including threads and flanges, are completely clean without signs of damage or degradation that could result in leakage.
B. Verify valve parts to be fully operational in all positions from closed to fully open.
C. Confirm gasket material to be suitable for the service, to be of correct size, and without defects that could compromise effectiveness.
D. Should valve is determined to be defective, replace with new valve.

### 3.2 INSTALLATION

A. Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.
B. Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.

**END OF SECTION**

## SECTION 230529

## HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

### PART 1 – GENERAL

#### 1.1 SECTION INCLUDES
A. Support and attachment components.

#### 1.2 RELATED REQUIREMENTS
A. Section 033000 - Cast-in-Place Concrete: Concrete equipment pads.

#### 1.3 REFERENCE STANDARDS
A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
D. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999, with Editorial Revision (2022).
E. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2023.
F. MFMA-4 - Metal Framing Standards Publication; 2004.

#### 1.4 ADMINISTRATIVE REQUIREMENTS
A. Coordination:
   1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
   2. Coordinate the work with other trades to provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
   4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
   5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
B. Sequencing:
   1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 033000.

#### 1.5 QUALITY ASSURANCE
A. Comply with applicable building code.

### PART 2 – PRODUCTS

#### 2.1 SUPPORT AND ATTACHMENT COMPONENTS
A. General Requirements:
   1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of plumbing work.
   2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
   3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
   4. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
      a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.

b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Prefabricated Trapeze-Framed Metal Strut Systems:
1. Manufacturers:
a. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
2. Strut Channel or Bracket Material:
a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
3. Accessories: Provide bracket covers, cable basket clips, cable tray clips, clamps, conduit clamps, fire-retarding brackets, j-hooks, protectors, and vibration dampeners.

C. Hanger Rods:
1. Threaded zinc-plated steel unless otherwise indicated.
2. Minimum Size, Unless Otherwise Indicated or Required:
a. Equipment Supports: 1/2 inch (13 mm) diameter.
b. Piping up to 1 inch (25 mm, DN): 1/4 inch (6 mm) diameter.
c. Piping larger than 1 inch (25 mm, DN): 3/8 inch (10 mm) diameter.
d. Trapeze Support for Multiple Pipes: 3/8 inch (10 mm) diameter.

D. Pipe Hangers:
1. Split Ring Hangers:
a. Provide hinged split ring and yoke roller hanger with epoxy copper or plain finish.
b. Material: ASTM A47/A47M malleable iron or ASTM A36/A36M carbon steel.
c. Provide hanger rod and nuts of the same type and material for a given pipe run.
d. Provide coated or plated hangers to isolate steel hangers from dissimilar metal tube or pipe.
2. Clevis Hangers, Adjustable:
a. Manufacturers:
1) FNW; 7005: www.fnw.com/#sle.
2) Substitutions: See Section 016000 - Product Requirements.
3) Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.

E. Anchors and Fasteners:
1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
4. Hollow Masonry: Use toggle bolts.
5. Hollow Stud Walls: Use toggle bolts.
6. Steel: Use beam-ceiling clamps, beam clamps, machine bolts, or welded threaded studs.
7. Beam Ceiling Flanges: ASTM A47/A47M Grade 32510, malleable iron or stainless steel with copper, plain, stainless steel, or zinc finish.
8. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
a. Comply with MFMA-4.
b. Channel Material: Use galvanized steel.
c. Manufacturer: Same as manufacturer of metal channel (strut) framing system.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. Verify that field measurements are as indicated.
B. Verify that mounting surfaces are ready to receive support and attachment components.
C. Verify that conditions are satisfactory for installation prior to starting work.

## 3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions.
B. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.
C. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
D. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
E. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
F. Equipment Support and Attachment:
    1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
    2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
    3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
    4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
G. Preset Concrete Inserts: Use manufacturer-provided closure strips to inhibit concrete seepage during concrete pour.
H. Secure fasteners according to manufacturer's recommended torque settings.
I. Remove temporary supports.

## 3.3 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements for additional requirements.
B. Inspect support and attachment components for damage and defects.
C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
D. Correct deficiencies and replace damaged or defective support and attachment components.

**END OF SECTION**

**SECTION 230553**

**IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Nameplates.
B. Tags.
C. Adhesive-backed duct markers.
D. Stencils.
E. Pipe markers.
F. Ceiling tacks.

### 1.2 REFERENCE STANDARDS

## PART 2 – PRODUCTS

### 2.1 IDENTIFICATION APPLICATIONS
A. Air Handling Units: Nameplates.
B. Ductwork: Ductwork markers.
C. Piping: Pipe markers.
D. Pumps: Nameplates.
E. Thermostats: Nameplates.
F. Valves: Tags and ceiling tacks where located above lay-in ceiling.

### 2.2 NAMEPLATES
A. Letter Color: White.
B. Letter Height: 1/4 inch (6 mm).
C. Background Color: Black.

### 2.3 TAGS
A. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch (40 mm) diameter.
B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch (40 mm) diameter with smooth edges.

### 2.4 ADHESIVE-BACKED DUCT MARKERS
A. Material: High gloss acrylic adhesive-backed vinyl film 0.0032 inch (0.76 mm); printed with UV and chemical resistant inks.
B. Style: Individual Label.
C. Color: Blue/White.

### 2.5 STENCILS
A. Stencils: With clean cut symbols and letters of following size:
   1. 3/4 to 1-1/4 inch (20-30 mm) Outside Diameter of Insulation or Pipe: 8 inch (200 mm) long color field, 1/2 inch (15 mm) high letters.
   2. 1-1/2 to 2 inch (40-50 mm) Outside Diameter of Insulation or Pipe: 8 inch (200 mm) long color field, 3/4 inch (20 mm) high letters.
   3. 2-1/2 to 6 inch (65-150 mm) Outside Diameter of Insulation or Pipe: 12 inch (300 mm) long color field, 1-1/4 inch (30 mm) high letters.

### 2.6 PIPE MARKERS
A. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
B. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure-sensitive adhesive backing and printed markings.

C. Color code as follows:
   1. Heating, Cooling, and Boiler Feedwater: Green with white letters.

**2.7 CEILING TACKS**

A. Description: Steel with 3/4 inch (20 mm) diameter color coded head.
B. Color code as follows:
   1. HVAC Equipment: Yellow.
   2. Fire Dampers and Smoke Dampers: Red.

## PART 3 – EXECUTION

**3.1 PREPARATION**

A. Degrease and clean surfaces to receive adhesive for identification materials.

**3.2 INSTALLATION**

A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
B. Install plastic pipe markers in accordance with manufacturer's instructions.
C. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
D. Use tags on piping 3/4 inch (20 mm) diameter and smaller.
E. Identify service and flow direction.
F. Install in clear view and align with axis of piping.
G. Install ductwork with Ductwork markers. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.
H. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

**END OF SECTION**

## SECTION 230593

## TESTING, ADJUSTING, AND BALANCING FOR HVAC

### PART 1 – GENERAL

#### 1.1 SECTION INCLUDES

A. Testing, adjustment, and balancing of air systems.

#### 1.2 REFERENCE STANDARDS

A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition; 2016.
B. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems; 2008, with Errata (2019).
C. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing; 2002.

### PART 2 – PRODUCTS - NOT USED

### PART 3 – EXECUTION

#### 3.1 GENERAL REQUIREMENTS

A. Perform total system balance in accordance with one of the following:
   1. AABC (NSTSB), AABC National Standards for Total System Balance.
   2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.
   3. SMACNA (TAB).
B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.
C. TAB Agency Qualifications:
   1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
   2. Having minimum of three years documented experience.

#### 3.2 EXAMINATION

A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
   1. Systems are started and operating in a safe and normal condition.
   2. Temperature control systems are installed complete and operable.
   3. Proper thermal overload protection is in place for electrical equipment.
   4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
   5. Duct systems are clean of debris.
   6. Fans are rotating correctly.
   7. Fire and volume dampers are in place and open.
   8. Air outlets are installed and connected.
   9. Duct system leakage is minimized.

#### 3.3 ADJUSTMENT TOLERANCES

A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.
B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

## 3.4 RECORDING AND ADJUSTING

A. Ensure recorded data represents actual measured or observed conditions.
B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
C. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

## 3.5 AIR SYSTEM PROCEDURE

A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.
B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
C. Measure air quantities at air inlets and outlets.
D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
E. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.
F. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
G. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.
H. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches (12.5 Pa) positive static pressure near the building entries.

## 3.6 SCOPE

A. Test, adjust, and balance the following:
    1. Direct Fired Furnaces.
    2. Packaged Roof Top Heating/Cooling Units.
    3. Air Handling Units.
    4. Air Terminal Units.
    5. Air Inlets and Outlets.

## 3.7 MINIMUM DATA TO BE REPORTED

A. Air Distribution Tests:
    1. Air terminal number.
    2. Room number/location.
    3. Terminal type.
    4. Design air flow.
    5. Test (final) air flow.
    6. Percent of design air flow.

**END OF SECTION**

# SECTION 230713

# DUCT INSULATION

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Duct insulation.

### 1.2 RELATED REQUIREMENTS
A. Section 230553 - Identification for HVAC Piping and Equipment.
B. Section 233100 - HVAC Ducts and Casings: Glass fiber ducts.

### 1.3 REFERENCE STANDARDS
A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.
B. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013 (Reapproved 2019).
C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023b.
D. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

### 1.4 QUALITY ASSURANCE

## PART 2 – PRODUCTS

### 2.1 REGULATORY REQUIREMENTS
A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

### 2.2 GLASS FIBER, FLEXIBLE
A. Manufacturer:
   1. CertainTeed Corporation; _____: www.certainteed.com/#sle.
   2. Johns Manville; _____: www.jm.com/#sle.
   3. JP Lamborn Co; Thermal Sleeve MT: www.jpflex.com/#sle.
   4. Knauf Insulation; Atmosphere Duct Wrap: www.knaufinsulation.com/#sle.
   5. Owens Corning Corporation; _____: www.ocbuildingspec.com/#sle.
   6. Substitutions: See Section 016000 - Product Requirements.
B. Insulation: ASTM C553; flexible, noncombustible blanket.
   1. K (Ksi) value: 0.36 at 75 degrees F (0.052 at 24 degrees C), when tested in accordance with ASTM C518.

## PART 3 – EXECUTION

### 3.1 EXAMINATION
A. Test ductwork for design pressure prior to applying insulation materials.
B. Verify that surfaces are clean, foreign material removed, and dry.

### 3.2 INSTALLATION
A. Install in accordance with manufacturer's instructions.
B. Install in accordance with NAIMA National Insulation Standards.
C. Insulated Ducts Conveying Air Below Ambient Temperature:
   1. Provide insulation with vapor barrier jackets.
   2. Finish with tape and vapor barrier jacket.

D. External Duct Insulation Application:
   1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
   2. Secure insulation without vapor barrier with staples, tape, or wires.
   3. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
   4. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.

**END OF SECTION**

## SECTION 230913

## INSTRUMENTATION AND CONTROL DEVICES FOR HVAC

### PART 1 – GENERAL

#### 1.1 SECTION INCLUDES
A. Dampers.
B. Damper Operators:
   1. Electric operators.
   2. Inlet vane operators.
C. Thermostats:
   1. Electric thermostats.
D. Time switches.
E. Pipe-Mounted Sensors and Transmitters:
   1. Fuel-gas flow meters.

#### 1.2 RELATED REQUIREMENTS
A. Section 233300 - Air Duct Accessories.
B. Section 253513 - Integrated Automation Actuators and Operators.
C. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.
D. Section 262726 - Wiring Devices: Elevation of exposed components.

#### 1.3 REFERENCE STANDARDS
A. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.
B. NEMA DC 3 - Residential Controls - Electrical Wall-Mounted Room Thermostats; 2013.
C. UL 916 - Energy Management Equipment; Current Edition, Including All Revisions.
D. UL 917 - Clock-Operated Switches; Current Edition, Including All Revisions.

#### 1.4 WARRANTY
A. See Section 017700 - Closeout Submittals for additional warranty requirements.
B. Correct defective work within a five year period after Substantial Completion.

### PART 2 – PRODUCTS

#### 2.1 EQUIPMENT – GENERAL
A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

#### 2.2 DAMPERS
A. See Section 233300 for dampers and this section for actuators and operators.

#### 2.3 DAMPER OPERATORS
A. General:
   1. Provide actuators with torque capacity sized for minimum of 20 percent greater than maximum design stream velocity and hold tight seal against maximum system pressures.
   2. Provide spring return for two position control and for fail safe operation.
   3. Provide sufficient number of operators to achieve unrestricted movement throughout damper range.
   4. Provide one operator for maximum 36 sq ft (3.24 sq m) damper section.
   5. See Section 253513 for field-mount damper actuators and operators.
B. Electric Operators:
C. Inlet Vane Operators:
   1. High pressure with pilot positioners and sufficient force to move vanes when fan is started with vanes in closed position. Return vane operator to closed position on fan shutdown.

## 2.4 THERMOSTATS

A. Electric Thermostats:
   1. Manufacturers:
      a. Honeywell International, Inc; _____: buildingcontrols.honeywell.com/#sle.
      b. Johnson Controls International, PLC; _____: www.johnsoncontrols.com/#sle.
      c. Siemens Industry, Inc; _____: www.siemens.com/#sle.
   2. Type: NEMA DC 3, 24 volts, with setback/setup temperature control.
   3. Service: Cooling and heating.
   4. Covers: Locking with set point adjustment, with thermometer.

## 2.5 TIME SWITCHES

A. Digital Electronic Time Switches:
   1. Description: Factory-assembled, solid-state programmable controller with LCD display, listed and labeled as complying with UL 916 or UL 917.
   2. Program Capability:
      a. 7-Day Time Switches: Single channel, capable of different schedule for each day of the week with additional holiday schedule available to override normal schedule for selected days.
   3. Schedule Capacity: Not less than 8 programmable on/off operations.
   4. Provide automatic daylight savings time and leap year compensation.
   5. Provide power outage backup to retain programming and maintain clock.
   6. Manual Override: Capable of overriding current schedule both permanently and temporarily until next scheduled event.
   7. Input Supply Voltage: As indicated on the drawings.
   8. Provide lockable enclosure; environmental type complying with NEMA 250 as specified for the following installation locations:

## 2.6 PIPE-MOUNTED SENSORS AND TRANSMITTERS

A. Fuel-Gas Flow Meters:
   1. Furnish positive displacement meter for metering up to 2,500 Std cfh (19.7 L/sec) natural or propane gas supply rated for scheduled flow rate at service pressure and temperature.
   2. Minimum Turndown Ratio: 10 to 1 with plus/minus 1 percent actual flow accuracy.
   3. Provide meter index with direct reading mechanical totalizing register and impulse dry contact output for remote monitoring.
   4. Output: Pulse with minimum resolution of 100 cu ft (3 cu m) per pulse without exceeding 15 pulses per sec at design flow. Field adjustment or calibration not required.

# PART 3 – EXECUTION

## 3.1 EXAMINATION

A. Sequence work to ensure installation of components is complementary to installation of similar components in other systems.
B. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.

## 3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Check and verify location of thermostats with plans and room details before installation. Locate 60 inches (1500 mm) above floor. Align with lighting switches and humidistats; see Section 262726.
C. Provide conduit and electrical wiring in accordance with Section 260583. Electrical material and installation shall be in accordance with appropriate requirements of Division 26.

**END OF SECTION**

## SECTION 231123

## FACILITY NATURAL-GAS PIPING

### PART 1 – GENERAL

#### 1.1 SECTION INCLUDES

A. Pipe, pipe fittings, valves, and connections for natural gas piping systems.

#### 1.2 RELATED REQUIREMENTS

A. Section 083100 - Access Doors and Panels.
B. Section 335216 - Gas Hydrocarbon Piping.

#### 1.3 REFERENCE STANDARDS

A. ANSI Z223.1 - National Fuel Gas Code; 2021.
B. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators; 2023.
C. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2021.
D. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.
E. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2021.
F. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes; 2018.
G. ASME B31.1 - Power Piping; 2022.
H. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999, with Editorial Revision (2022).
I. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.
J. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2023a.
K. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2022.
L. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2020.
M. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2019.
N. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; 2018.
O. AWWA C606 - Grooved and Shouldered Joints; 2022.
P. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements; 2018, with Editorial Revision (2020).
Q. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry; 2018, with Editorial Revision (2020).
R. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2017, with Editorial Revision (2020).
S. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements; 2023.
T. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010, with Errata .

#### 1.4 QUALITY ASSURANCE

A. Perform work in accordance with applicable codes.
B. Valves: Manufacturer's name and pressure rating marked on valve body.
C. Welding Materials and Procedures: Comply with ASME BPVC-IX and applicable state labor regulations.

#### 1.5 FIELD CONDITIONS

A. Do not install underground piping when bedding is wet or frozen.

## PART 2 – PRODUCTS

### 2.1 NATURAL GAS PIPING, BURIED WITHIN 5 FEET (1500 MM) OF BUILDING

A. Steel Pipe: ASTM A53/A53M, Grade B, Type F, Schedule 40 black.
   1. Fittings: ASTM A234/A234M, wrought steel welding type.
   2. Joints: ANSI Z223.1, welded.
   3. Jacket: AWWA C105/A21.5 polyethylene jacket or double layer, half-lapped 10 mil (0.25 mm) polyethylene tape.

B. Copper Tubing: Listed, ASTM B88 (ASTM B88M), Type K (A), annealed.
   1. Fittings: ASME B16.18, cast copper or ASME B16.22, wrought copper.
   2. Joints: Compression connection or AWS A5.8M/A5.8, BCuP silver braze.
   3. Mechanical Press Sealed Fittings: Double-pressed type and approved or certified, utilizing EPDM, nontoxic, synthetic rubber sealing elements.

### 2.2 NATURAL GAS PIPING, ABOVE GRADE

A. Steel Pipe: ASTM A53/A53M, Grade B, Type F, Schedule 40 black.
   1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought steel welding type.
   2. Joints: Threaded or welded to ASME B31.1.

B. Copper Tube: ASTM B88 (ASTM B88M), Type K (A) or L (B) annealed.
   1. Fittings: ASME B16.26, cast bronze.
   2. Joints: Flared.

### 2.3 FLANGES, UNIONS, AND COUPLINGS

A. Unions for Pipe Sizes 3 Inches (80 mm) and Under:
   1. Ferrous Pipe: Class 150 malleable iron threaded unions.
   2. Copper Tube and Pipe: Class 150 bronze unions with soldered joints.

B. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to secure and compress gasket.
   1. Dimensions and Testing: In accordance with AWWA C606.
   2. Housing Material: Provide ASTM A47/A47M malleable iron, ductile iron, or _____, galvanized.
   3. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.
   4. When pipe is field grooved, provide coupling manufacturer's grooving tools.

### 2.4 PIPE HANGERS AND SUPPORTS

A. Provide hangers and supports that comply with MSS SP-58.
   1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
   2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
   3. Trapeze Hangers: Welded steel channel frames attached to structure.
   4. Vertical Pipe Support: Steel riser clamp.

B. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
   1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
   2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
   3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
   4. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
   5. Concrete Adhesive Type Anchors: Complying with ICC-ES AC308.
   6. Other Types: As required.

### 2.5 BALL VALVES

A. Manufacturers:
   1. Apollo Valves; _____: www.apollovalves.com/#sle.
   2. Grinnell Products; _____: www.grinnell.com/#sle.

3. Milwaukee Valve Company; _____: www.milwaukeevalve.com/#sle.
4. Nibco, Inc; _____: www.nibco.com/#sle.
5. Substitutions: See Section 016000 - Product Requirements.

B. Construction, 4 Inches (100 mm) and Smaller: MSS SP-110, Class 150, 400 psi (2760 kPa) CWP, bronze or ductile iron body, 304 stainless steel or chrome plated brass ball, regular port, Teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, solder, threaded, or grooved ends with union.

## 2.6 LINE PRESSURE REGULATORS AND APPLIANCE REGULATORS INDICATORS

A. Manufacturers:
1. Actaris Metering Systems (A brand of ITT Controls); _____: www.actaris-metering-systems.com/#sle.
2. Dungs Combustion Controls; _____: www.dungs.com/#sle.
3. Maxitrol Company; _____: www.maxitrol.com/#sle.
4. Substitutions: See Section 016000 - Product Requirements.

B. Materials in Contact With Gas:
C. Maximum Inlet Operating Pressure: 5 psi (34.5 kPa).
D. Output Pressure Range: 1 inch wc (2.5 mbar) to 80 inch wc (200 mbar).

# PART 3 – EXECUTION

## 3.1 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
B. Remove scale and dirt, on inside and outside, before assembly.
C. Prepare piping connections to equipment with flanges or unions.

## 3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
C. Install piping to maintain headroom, conserve space, and not interfere with use of space.
D. Group piping whenever practical at common elevations.
E. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
F. Provide access where valves and fittings are not exposed.
1. Coordinate size and location of access doors with Section 083100.

G. Provide support for utility meters in accordance with requirements of utility companies.
H. Sleeve pipes passing through partitions, walls and floors.
I. Pipe Hangers and Supports:
1. Support horizontal piping as indicated.
2. Install hangers to provide minimum 1/2 inch (15 mm) space between finished covering and adjacent work.
3. Place hangers within 12 inches (300 mm) of each horizontal elbow.
4. Use hangers with 1-1/2 inch (40 mm) minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

## 3.3 APPLICATION

A. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.

## 3.4 SERVICE CONNECTIONS

A. Provide new gas service complete with gas meter and regulators in accordance with Section 335216. Gas service distribution piping to have initial minimum pressure of 7 inch wg (1.75 kPa).

**END OF SECTION**

**SECTION 232300**

**REFRIGERANT PIPING**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Piping.
B. Refrigerant.
C. Moisture and liquid indicators.
D. Valves.
E. Strainers.
F. Filter-driers.

### 1.2 REFERENCE STANDARDS

A. AHRI 710 (I-P) - Performance Rating of Liquid-Line Driers; 2009.
B. AHRI 711 (SI) - Performance Rating of Liquid-Line Driers; 2009.
C. ASHRAE Std 34 - Designation and Safety Classification of Refrigerants; 2022, with Errata (2023).
D. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2021.
E. ASME B31.9 - Building Services Piping; 2020.
F. ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service; 2020.
G. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2019.

## PART 2 – PRODUCTS

### 2.1 SYSTEM DESCRIPTION

A. Where more than one piping system material is specified ensure system components are compatible and joined to ensure integrity of system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.
B. Liquid Indicators:
   1. Use line size liquid indicators in main liquid line leaving condenser.
   2. If receiver is provided, install in liquid line leaving receiver.
C. Strainers:
D. Filter-Driers:
   1. Use a filter-drier immediately ahead of liquid-line controls, such as thermostatic expansion valves, solenoid valves, and moisture indicators.

### 2.2 REGULATORY REQUIREMENTS

A. Comply with ASME B31.9 for installation of piping system.
B. Products Requiring Electrical Connection: Listed and classified by UL, as suitable for the purpose indicated.

### 2.3 PIPING

A. Copper Tube: ASTM B280, H58 hard drawn or O60 soft annealed.
   1. Fittings: ASME B16.22 wrought copper.
   2. Joints: Braze, AWS A5.8M/A5.8 BCuP silver/phosphorus/copper alloy.

### 2.4 REFRIGERANT

A. Refrigerant: Use only refrigerants that have ozone depletion potential (ODP) of zero and global warming potential (GWP) of less than 50.
B. Refrigerant: R-134a, tetrafluoroethane as defined in ASHRAE Std 34.

## 2.5 MOISTURE AND LIQUID INDICATORS

A. Indicators: Single port type, UL listed, with copper or brass body, flared or soldered ends, sight glass, color coded paper moisture indicator with removable element cartridge and plastic cap; for maximum temperature of 200 degrees F (93 degrees C) and maximum working pressure of 500 psi (3450 kPa).

## 2.6 STRAINERS

A. Manufacturers:
   1. Hansen Technologies Corporation; _____: www.hantech.com/#sle.
   2. Parker Hannifin - Sporlan Division; _____: www.parker.com/#sle.
   3. Substitutions: See Section 016000 - Product Requirements.
B. Straight Line or Angle Line Type:
   1. Brass or steel shell, steel cap and flange, and replaceable cartridge, with screen of stainless steel wire or monel reinforced with brass; for maximum working pressure of 430 psi (2960 kPa).

## 2.7 FILTER-DRIERS

A. Manufacturers:
   1. Flow Controls Division of Emerson Electric; _____: www.emersonflowcontrols.com/#sle.
   2. Parker Hannifin - Sporlan Division; Catch-All; _____: www.parker.com/#sle.
   3. Substitutions: See Section 016000 - Product Requirements.
B. Performance:
   1. Flow Capacity - Liquid Line: ____ ton (____ kW), minimum, rated in accordance with AHRI 710 (I-P) (AHRI 711 (SI)).
   2. Pressure Drop: 2 psi (14 kPa), maximum, when operating at full connected evaporator capacity.
   3. Design Working Pressure: 350 psi (2410 kPa), minimum.
C. Cores: Molded or loose-fill molecular sieve desiccant compatible with refrigerant, activated alumina, activated charcoal, and filtration to 40 microns, with secondary filtration to 20 microns; of construction that will not pass into refrigerant lines.
D. Construction: UL listed.
   1. Connections: As specified for applicable pipe type.

# PART 3 – EXECUTION

## 3.1 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain-end ferrous pipe.
B. Remove scale and dirt on inside and outside before assembly.
C. Prepare piping connections to equipment with flanges or unions.

## 3.2 INSTALLATION

A. Install refrigeration specialties in accordance with manufacturer's instructions.
B. Route piping in orderly manner, with plumbing parallel to building structure, and maintain gradient.
C. Install piping to conserve building space and avoid interference with use of space.
D. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
E. Provide clearance for installation of insulation and access to valves and fittings.

**END OF SECTION**

**SECTION 233100**

**HVAC DUCTS AND CASINGS**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Metal ducts.
B. Flexible ducts.
C. Ducts for kitchen exhaust applications.

### 1.2 RELATED REQUIREMENTS

A. Section 114000 - Foodservice Equipment: Kitchen range hoods.
B. Section 230130.51 - HVAC Air-Distribution System Cleaning: Post install duct cleaning.
C. Section 230713 - Duct Insulation: External insulation and duct liner.
D. Section 233300 - Air Duct Accessories.
E. Section 233319 - Duct Silencers.
F. Section 233600 - Air Terminal Units.
G. Section 233700 - Air Outlets and Inlets: Fabric air distribution devices.

### 1.3 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023b.
D. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements; 2018, with Editorial Revision (2020).
E. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry; 2018, with Editorial Revision (2020).
F. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2017, with Editorial Revision (2020).
G. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements; 2023.
H. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.
I. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2024.
J. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.
K. SMACNA (FGD) - Fibrous Glass Duct Construction Standards; 2021.
L. SMACNA (KVS) - Kitchen Ventilation Systems and Food Service Equipment Fabrication and Installation Guidelines; 2001.
M. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; Current Edition, Including All Revisions.
N. UL 1978 - Grease Ducts; Current Edition, Including All Revisions.
O. UL 2221 - Tests of Fire Resistive Grease Duct Enclosure Assemblies; Current Edition, Including All Revisions.

## PART 2 – PRODUCTS

### 2.1 GENERAL REQUIREMENTS

A. Provide UL Class 1 ductwork, fittings, hangers, supports, and appurtenances in accordance with NFPA 90A and SMACNA (DCS) guidelines unless stated otherwise.
B. Provide metal duct unless otherwise indicated. Fibrous glass duct can be substituted at the Contractor's option.
C. Acoustical Treatment: Provide sound-absorbing liners and sectional silencers for metal-based ducts in compliance with Section 233319.
D. Duct Shape and Material in accordance with Allowed Static Pressure Range:
   1. Round: Plus or minus 2 in-wc (500 Pa) of galvanized steel.

2. Rectangular: Plus or minus 1/2 in-wc (125 Pa) of galvanized steel.
3. Flexible Duct (Fabric and wire): Plus or minus 1/2 in-wc (125 Pa); see Section 233700.

E. Duct Sealing and Leakage in accordance with Static Pressure Class:
1. Duct Pressure Class and Material for Common Mechanical Ventilation Applications:
a. Supply Air: 1/2 in-wc (125 Pa) pressure class, galvanized steel.
b. Outside Air Intake: 1/2 in-wc (125 Pa) pressure class, galvanized steel.
c. Return and Relief Air: 1/2 in-wc (125 Pa) pressure class, galvanized steel.
d. General Exhaust Air: 1/2 in-wc (125 Pa) pressure class, galvanized steel.

F. Duct Fabrication Requirements:
1. Duct and Fitting Fabrication and Support: SMACNA (DCS) including specifics for continuously welded round and oval duct fittings.
2. Use reinforced and sealed sheet-metal materials at recommended gauges for indicated operating pressures or pressure class.
3. Construct tees, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide airfoil turning vanes of perforated metal with glass fiber insulation.
4. Provide turning vanes of perforated metal with glass fiber insulation when acoustical lining is indicated.
5. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
6. Provide turning vanes of perforated metal with glass fiber insulation when an acoustical lining is required.
7. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.

## 2.2 METAL DUCTS

A. Material Requirements:
1. Galvanized Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.

B. Rectangular Metal Duct:
1. Rectangular Double Wall Insulated: Rectangular spiral lock seam duct with galvanized steel outer wall, perforated galvanized steel inner wall; fitting with the solid inner wall.
a. Insulation:
1) Thickness: 1 inch (25 mm).
2) Material: Air.

C. Round Metal Ducts:
1. Round Single Wall Duct: Round lock seam duct with galvanized steel outer wall.
a. Manufacturers:
1) EHG, a DMI Company; _____: www.ehgduct.com/#sle.
2) Elgen Manufacturing Company, Inc; Snap Lock Pipes and Fittings: www.elgenmfg.com/#sle.
3) Linx Industries, Inc, a DMI Company; _____: www.li-hvac.com/#sle.
4) MKT Metal Manufacturing; _____: www.mktduct.com/#sle.
5) Nordfab Ducting; _____: www.nordfab.com/#sle.
6) Substitutions: See Section 016000 - Product Requirements.
2. Round Connection System: Interlocking duct connection system in accordance with SMACNA (DCS).

D. Round Spiral Duct:
1. Round spiral lock seam duct with galvanized steel outer wall.
2. Manufacturers:
a. EHG, a DMI Company; _____: www.ehgduct.com/#sle.
b. Elgen Manufacturing Company, Inc; _____: www.elgenmfg.com/#sle.
c. GSI, a DMI Company; _____: www.greenseamind.com/#sle.

d. Linx Industries, Inc, a DMI Company; _____: www.li-hvac.com/#sle.
e. MKT Metal Manufacturing; _____: www.mktduct.com/#sle.
f. Substitutions: See Section 016000 - Product Requirements.

E. Connectors, Fittings, Sealants, and Miscellaneous:
1. Fittings: Manufacture with solid inner wall of perforated galvanized steel.
2. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
a. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
b. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.
3. Gasket Tape:
a. Provide butyl rubber gasket tape for a flexible seal between transfer duct connector (TDC), transverse duct flange (TDF), applied flange connections, and angle ring connections.
4. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.
5. Hanger Fasteners: Attach hangers to structure using appropriate fasteners as follows:
a. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
b. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
c. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
d. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
e. Concrete Adhesive Type Anchors: Complying with ICC-ES AC308.
f. Other Types: As required.

## 2.3 FLEXIBLE DUCTS

A. Flexible Air Ducts:
1. UL 181, Class 1, aluminum laminate and polyester film with latex adhesive supported by helically wound spring steel wire.
2. Pressure Rating: From 10 in-wc (2.5 kPa) to 1 in-wc (250 Pa) negative.
3. Temperature Range: Minus 20 to 210 degrees F (Minus 28 to 99 degrees C).

## 2.4 DUCTS FOR KITCHEN EXHAUST APPLICATIONS

A. Provide ductwork, fittings, and appurtenances in accordance with NFPA 96, SMACNA (KVS), UL 1978, and UL 2221 requirements and guidelines.
B. Class 1 duct for air with gas and grease particle exhaust at an air velocity of 1,500 to 2,500 fpm (7.6 to 12.7 m/s).
C. Where ducts are not self-draining back to equipment, provide low-point drain pocket with the copper drain pipe to a sanitary sewer.
D. Design, fabricate, and install liquidtight preventing exhaust leakage into building.
E. Kitchen Hood and Grease Exhaust Duct:
1. Fabricate in accordance with ductwork manufacturer's instructions, SMACNA (DCS), SMACNA (KVS), and NFPA 96.
2. Round, Single-Wall, Premanufactured Grease Exhaust Duct:
a. UL Listed and labeled to UL 1978.
b. Construct of 20-gauge, 0.035-inch (0.95 mm) Type 304 stainless steel.
c. Seal joints during installation with factory-supplied overlapping V-bands and sealant.
d. Minimum horizontal slope of 1/16 inch per foot (0.52 cm per m) per manufacturers listing to UL 1978.
3. Rectangular, Single-Wall, Premanufactured Grease Exhaust Duct:
a. UL Listed and labeled to UL 1978.
b. Construct of 16-gauge, 0.059-inch (1.52 mm) sheet steel using continuous external welded joints in rectangular sections.
c. Construct of 18-gauge, 0.050-inch (1.27 mm) stainless steel using continuous external welded joints in rectangular sections.

4. Grease Exhaust Duct Access Doors:
   a. Listed when tested in accordance with UL 1978.
   b. Install hinged access doors where indicated or required for access for cleaning and inspection of duct.
   c. Reinforce door frames with steel angles tied to horizontal and vertical plenum supporting angles.
   d. Size: 12 by 12 inches (300 by 300 mm).

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. Install, support, and seal ducts in accordance with SMACNA (DCS).
B. Install products following the manufacturer's instructions.
C. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
D. Fibrous Glass Ducts: Install in accordance with SMACNA (FGD). Obtain manufacturer's inspection and acceptance of fabrication and installation at beginning of installation.
E. Flexible Ducts: Connect to metal ducts with mechanical fastener.
F. Kitchen Range Hoods: Install when provided by Section 114000 then fit-out with respective ductwork and accessories to interconnect exhaust system.
G. Kitchen Hood Exhaust: Provide residue traps at the base of vertical risers with provisions for the cleanout.
H. Duct sizes indicated are precise inside dimensions. For lined ducts, maintain sizes inside lining.
I. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
J. Connect diffusers or light troffer boots to low-pressure ducts directly or with 5 feet (1.5 m) maximum length of flexible duct held in place with strap or clamp.
K. At exterior wall louvers, seal duct to louver frame and install blank-out panels.
L. Louver Fit-out:
   1. Provide blank-out panels sealing available area of wall-mounted exterior-faced louver when connected ductwork is smaller than actual louver free area, and duct outlet is smaller than the louver frame.
   2. Use the same duct material painted black on the exterior side, then seal louver frame and duct.
M. Duct Accessories, Terminal Units, Inlets, and Outlets: Interconnect as indicated in Sections 233300, 233600, and 233700.
N. Duct Insulation: Provide duct insulation. See Section 230713.

### 3.2 CLEANING

A. Clean thoroughly each duct system. See Section 230130.51.

**END OF SECTION**

## SECTION 233300

## AIR DUCT ACCESSORIES

### PART 1 – GENERAL

#### 1.1 SECTION INCLUDES
A. Backdraft dampers - metal.
B. Backdraft dampers - fabric.
C. Flexible duct connectors.
D. Volume control dampers.
E. Miscellaneous Products:
   1. Damper operators.

#### 1.2 RELATED REQUIREMENTS
A. Section 233100 - HVAC Ducts and Casings.

#### 1.3 REFERENCE STANDARDS
A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.
B. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

### PART 2 – PRODUCTS

#### 2.1 BACKDRAFT DAMPERS - METAL

#### 2.2 BACKDRAFT DAMPERS – FABRIC
A. Fabric Backdraft Dampers: Factory-fabricated.
   1. Blades: Neoprene coated fabric material.
   2. Birdscreen: 1/2 inch (12 mm) nominal mesh of galvanized steel or aluminum.
   3. Maximum Velocity: 1000 fpm (5 mps) face velocity.

#### 2.3 FLEXIBLE DUCT CONNECTORS
A. Fabricate in accordance with SMACNA (DCS) and as indicated.
B. Flexible Duct Connections: Fabric crimped into metal edging strip.

#### 2.4 VOLUME CONTROL DAMPERS
A. Manufacturers:
   1. AireTechnologies, Inc, a DMI Company; _____: www.airetechnologies.com/#sle.
   2. Louvers & Dampers, Inc, a brand of Mestek, Inc; _____: www.louvers-dampers.com/#sle.
   3. Elgen Manufacturing Company, Inc; _____: www.elgenmfg.com/#sle.
   4. MKT Metal Manufacturing; _____: www.mktduct.com/#sle.
   5. Nailor Industries, Inc; _____: www.nailor.com/#sle.
   6. NCA, a brand of Metal Industries Inc; _____: www.ncamfg.com/#sle.
   7. Ruskin Company; _____: www.ruskin.com/#sle.
   8. United Enertech; _____: www.unitedenertech.com/#sle.
   9. Substitutions: See Section 016000 - Product Requirements.
B. Fabricate in accordance with SMACNA (DCS) and as indicated.
C. Single Blade Dampers:
   1. Fabricate for duct sizes up to 6 by 30 inch (150 by 760 mm).
   2. Blade: 24 gauge, 0.0239 inch (0.61 mm), minimum.
D. Multi-Blade Damper: Fabricate consisting of opposed blades with maximum blade sizes 8 by 72 inches (200 by 1825 mm). Assemble center- and edge-crimped blades in prime-coated or galvanized-channel frame with suitable hardware.
   1. Blade: 18 gauge, 0.0478 inch (1.21 mm), minimum.

## PART 3 – EXECUTION

### 3.1 PREPARATION

A. Verify that electric power is available and of the correct characteristics.

### 3.2 INSTALLATION

A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). See Section 233100 for duct construction and pressure class.
B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.
C. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.
D. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum two duct widths from duct take-off.
E. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

**END OF SECTION**

## SECTION 233416

## CENTRIFUGAL HVAC FANS

### PART 1 – GENERAL

#### 1.1 SECTION INCLUDES
A. Backward inclined centrifugal fans.

#### 1.2 SUBMITTALS
A. See Section 013300 - Administrative Requirements for submittal procedures.
B. Product Data: Provide data on centrifugal fans and accessories including fan curves with specified operating point plotted, power, rpm, sound power levels for both fan inlet and outlet at rated capacity, and electrical characteristics and connection requirements.

#### 1.3 FIELD CONDITIONS
A. Permanent fans may not be used for ventilation during construction.

### PART 2 – PRODUCTS – NOT USED

### PART 3 – EXECUTION

#### 3.1 INSTALLATION
A. Install in accordance with manufacturer's instructions.
B. Install flexible connections between fan inlet and discharge ductwork; see Section 233300. Ensure metal bands of connectors are parallel with minimum one inch (25 mm) flex between ductwork and fan while running.
C. Provide backdraft dampers on exhaust fans located at discharge side; see Section 233300.

**END OF SECTION**

## SECTION 233700

## AIR OUTLETS AND INLETS

### PART 1 – GENERAL

#### 1.1 SECTION INCLUDES

A. Diffusers:
   1. Perforated ceiling diffusers.
B. Rectangular ceiling diffusers.
C. Registers/grilles:
   1. Ceiling-mounted, egg crate exhaust and return register/grilles.
   2. Ceiling-mounted, exhaust and return register/grilles.
   3. Ceiling-mounted, supply register/grilles.
   4. Wall-mounted, supply register/grilles.
   5. Wall-mounted, exhaust and return register/grilles.
D. Door grilles.
E. Louvers:
F. Goosenecks.

#### 1.2 RELATED REQUIREMENTS

A. Section 099100 - Interior Painting: Painting of ducts visible behind outlets and inlets.

#### 1.3 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023b.
B. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.
C. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2021.
D. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.
E. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.
F. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.
G. UL 2518 - Standard for Safety Air Dispersion Systems; Current Edition, Including All Revisions.

#### 1.4 SUBMITTALS

A. See Section 013300 - Administrative Requirements for submittal procedures.
B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

### PART 2 – PRODUCTS

#### 2.1 MANUFACTURERS

A. Metalaire, a brand of Metal Industries Inc; _____: www.metalaire.com/#sle.
B. Price Industries; _____: www.price-hvac.com/#sle.
C. Ruskin Company; _____: www.ruskin.com/#sle.
D. Titus, a brand of Air Distribution Technologies; _____: www.titus-hvac.com/#sle.
E. Greenheck: www.greenheck.com/#sle.
F. Substitutions: See Section 016000 - Product Requirements.

#### 2.2 RECTANGULAR CEILING DIFFUSERS

A. Type: Provide 24x24 square lay-in ceiling diffusers constructed to maintain 360 degree discharge air pattern.
B. Connections: Round.
C. Fabrication: Aluminum with selected finish as specified by architect.
D. Color: As selected by Architect from manufacturer's standard range.

## 2.3 PERFORATED FACE CEILING DIFFUSERS

A. Type: Perforated face with fully adjustable pattern and removable face.
B. Fabrication: Steel with aluminum frame.
C. Color: As selected by Architect from manufacturer's standard range.

## 2.4 CEILING SUPPLY REGISTERS/GRILLES

A. Type: Streamlined adjustable blades to discharge air along face of grille, one-way deflection.
B. Construction: Made of stainless steel.
C. Color: As selected by Architect from manufacturer's standard range.
D. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face.

## 2.5 CEILING EXHAUST AND RETURN REGISTERS/GRILLES

A. Type: Streamlined blades, 1 inch (25 mm) minimum depth, 1 inch (25 mm) maximum spacing, with blades set at 45 degrees, horizontal face.
B. Fabrication: Stainless steel with 20 gauge, 0.0359 inch (0.91 mm) minimum frames and 22 gauge, 0.0299 inch (0.76 mm) minimum blades, steel and aluminum with 20 gauge, 0.0359 inch (0.91 mm) minimum frame.
C. Color: To be selected by Architect from manufacturer's standard range.
D. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face where not individually connected to exhaust fans.

## 2.6 CEILING EGG CRATE EXHAUST AND RETURN GRILLES

A. Type: Egg crate style face consisting of 1/2 by 1/2 by 1/2 inch (13 by 13 by 13 mm) grid core.
B. Fabrication: Grid core consists of aluminum with mill aluminum finish.
C. Color: To be selected by Architect from manufacturer's standard range.
D. Accessories: Provide integral gang and face operated opposed blade damper.

## 2.7 WALL SUPPLY REGISTERS/GRILLES

A. Type: Streamlined and individually adjustable blades, 3/4 inch (19 mm) minimum depth, 3/4 inch (19 mm) maximum spacing with spring or other device to set blades, vertical face, single deflection.
B. Fabrication: Steel with 20 gauge, 0.0359 inch (0.91 mm) minimum frames and 22 gauge, 0.0299 inch (0.76 mm) minimum blades, steel and aluminum with 20 gauge, 0.0359 inch (0.91 mm) minimum frame, or aluminum extrusions, with factory baked enamel finish.
C. Color: To be selected by Architect from manufacturer's standard range.

## 2.8 WALL EXHAUST AND RETURN REGISTERS/GRILLES

A. Type: Streamlined blades, 3/4 inch (19 mm) minimum depth, 3/4 inch (19 mm) maximum spacing, with spring or other device to set blades, vertical face.
B. Fabrication: Steel frames and blades, with factory baked enamel finish.
C. Color: To be selected by Architect from manufacturer's standard range.

## 2.9 FABRIC AIR DISTRIBUTION DEVICES

A. General Requirements:
   1. Diffuser material to comply with ASTM E84, UL 723, UL 2518, NFPA 90A, and NFPA 90B.
   2. Air Dispersion Method:
   3. Hanger Supports:

## 2.10 LOUVERS

A. Type: 6 inch (150 mm) deep frame with blades on 45 degree slope with center baffle and return bend, heavy channel frame, 1/2 inch (13 mm) square mesh screen over intake or exhaust end.
B. Fabrication: Aluminum thick galvanized steel welded assembly, with factory prime coat finish.
C. Color: To be selected by Architect from manufacturer's standard range.

D. Mounting: Furnish with interior angle flange for installation.

### 2.11 GOOSENECKS

A. Fabricate in accordance with 1 of minimum 18 gauge, 0.0598 inch (1.21 mm) galvanized steel.
B. Mount on minimum 12 inch (300 mm) high curb base where size exceeds 9 by 9 inch (230 by 230 mm).

## PART 3 – EXECUTION

### 3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Comply with SMACNA (ASMM) for flashing/counter-flashing of roof penetrations and supports for roof curbs and roof mounted equipment.
C. Check location of outlets and inlets and make necessary adjustments in position to comply with architectural features, symmetry, and lighting arrangement.
D. Install diffusers to ductwork with air tight connection.
E. Provide balancing dampers on duct take-off to diffusers and grilles and registers, despite whether dampers are specified as part of diffuser, or grille and register assembly.
F. Paint ductwork visible behind air outlets and inlets matte black, see Section 099123.

### 3.2 CLOSEOUT ACTIVITIES

A. Demonstrate operational system to Owner's representative.
B. Instruct Owner's representative to maintain system and use occupant controls or interfaces, as required.

### 3.3 PROTECTION

A. Protect installed products until completion of project.
B. Replace, repair, or touch-up damaged products before Substantial Completion.

**END OF SECTION**

## SECTION 233813

## COMMERCIAL-KITCHEN HOODS

### PART 1 – GENERAL

#### 1.1 SECTION INCLUDES
A. Cooking hoods.

#### 1.2 REFERENCE STANDARDS
A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.
B. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2024.
C. SMACNA (KVS) - Kitchen Ventilation Systems and Food Service Equipment Fabrication and Installation Guidelines; 2001.
D. UL 710 - Standard for Exhaust Hoods for Commercial Cooking Equipment; Current Edition, Including All Revisions.

#### 1.3 SUBMITTALS
A. See Section 013300 - Administrative Requirements, for submittal procedures.
B. 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 instructions, adjusting and balancing methods.
C. Test Reports for Grease Extracting Hoods: Provide test reports substantiating exhaust volume ratings and grease extraction performance.

#### 1.4 QUALITY ASSURANCE
A. Manufacturer Qualifications:
   1. At least five years experience in the design and manufacture of products of similar type to those specified.
   2. For grease extracting hoods, able to provide test data showing performance of hoods to be provided.

### PART 2 – PRODUCTS

#### 2.1 HOOD APPLICATIONS
A. Canopy-Style Cooking Hoods Type 2:
B. Style: Wall-attached canopy.
C. Type: Grease extracting type, no water wash.
D. Refer to CaptiveAire drawings for hood capacities.

#### 2.2 HOOD CONSTRUCTION
A. Provide products that comply with NFPA 96, the requirements and recommendations of SMACNA (KVS), and the requirements of the Authorities Having Jurisdiction.
B. Cooking Hoods: Provide Type I hoods, with all external joints and seams continuously welded, liquid-tight, and all internal joints, seams, and attachments sealed liquid-tight and grease-tight.
   1. Provide fire extinguishing system for all cooking hoods.
   2. Provide complete assemblies listed and labeled by UL under UL 710 for its intended use.
C. Construction: Materials, inside and out, are stainless steel complying with ASTM A666, Type 304, stretcher leveled; unless otherwise indicated.
   1. Sheet Thickness: 18 gauge, 0.048 inch (1.22 mm), minimum.
   2. Fabrication: Fabricate each individual hood in one piece, with all welds ground and finished to match (inside and out); fabricate flat surfaces exposed to view as double-pan formed panels with internal stiffener members.
   3. Finish on Surfaces Exposed to View: No.4 (brushed directional); provide stainless steel faces on all sides exposed to view.

4. Finish on Concealed Surfaces: No.4 or No.2B (dull, matte).
5. Multiple Hoods: Where total hood length in one run is over 12 feet (3600 mm), provide multiple hoods, complete in all respects, of the largest size available and of approximately equal length, mounted end to end.
    a. Provide junction boxes for field interconnection of wiring.
    b. Provide pre-drilled holes for field connections, with stainless steel fasteners; if field welding is necessary, grind and polish welds to match adjacent finish.
6. Duct Collars: For exhaust and make-up air openings, provide duct collar welded to hood unit; minimum of 8 inches (200 mm) extension from top or back face of unit, with minimum one inch (25 mm) 90 degree flange, unless otherwise indicated.
7. Access Panels: Provide removable or hinged access panels sufficient for maintenance and replacement of operating components inside unit; maximum width of 40 inches (1000 mm).
8. Supports: Stainless steel mounting brackets, struts, and threaded hanger rods.
    a. Hanger Rods: 3/8 inch (9 mm) diameter, minimum.
    b. Hanger Spacing: 48 inches (1220 mm) on center, maximum.
    c. Attachment to Structure: Mechanical fittings or inserts, stainless steel.

D. Exhaust Air Volume Control: For balancing; provide either built-in volume control damper or separate damper in exhaust duct.

E. Make-Up Air System: Provide volume damper at inlet, accessible for balancing.
1. Diffusers: Louvered register with opposed blade dampers.
2. Plenum: Insulated with one inch (25 mm) thick foil-face fiberglass insulation, on inside of plenum.

## 2.3 GREASE EXTRACTING HOODS

A. Grease Extracting Hoods: Pre-engineered, factory-fabricated standard products; high-velocity centrifugal grease extraction without requiring filters, cartridges, moving parts, removable parts, or constantly running water, with grease collected in gutter piped to drain, and as specified above.
1. Performance: Remove 95 percent of extraneous matter in air stream at rated air velocity; provide substantiation.
2. Grease Extracting Baffles: Non-removable, adjustable for balancing.
3. Access Panels: Provide removable panels, with handles, for access to exhaust plenum for cleaning.
4. Label: Provide permanent label indicating rated exhaust performance.

## 2.4 HOOD ACCESSORIES

A. Refer to CaptiveAire sheets.

B. Controls:
1. Fans: Provide manual push button controls for starting and stopping fans and labeled indicator lights showing fan status.
2. Fans: Provide controls for fan operation by time clock, programmable by the week, capable of maintaining time cycle after operation of manual push buttons.
3. Cooking Equipment: Provide manual shutoff and reset button located where indicated; combine with fire extinguishing actuation.

C. Control Panels: Factory assembled and pre-wired, ready for utility connections.
1. UL listed for use with specific hood.
2. Provide a single control panel combining all control functions for a particular hood, unless otherwise indicated.
3. Provide a single control panel for each group of hoods served by a single exhaust fan.
4. Enclosures: Flush-mounted; stainless steel, to match hood.
5. Provide indicator lights on control panel door showing status of fans and power supply.

## PART 3 – EXECUTION

### 3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions and NFPA 96.
B. Install hoods level and plumb, securely fastened, with seismic restraints as specified, and free of vibration during normal operation.
C. Weld hood duct collars to ductwork, liquid-tight.
D. Connect to utilities.

### 3.2 SYSTEM STARTUP

A. Obtain the services of the manufacturer's representative experienced in the installation, adjustment, and operation of the equipment to supervise the starting and adjusting of equipment.
B. Prepare equipment for startup, start and operate equipment for sufficient period to verify proper operation; correct equipment not operating correctly.
C. Adjust volume dampers as required for proper air flow after building air handling systems have been balanced and adjusted.
D. Demonstrate operation to Owner's designated personnel.
E. Demonstrate operation to authorities having jurisdiction if required by them; comply with their requirements for demonstration.
F. Report deficiencies in writing to Architect.

### 3.3 CLEANING

A. Clean surfaces of equipment.

### 3.4 PROTECTION

A. Protect installed products until completion of project.
B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

**END OF SECTION**

## SECTION 235400

## FURNACES

### PART 1 – GENERAL

#### 1.1 SECTION INCLUDES
A. Forced air furnaces.
B. Thermostats.

#### 1.2 RELATED REQUIREMENTS
A. Section 231123 - Facility Natural-Gas Piping.
B. Section 231126 - Facility Liquefied-Petroleum Gas Piping.

#### 1.3 REFERENCE STANDARDS
A. ANSI Z21.47 - American National Standard for Gas-Fired Central Furnaces; 2021.
B. ASHRAE Std 103 - Method of Testing for Annual Fuel Utilization Efficiency of Residential Central Furnaces and Boilers; 2022.
C. NFPA 54 - National Fuel Gas Code; 2021.
D. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.
E. NFPA 211 - Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances; 2019.

#### 1.4 SUBMITTALS
A. See Section 013300 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.
C. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

#### 1.5 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

#### 1.6 WARRANTY
A. See Section 017700 - Closeout Submittals, for additional warranty requirements.

### PART 2 – PRODUCTS

#### 2.1 GAS FIRED FURNACES
A. Manufacturers:
   1. Carrier Corporation, a brand of United Technologies Corporation Building & Industrial Systems; _____: www.carrier.com/#sle.
   2. Rheem Manufacturing Company Inc; _____: www.rheem.com/#sle.
   3. Substitutions: See Section 016000 - Product Requirements.
B. Basis of Design: Carrier Corporation, a brand of United Technologies Corporation Building & Industrial Systems: www.carrier.com/#sle.
C. Annual Fuel Utilization Efficiency (AFUE): 0.95 ("condensing") in accordance with ASHRAE Std 103.
D. Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, heating element, controls, air filter, humidifier, and accessories; wired for single power connection with control transformer.
   1. Safety certified by CSA in accordance with ANSI Z21.47.
   2. Venting System: Direct.
   3. Combustion: Sealed.
   4. Air Flow Configuration: Upflow.
   5. Heating: Natural gas fired.

6. Accessories:
   a. Concentric roof termination kit.
7. Performance:
   a. Refer to Furnace Schedule. Gas heating capacities are sea level ratings.
8. Supply Fan: Centrifugal type rubber mounted with direct drive with adjustable variable pitch motor pulley.
9. Air Filters: 1 inch (25 mm) thick glass fiber, disposable type arranged for easy replacement.
10. Operating Controls:
    a. Room Thermostat: Cycles burner to maintain room temperature setting.

## 2.2 THERMOSTATS

A. Room Thermostat: Low voltage, electric solid state microcomputer based room thermostat with remote sensor:
   1. System selector switch (heat-off) and fan control switch (auto-on).
   2. Preferential rate control to minimize overshoot and deviation from setpoint.
   3. Instant override of setpoint for continuous or timed period from one hour to 31 days.
   4. Programming based on every day of the week.
   5. Thermostat Display:
      a. Actual room temperature.
      b. System Mode Indication: Heating, fan auto, off, or on.

# PART 3 – EXECUTION

## 3.1 EXAMINATION

A. Verify that substrates are ready for installation of units and openings are as indicated on shop drawings.
B. Verify that proper power supply is available and located correctly.
C. Verify that proper fuel supply is available for connection.

## 3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions and requirements of authorities having jurisdiction.
B. Install in accordance with NFPA 90A.
C. Install gas fired furnaces in accordance with NFPA 54.
D. Coordinate gas-feed piping connection with Section 231123 or 231126.
E. Provide vent connections in accordance with NFPA 211.

**END OF SECTION**

**SECTION 238126.13**

**SMALL-CAPACITY SPLIT-SYSTEM AIR CONDITIONERS**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Air-source heat pumps.
B. Air cooled condensing units.
C. Indoor air handling (fan and coil) units for ductless systems.
D. Controls.

### 1.2 REFERENCE STANDARDS
A. AHRI 210/240 - Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; 2023.
B. AHRI 520 - Performance Rating of Positive Displacement Condensing Units; 2004.
C. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; 2022, with Errata (2023).
D. ASHRAE Std 23 - Methods for Performance Testing Positive Displacement Refrigerant Compressors and Compressor Units; 2022.
E. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.
F. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2021.
G. UL 207 - Standard for Refrigerant-Containing Components and Accessories, Nonelectrical; Current Edition, Including All Revisions.

### 1.3 SUBMITTALS
A. See Section 013300 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.
C. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

### 1.4 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

### 1.5 WARRANTY
A. See Section 017700 - Closeout Submittals, for additional warranty requirements.

## PART 2 – PRODUCTS

### 2.1 SYSTEM DESIGN
A. Split-System Heating and Cooling Units: Self-contained, packaged, matched factory-engineered and assembled, pre-wired indoor and outdoor units; UL listed.
   1. Heating and Cooling: Air-source electric heat pump located in outdoor unit with evaporator.
   2. Provide refrigerant lines internal to units and between indoor and outdoor units, factory cleaned, dried, pressurized and sealed, with insulated suction line.
B. Performance Requirements: See Drawings for additional requirements.

### 2.2 INDOOR AIR HANDLING UNITS FOR DUCTLESS SYSTEMS
A. Indoor Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, evaporator coil, and controls; wired for single power connection with control transformer.
   1. Location: Ceiling.

B. Evaporator Coils: Copper tube aluminum fin assembly, galvanized or polymer drain pan sloped in all directions to drain, drain connection, refrigerant piping connections, restricted distributor or thermostatic expansion valve.
   1. Construction and Ratings: In accordance with AHRI 210/240 and UL 207.
   2. Manufacturer: System manufacturer.

## 2.3 OUTDOOR UNITS

A. Outdoor Units: Self-contained, packaged, pre-wired unit consisting of cabinet, with compressor and condenser.
   1. Comply with AHRI 210/240.
   2. Refrigerant: R-410A.
   3. Construction and Ratings: In accordance with AHRI 210/240 with testing in accordance with ASHRAE Std 23 and UL 207.

B. Air Cooled Condenser: Aluminum fin and copper tube coil, AHRI 520 with direct drive axial propeller fan resiliently mounted, galvanized fan guard.

C. Accessories: Filter drier, high-pressure switch (manual reset), low pressure switch (automatic reset), service valves and gauge ports, thermometer well (in liquid line).
   1. Provide thermostatic expansion valves.

D. Operating Controls:
   1. Control by room thermostat to maintain room temperature setting.

# PART 3 – EXECUTION

## 3.1 EXAMINATION

A. Verify that substrates are ready for installation of units and openings are as indicated on shop drawings.

B. Verify that proper power supply is available and in correct location.

## 3.2 INSTALLATION

A. Install in accordance with NFPA 90A and NFPA 90B.

B. Install refrigeration systems in accordance with ASHRAE Std 15.

**END OF SECTION**

**SECTION 260505**

**SELECTIVE DEMOLITION FOR ELECTRICAL**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Electrical demolition.

### 1.2 RELATED REQUIREMENTS

## PART 2 – PRODUCTS

### 2.1 MATERIALS AND EQUIPMENT
A. Materials and equipment for patching and extending work: As specified in individual sections.

## PART 3 – EXECUTION

### 3.1 EXAMINATION
A. Verify that abandoned wiring and equipment serve only abandoned facilities.
B. Report discrepancies to Owner and Architect before disturbing existing installation.
C. Beginning of demolition means installer accepts existing conditions.

### 3.2 PREPARATION
A. Disconnect electrical systems in walls, floors, and ceilings to be removed.
B. Coordinate utility service outages with utility company.
C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.
D. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.
    1. Obtain permission from Owner at least 24 hours before partially or completely disabling system.
    2. Make temporary connections to maintain service in areas adjacent to work area.

### 3.3 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK
A. Remove, relocate, and extend existing installations to accommodate new construction.
B. Remove abandoned wiring to source of supply.
C. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
D. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.
E. Disconnect and remove abandoned panelboards and distribution equipment.
F. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
G. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.
H. Repair adjacent construction and finishes damaged during demolition and extension work.
I. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.
J. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.

## 3.4 CLEANING AND REPAIR

A. See Section 017419 - Construction Waste Management and Disposal for additional requirements.
B. Clean and repair existing materials and equipment that remain or that are to be reused.
C. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

**END OF SECTION**

## SECTION 260519

## LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Single conductor building wire.
B. Underground feeder and branch-circuit cable.
C. Wiring connectors.
D. Electrical tape.
E. Heat shrink tubing.
F. Wire pulling lubricant.
G. Cable ties.
H. Firestop sleeves.

### 1.2 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.
B. Section 260526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.
C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
D. Section 312316 - Excavation.
E. Section 312323 - Fill: Bedding and backfilling.

### 1.3 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013 (Reapproved 2018).
B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011 (Reapproved 2017).
C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010, with Editorial Revision (2020).
D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2020).
E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2017.
F. ASTM D4388 - Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes; 2020.
G. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
H. NECA 121 - Standard for Installing Nonmetallic-Sheathed Cable (Type NM-B) and Underground Feeder and Branch-Circuit Cable (Type UF); 2007.
I. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; 2021.
J. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems; 2021.
K. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
L. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.
M. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.
N. UL 267 - Outline of Investigation for Wire-Pulling Compounds; Current Edition, Including All Revisions.
O. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.
P. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.
Q. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.
R. UL 493 - Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables; Current Edition, Including All Revisions.
S. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.

## 1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
   2. Coordinate the installation of direct burial cable with other trades to avoid conflicts with piping or other potential conflicts.
   3. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
   4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

## 1.5 SUBMITTALS

A. See Section 013300 - Administrative Requirements, for submittal procedures.
B. Project Record Documents: Record actual installed circuiting arrangements. Record actual routing for underground circuits.
C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.

## 1.6 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.
B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

## 1.7 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

## 1.8 FIELD CONDITIONS

A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F (-10 degrees C), unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.

# PART 2 – PRODUCTS

## 2.1 CONDUCTOR AND CABLE APPLICATIONS

A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.
C. Nonmetallic-sheathed cable is not permitted.
D. Manufactured wiring systems are not permitted.

## 2.2 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

A. Provide products that comply with requirements of NFPA 70.
B. Provide products listed, classified, and labeled as suitable for the purpose intended.
C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
D. Comply with NEMA WC 70.
E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.

F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
G. Conductors for Grounding and Bonding: Also comply with Section 260526.
H. Conductors and Cables Installed Where Exposed to Direct Rays of Sun: Listed and labeled as sunlight resistant.
I. Conductor Material:
   1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
   2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
   3. Tinned Copper Conductors: Comply with ASTM B33.
J. Minimum Conductor Size:
   1. Branch Circuits: 12 AWG.
      a. Exceptions:
         1) 20 A, 120 V circuits longer than 75 feet (23 m): 10 AWG, for voltage drop.
         2) 20 A, 120 V circuits longer than 150 feet (46 m): 8 AWG, for voltage drop.
         3) 20 A, 277 V circuits longer than 150 feet (46 m): 10 AWG, for voltage drop.
   2. Control Circuits: 14 AWG.
K. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
L. Conductor Color Coding:
   1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
   2. Color Coding Method: Integrally colored insulation.
   3. Color Code:
      a. 480Y/277 V, 3 Phase, 4 Wire System:
         1) Phase A: Brown.
         2) Phase B: Orange.
         3) Phase C: Yellow.
         4) Neutral/Grounded: Gray.
      b. 208Y/120 V, 3 Phase, 4 Wire System:
         1) Phase A: Black.
         2) Phase B: Red.
         3) Phase C: Blue.
         4) Neutral/Grounded: White.
      c. Equipment Ground, All Systems: Green.
      d. Travelers for 3-Way and 4-Way Switching: Pink.
      e. For modifications or additions to existing wiring systems, comply with existing color code when existing code complies with NFPA 70 and is approved by the authority having jurisdiction.
      f. For control circuits, comply with manufacturer's recommended color code.

## 2.3 SINGLE CONDUCTOR BUILDING WIRE

A. Description: Single conductor insulated wire.
B. Conductor Stranding:
   1. Feeders and Branch Circuits:
      a. Size 10 AWG and Smaller: Solid.
      b. Size 8 AWG and Larger: Stranded.
C. Insulation Voltage Rating: 600 V.
D. Insulation:
   1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.
      a. Installed Underground: Type XHHW-2.

## 2.4 UNDERGROUND FEEDER AND BRANCH-CIRCUIT CABLE

A. Description: NFPA 70, Type UF multiple-conductor cable listed and labeled as complying with UL 493, Type UF-B.
B. Provide equipment grounding conductor unless otherwise indicated.
C. Conductor Stranding:
   1. Size 10 AWG and Smaller: Solid.
   2. Size 8 AWG and Larger: Stranded.
D. Insulation Voltage Rating: 600 V.

## 2.5 WIRING CONNECTORS

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.
B. Connectors for Grounding and Bonding: Comply with Section 260526.
C. Wiring Connectors for Splices and Taps:
   1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
   2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.
D. Wiring Connectors for Terminations:
   1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
   2. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.
   3. Provide motor pigtail connectors for connecting motor leads in order to facilitate disconnection.
   4. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
   5. Stranded Conductors Size 10 AWG and Smaller: Use crimped terminals for connections to terminal screws.
   6. Conductors for Control Circuits: Use crimped terminals for all connections.
E. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.
F. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F (105 degrees C) for standard applications and 302 degrees F (150 degrees C) for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
G. Mechanical Connectors: Provide bolted type or set-screw type.
H. Compression Connectors: Provide circumferential type or hex type crimp configuration.
I. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.

## 2.6 ACCESSORIES

A. Electrical Tape:
   1. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil (0.18 mm); resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F (105 degrees C).
   2. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil (0.18 mm); resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F (-18 degrees C) and suitable for continuous temperature environment up to 221 degrees F (105 degrees C).
   3. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil (0.76 mm); suitable for continuous temperature environment up to 194 degrees F (90 degrees C) and short-term 266 degrees F (130 degrees C) overload service.

4. Electrical Filler Tape: Rubber-based insulating moldable putty, minimum thickness of 125 mil (3.2 mm); suitable for continuous temperature environment up to 176 degrees F (80 degrees C).
5. Varnished Cambric Electrical Tape: Cotton cambric fabric tape, with or without adhesive, oil-primed and coated with high-grade insulating varnish; minimum thickness of 7 mil (0.18 mm); suitable for continuous temperature environment up to 221 degrees F (105 degrees C).
6. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90 mil (2.3 mm).

B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.
C. Wire Pulling Lubricant:
1. Listed and labeled as complying with UL 267.
2. Suitable for use with conductors/cables and associated insulation/jackets to be installed.
3. Suitable for use at installation temperature.
D. Cable Ties: Material and tensile strength rating suitable for application.
E. Sealing Systems for Roof Penetrations: Premanufactured components and accessories as required to preserve integrity of roofing system and maintain roof warranty; suitable for cables and roofing system to be installed; designed to accommodate existing penetrations where applicable.
F. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.
G. Fire-Protective Coating for Electrical Conductors and Cables: Field-applied, intumescent or ablative coating designed to prevent ignition and propagation of fire along thermoplastic-insulated conductors and cables.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. Verify that interior of building has been protected from weather.
B. Verify that work likely to damage wire and cable has been completed.
C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.
D. Verify that field measurements are as indicated.
E. Verify that conditions are satisfactory for installation prior to starting work.

### 3.2 PREPARATION

A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

### 3.3 INSTALLATION

A. Circuiting Requirements:
1. Unless dimensioned, circuit routing indicated is diagrammatic.
2. When circuit destination is indicated without specific routing, determine exact routing required.
3. Arrange circuiting to minimize splices.
4. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
5. Maintain separation of wiring for emergency systems in accordance with NFPA 70.

B. Install products in accordance with manufacturer's instructions.
C. Perform work in accordance with NECA 1 (general workmanship).
D. Install underground feeder and branch-circuit cable (Type UF-B) in accordance with NECA 121.

E. Installation in Raceway:
   1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
   2. Pull all conductors and cables together into raceway at same time.
   3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
   4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.
F. Direct Burial Cable Installation:
   1. Provide trenching and backfilling in accordance with Section 312316 - Excavation and Section 312323 - Fill.
   2. Install cable with minimum cover of 24 inches (610 mm) unless otherwise indicated or required.
   3. Protect cables from damage in accordance with NFPA 70.
   4. Provide underground warning tape in accordance with Section 260553 along entire cable length.
G. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.
H. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
I. Terminate cables using suitable fittings.
J. Install conductors with a minimum of 12 inches (300 mm) of slack at each outlet.
K. Where conductors are installed in enclosures for future termination by others, provide a minimum of 5 feet (1.5 m) of slack.
L. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
M. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.
N. Make wiring connections using specified wiring connectors.
   1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
   2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
   3. Do not remove conductor strands to facilitate insertion into connector.
   4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
   5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
   6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
O. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
   1. Dry Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
      a. For taped connections, first apply adequate amount of rubber splicing electrical tape or electrical filler tape, followed by outer covering of vinyl insulating electrical tape.
      b. For taped connections likely to require re-entering, including motor leads, first apply varnished cambric electrical tape, followed by adequate amount of rubber splicing electrical tape, followed by outer covering of vinyl insulating electrical tape.

2. Damp Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
   a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.
   b. For taped connections, follow same procedure as for dry locations but apply outer covering of moisture sealing electrical tape.
3. Wet Locations: Use heat shrink tubing.

P. Insulate ends of spare conductors using vinyl insulating electrical tape.
Q. Identify conductors and cables in accordance with Section 260553.
R. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.
S. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

## 3.4 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.
B. Inspect and test in accordance with NETA ATS, except Section 4.
C. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is required for all conductors. The resistance test for parallel conductors listed as optional is not required.
D. Correct deficiencies and replace damaged or defective conductors and cables.

**END OF SECTION**

## SECTION 260526

## GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Grounding and bonding requirements.
B. Conductors for grounding and bonding.
C. Connectors for grounding and bonding.
D. Ground bars.
E. Ground rod electrodes.

### 1.2 RELATED REQUIREMENTS

A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
B. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
C. Section 265600 - Exterior Lighting: Additional grounding and bonding requirements for pole-mounted luminaires.

### 1.3 REFERENCE STANDARDS

A. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System; 2012.
B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
C. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings; 2022.
D. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems; 2021.
E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
F. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

### 1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Verify exact locations of underground metal water service pipe entrances to building.
   2. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
B. Sequencing:
   1. Do not install ground rod electrodes until final backfill and compaction is complete.

### 1.5 SUBMITTALS

A. See Section 013300 - Administrative Requirements for submittals procedures.
B. Field quality control test reports.
C. Project Record Documents: Record actual locations of grounding electrode system components and connections.

### 1.6 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.
B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

### 1.7 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

## PART 2 – PRODUCTS

### 2.1 GROUNDING AND BONDING REQUIREMENTS

A. Existing Work: Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.
B. Do not use products for applications other than as permitted by NFPA 70 and product listing.
C. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
D. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
E. Grounding System Resistance:
    1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Architect. Precipitation within the previous 48 hours does not constitute normally dry conditions.
    2. Grounding Electrode System: Not greater than 5 ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.
    3. Between Grounding Electrode System and Major Electrical Equipment Frames, System Neutral, and Derived Neutral Points: Not greater than 0.5 ohms, when tested using "point-to-point" methods.
F. Grounding Electrode System:
    1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
        a. Provide continuous grounding electrode conductors without splice or joint.
        b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
    2. Metal Underground Water Pipe(s):
        a. Provide connection to underground metal domestic and fire protection (where present) water service pipe(s) that are in direct contact with earth for at least 10 feet (3.0 m) at an accessible location not more than 5 feet (1.5 m) from the point of entrance to the building.
        b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.
        c. Provide bonding jumper around water meter of sufficient length to permit removal of meter without disconnecting jumper.
    3. Metal In-Ground Support Structure:
        a. Provide connection to metal in-ground support structure that is in direct contact with earth in accordance with NFPA 70.
    4. Ground Rod Electrode(s):
        a. Provide three electrodes in an equilateral triangle configuration unless otherwise indicated or required.
        b. Space electrodes not less than 10 feet (3.0 m) from each other and any other ground electrode.
        c. Where location is not indicated, locate electrode(s) at least 5 feet (1.5 m) outside building perimeter foundation as near as possible to electrical service entrance; where possible, locate in softscape (uncovered) area.
    5. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.
    6. Ground Bar: Provide ground bar, separate from service equipment enclosure, for common connection point of grounding electrode system bonding jumpers as permitted in NFPA 70. Connect grounding electrode conductor provided for service-supplied system grounding to this ground bar.

a. Ground Bar Size: 1/4 by 2 by 12 inches (6 by 50 by 300 mm) unless otherwise indicated or required.
b. Where ground bar location is not indicated, locate in accessible location as near as possible to service disconnect enclosure.
c. Ground Bar Mounting Height: 18 inches (450 mm) above finished floor unless otherwise indicated.

G. Bonding and Equipment Grounding:
1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
2. Raceways may be used as sole equipment grounding conductor where permitted by NFPA 70. Provide insulated equipment grounding conductor where indicated or required, including but not limited to:
a. In each nonmetallic feeder and branch circuit raceway.
b. In each flexible conduit.
c. In outdoor portions of each metallic feeder and branch circuit raceway utilizing non-threaded fittings (where permitted) supplying rooftop multimotor and combination-load air-conditioning and refrigerating equipment.
3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.
7. Provide bonding for interior metal piping systems in accordance with NFPA 70. This includes, but is not limited to:
a. Metal water piping where not already effectively bonded to metal underground water pipe used as grounding electrode.
b. Metal gas piping.
8. Provide bonding for interior metal air ducts.

H. Communications Systems Grounding and Bonding:
1. Provide intersystem bonding termination at service equipment or metering equipment enclosure and at disconnecting means for any additional buildings or structures in accordance with NFPA 70.

I. Pole-Mounted Luminaires: Also comply with Section 265600.

## 2.2 GROUNDING AND BONDING COMPONENTS

A. General Requirements:
1. Provide products listed, classified, and labeled as suitable for the purpose intended.
2. Provide products listed and labeled as complying with UL 467 where applicable.

B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 260526:
1. Use insulated copper conductors unless otherwise indicated.
a. Exceptions:
1) Use bare copper conductors where installed underground in direct contact with earth.
2) Use bare copper conductors where directly encased in concrete (not in raceway).

C. Connectors for Grounding and Bonding:
1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.

3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
4. Manufacturers - Mechanical and Compression Connectors:
   a. Burndy LLC; _____: www.burndy.com/#sle.
   b. Harger Lightning & Grounding; _____: www.harger.com/#sle.
   c. Thomas & Betts Corporation; _____: www.tnb.com/#sle.
   d. Substitutions: See Section 016000 - Product Requirements.
5. Manufacturers - Exothermic Welded Connections:
   a. Burndy LLC; _____: www.burndy.com/#sle.
   b. thermOweld, subsidiary of Continental Industries; division of Burndy LLC; _____: www.thermoweld.com/#sle.
   c. Substitutions: See Section 016000 - Product Requirements.

D. Ground Bars:
1. Description: Copper rectangular ground bars with mounting brackets and insulators.
2. Size: As indicated.
3. Holes for Connections: As indicated or as required for connections to be made.
4. Manufacturers:
   a. Harger Lightning & Grounding; _____: www.harger.com/#sle.
   b. thermOweld, subsidiary of Continental Industries; division of Burndy LLC; _____: www.thermoweld.com/#sle.
   c. Substitutions: See Section 016000 - Product Requirements.

E. Ground Rod Electrodes:
1. Comply with NEMA GR 1.
2. Material: Copper-bonded (copper-clad) steel.
3. Size: 3/4 inch (19 mm) diameter by 10 feet (3.0 m) length, unless otherwise indicated.
4. Manufacturers:
   a. Harger Lightning & Grounding; _____: www.harger.com/#sle.
   b. Substitutions: See Section 016000 - Product Requirements.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. Verify that work likely to damage grounding and bonding system components has been completed.
B. Verify that field measurements are as indicated.
C. Verify that conditions are satisfactory for installation prior to starting work.

### 3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions.
B. Perform work in accordance with NECA 1 (general workmanship).
C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.
1. Outdoor Installations: Unless otherwise indicated, install with top of rod 6 inches (150 mm) below finished grade.
2. Indoor Installations: Unless otherwise indicated, install with 4 inches (100 mm) of top of rod exposed.

D. Make grounding and bonding connections using specified connectors.
1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.

3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

E. Identify grounding and bonding system components in accordance with Section 260553.

## 3.3 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.
B. Inspect and test in accordance with NETA ATS except Section 4.
C. Perform inspections and tests listed in NETA ATS, Section 7.13.
D. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.
E. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.
F. Submit detailed reports indicating inspection and testing results and corrective actions taken.

**END OF SECTION**

## SECTION 260529

## HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

### PART 1 – GENERAL

#### 1.1 SECTION INCLUDES
A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

#### 1.2 RELATED REQUIREMENTS
A. Section 033000 - Cast-in-Place Concrete: Concrete equipment pads.

#### 1.3 REFERENCE STANDARDS
A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2023.
D. MFMA-4 - Metal Framing Standards Publication; 2004.
E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

#### 1.4 ADMINISTRATIVE REQUIREMENTS
A. Coordination:
   1. Coordinate sizes and arrangement of supports and bases with actual equipment and components to be installed.
   2. Coordinate work to provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at installed locations.
   4. Coordinate arrangement of supports with ductwork, piping, equipment and other potential conflicts.
   5. Notify Architect of conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
B. Sequencing:
   1. Do not install products on or provide attachment to concrete surfaces until concrete has cured; see Section 033000.

#### 1.5 QUALITY ASSURANCE
A. Product Listing Organization Qualifications: Organization recognized by OSHA as Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

#### 1.6 DELIVERY, STORAGE, AND HANDLING
A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

### PART 2 – PRODUCTS

#### 2.1 SUPPORT AND ATTACHMENT COMPONENTS
A. General Requirements:
   1. Comply with the following. Where requirements differ, comply with most stringent.
      a. NFPA 70.
      b. 2021 IBC.
      c. Requirements of authorities having jurisdiction.
   2. Provide required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for complete installation of electrical work.

3. Provide products listed, classified, and labeled as suitable for purpose intended, where applicable.
4. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for load to be supported with minimum safety factor of 5 times the applied force. Include consideration for vibration, equipment operation, and shock loads where applicable.
5. Do not use products for applications other than as permitted by NFPA 70 and product listing.
6. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
7. Steel Components: Use corrosion-resistant materials suitable for environment where installed.
   a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
   b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
   c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
   d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Conduit and Cable Supports: Straps and clamps suitable for conduit or cable to be supported.
   1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
   2. Conduit Clamps: Bolted type unless otherwise indicated.
C. Outlet Box Supports: Hangers and brackets suitable for boxes to be supported.
D. Metal Channel/Strut Framing Systems:
   1. Description: Factory-fabricated, continuous-slot, metal channel/strut and associated fittings, accessories, and hardware required for field assembly of supports.
   2. Comply with MFMA-4.
E. Hanger Rods: Threaded, zinc-plated steel unless otherwise indicated.
F. Anchors and Fasteners:
   1. Unless otherwise indicated and where not otherwise restricted, use anchor and fastener types indicated for specified applications.
   2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
   3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
   4. Hollow Masonry: Use toggle bolts.
   5. Hollow Stud Walls: Use toggle bolts.
   6. Steel: Use beam clamps, machine bolts, or welded threaded studs.
   7. Sheet Metal: Use sheet metal screws.
   8. Wood: Use wood screws.
   9. Plastic and lead anchors are not permitted.
   10. Preset Concrete Inserts: Continuous metal channel/strut and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
      a. Manufacturer: Same as manufacturer of metal channel/strut framing system.
      b. Comply with MFMA-4.
      c. Channel Material: Use galvanized steel.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. Verify that field measurements are as indicated.
B. Verify that mounting surfaces are ready to receive support and attachment components.
C. Verify that conditions are satisfactory for installation prior to starting work.

## 3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions.
B. Install hangers and supports in accordance with NECA 1.
C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
E. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
G. Equipment Support and Attachment:
    1. Use metal, fabricated supports or supports assembled from metal channel/strut to support equipment as required.
    2. Use metal channel/strut secured to studs to support equipment surface mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
    3. Use metal channel/strut to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
    4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
H. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.
I. Secure fasteners in accordance with manufacturer's recommended torque settings.
J. Remove temporary supports.

## 3.3 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements for additional requirements.
B. Inspect support and attachment components for damage and defects.
C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
D. Correct deficiencies and replace damaged or defective support and attachment components.

**END OF SECTION**

**SECTION 260533.13**

**CONDUIT FOR ELECTRICAL SYSTEMS**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Galvanized steel rigid metal conduit (RMC).
B. Stainless steel rigid metal conduit (RMC).
C. Galvanized steel intermediate metal conduit (IMC).
D. Stainless steel intermediate metal conduit (IMC).
E. PVC-coated galvanized steel rigid metal conduit (RMC).
F. Flexible metal conduit (FMC).
G. Liquidtight flexible metal conduit (LFMC).
H. Galvanized steel electrical metallic tubing (EMT).
I. Stainless steel electrical metallic tubing (EMT).
J. Rigid polyvinyl chloride (PVC) conduit.
K. Reinforced thermosetting resin conduit (RTRC).

### 1.2 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.
B. Section 260526 - Grounding and Bonding for Electrical Systems.
   1. Includes additional requirements for fittings for grounding and bonding.
C. Section 260529 - Hangers and Supports for Electrical Systems.
D. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
E. Section 262100 - Low-Voltage Electrical Service Entrance: Additional requirements for electrical service conduits.
F. Section 312316.13 - Trenching: Excavating, bedding, and backfilling.

### 1.3 REFERENCE STANDARDS

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2020.
B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S); 2020.
C. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit; 2018.
D. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
E. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2020.
F. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC); 2017.
G. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.
H. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Metal Conduit and Intermediate Metal Conduit; 2018.
I. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit; 2020.
J. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; 2021.
K. NEMA TC 14 (SERIES) - Reinforced Thermosetting Resin Conduit and Fittings Series; 2015.
L. NEMA TC 14.AG - Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings; 2015 (Reaffirmed 2021).
M. NEMA TC 14.BG - Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings; 2015 (Reaffirmed 2020).
N. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
O. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.
P. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.
Q. UL 6A - Electrical Rigid Metal Conduit-Aluminum, Red Brass, and Stainless Steel; Current Edition, Including All Revisions.
R. UL 360 - Liquid-Tight Flexible Metal Conduit; Current Edition, Including All Revisions.
S. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.
T. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.

U. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.
V. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.
W. UL 797A - Electrical Metallic Tubing - Aluminum and Stainless Steel; Current Edition, Including All Revisions.
X. UL 1242 - Electrical Intermediate Metal Conduit-Steel; Current Edition, Including All Revisions.
Y. UL 2419 - Outline of Investigation for Electrically Conductive Corrosion Resistant Compounds; Current Edition, Including All Revisions.
Z. UL 2420 - Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings; Current Edition, Including All Revisions.
AA. UL 2515 - Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings; Current Edition, Including All Revisions.

## 1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate minimum sizes of conduits with actual type and quantity of conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
   2. Coordinate arrangement of conduits with structural members, ductwork, piping, equipment, and other potential conflicts.
   3. Verify exact conduit termination locations required for boxes, enclosures, and equipment.
   4. Coordinate work to provide roof penetrations that preserve integrity of roofing system and do not void roof warranty.
   5. Notify Architect of conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
B. Sequencing:
   1. Do not begin installation of conductors and cables until installation of conduit between termination points is complete.

## 1.5 QUALITY ASSURANCE

A. Product Listing Organization Qualifications: Organization recognized by OSHA as Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

## 1.6 DELIVERY, STORAGE, AND HANDLING

A. See Section 017419 - Construction Waste Management and Disposal for packaging waste requirements.
B. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

# PART 2 – PRODUCTS

## 2.1 CONDUIT APPLICATIONS

A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70, manufacturer's instructions, and product listing.
B. Unless otherwise indicated and where not otherwise restricted, use conduit types indicated for specified applications. Where more than one listed application applies, comply with most restrictive requirements. Where conduit type for particular application is not specified, use galvanized steel rigid metal conduit.
C. Underground:
   1. Under Slab on Grade: Use galvanized steel rigid metal conduit (RMC), stainless steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), stainless steel intermediate metal conduit (IMC), PVC-coated galvanized steel rigid metal conduit (RMC), galvanized steel electrical metallic tubing (EMT), stainless steel electrical metallic tubing (EMT), rigid PVC conduit, or reinforced thermosetting resin conduit (RTRC).

2. Exterior, Direct-Buried: Use galvanized steel rigid metal conduit (RMC), stainless steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), stainless steel intermediate metal conduit (IMC), PVC-coated galvanized steel rigid metal conduit, galvanized steel electrical metallic tubing (EMT), stainless steel electrical metallic tubing (EMT), rigid PVC conduit, or reinforced thermosetting resin conduit (RTRC).
3. Where rigid polyvinyl chloride (PVC) conduit is provided, transition to galvanized steel rigid metal conduit (RMC), stainless steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), stainless steel intermediate metal conduit (IMC), or schedule 80 rigid PVC conduit where emerging from underground.
4. Where galvanized steel rigid metal conduit (RMC) or galvanized steel intermediate metal conduit (IMC) is installed in direct contact with earth where soil has resistivity of less than 2000 ohm-centimeters or is characterized as severely corrosive based on soils report or local experience, use corrosion protection tape, factory-applied corrosion protection coating, or field-applied corrosion protection compound acceptable to authorities having jurisdiction to provide supplementary corrosion protection.
5. Where galvanized steel electrical metallic tubing (EMT) is installed in direct contact with earth, use corrosion protection tape, factory-applied corrosion protection coating, or field-applied corrosion protection compound acceptable to authorities having jurisdiction to provide supplementary corrosion protection.
6. Where galvanized rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), or galvanized steel electrical metallic tubing (EMT) emerges from concrete into soil, use corrosion protection tape, factory-applied corrosion protection coating, or field-applied corrosion protection compound acceptable to authorities having jurisdiction to provide supplementary corrosion protection for minimum of 4 inches (100 mm) on either side of where conduit emerges.

D. Concealed Within Masonry Walls: Use galvanized steel rigid metal conduit (RMC), stainless steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), stainless steel intermediate metal conduit (IMC), galvanized steel electrical metallic tubing (EMT), or stainless steel electrical metallic tubing (EMT).
E. Concealed Above Accessible Ceilings: Use galvanized steel rigid metal conduit (RMC), stainless steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), stainless steel intermediate metal conduit (IMC), galvanized steel electrical metallic tubing (EMT), or stainless steel electrical metallic tubing (EMT).
F. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit (RMC), stainless steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), stainless steel intermediate metal conduit (IMC), galvanized steel electrical metallic tubing (EMT), or stainless steel electrical metallic tubing (EMT).
G. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit (RMC), stainless steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), stainless steel intermediate metal conduit (IMC), galvanized steel electrical metallic tubing (EMT), or stainless steel electrical metallic tubing (EMT).
H. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit (RMC), stainless steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), stainless steel intermediate metal conduit (IMC), galvanized steel electrical metallic tubing (EMT), or stainless steel electrical metallic tubing (EMT).
    1. Locations subject to physical damage include, but are not limited to:
        a. Where exposed below 8 feet (2.4 m), except within electrical and communication rooms or closets.
I. Exposed, Exterior, Not Subject to Severe Physical Damage: Use galvanized steel rigid metal conduit (RMC), stainless steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), stainless steel intermediate metal conduit (IMC), galvanized steel electrical metallic tubing (EMT), or stainless steel electrical metallic tubing (EMT).

J. Corrosive Locations Above Ground: Use stainless steel rigid metal conduit (RMC), stainless steel intermediate metal conduit (IMC), PVC-coated galvanized steel rigid metal conduit (RMC), stainless steel electrical metallic tubing (EMT), or reinforced thermosetting resin conduit (RTRC).
K. Flexible Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit (FMC).
   1. Maximum Length: 6 feet (1.8 m).
L. Flexible Connections to Vibrating Equipment:
   1. Dry Locations: Use flexible metal conduit (FMC).
   2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit (LFMC).
   3. Maximum Length: 6 feet (1.8 m) unless otherwise indicated.
   4. Vibrating equipment includes, but is not limited to:
      a. Transformers.
      b. Motors.
M. Fished in Existing Walls, Where Necessary: Use flexible metal conduit (FMC), galvanized steel electrical metallic tubing (EMT), or stainless steel electrical metallic tubing (EMT).

## 2.2 CONDUIT - GENERAL REQUIREMENTS

A. Comply with NFPA 70.
B. Existing Work: Where existing conduits are indicated to be reused, they may be reused only where they comply with specified requirements, are free from corrosion, and integrity is verified by pulling mandrel through them.
C. Electrical Service Conduits: See Section 262100 for additional requirements.
D. Fittings for Grounding and Bonding: See Section 260526 for additional requirements.
E. Provide conduit, fittings, supports, and accessories required for complete raceway system.
F. Provide products listed, classified, and labeled as suitable for purpose intended.
G. Minimum Conduit Size, Unless Otherwise Indicated:
   1. Branch Circuits: 1/2-inch (16 mm) trade size.
   2. Branch Circuit Homeruns: 3/4-inch (21 mm) trade size.
   3. Control Circuits: 1/2-inch (16 mm) trade size.
   4. Flexible Connections to Luminaires: 3/8-inch (12 mm) trade size.
   5. Underground, Interior: 3/4-inch (21 mm) trade size.
   6. Underground, Exterior: 3/4-inch (21 mm) trade size.
H. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

## 2.3 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
B. Fittings:
   1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6.
   2. Material: Use steel or malleable iron.
   3. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

## 2.4 STAINLESS STEEL RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC stainless steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6A.
B. Fittings:
   1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6A.
   2. Material: Use stainless steel with corrosion resistance equivalent to conduit.
   3. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

## 2.5 GALVANIZED STEEL INTERMEDIATE METAL CONDUIT (IMC)

A. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.
B. Fittings:
   1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 1242.
   2. Material: Use steel or malleable iron.
   3. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

## 2.6 STAINLESS STEEL INTERMEDIATE METAL CONDUIT (IMC)

A. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.
B. Fittings:
   1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 1242.

## 2.7 PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit with external polyvinyl chloride (PVC) coating complying with NEMA RN 1 and listed and labeled as complying with UL 6.
B. Exterior Coating: Polyvinyl chloride (PVC), nominal thickness of 40 mil, 0.040 inch (1.02 mm).
C. PVC-Coated Boxes and Fittings:
   1. Manufacturer: Same as manufacturer of PVC-coated conduit to be installed.
   2. Nonhazardous Locations: Use boxes and fittings listed and labeled as complying with UL 514A, UL 514B, or UL 6.
   3. Material: Use steel or malleable iron.
   4. Exterior Coating: Polyvinyl chloride (PVC), minimum thickness of 40 mil, 0.040 inch (1.02 mm).
D. PVC-Coated Supports: Furnish with exterior coating of polyvinyl chloride (PVC), minimum thickness of 15 mil, 0.015 inch (0.38 mm).

## 2.8 FLEXIBLE METAL CONDUIT (FMC)

A. Description: NFPA 70, Type FMC standard-wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems.
B. Fittings:
   1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel or malleable iron.

## 2.9 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

A. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.
B. Fittings:
   1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel or malleable iron.

## 2.10 GALVANIZED STEEL ELECTRICAL METALLIC TUBING (EMT)

A. Description: NFPA 70, Type EMT galvanized steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
B. Fittings:
   1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.

2. Material: Use steel or malleable iron.
3. Connectors and Couplings: Use compression/gland or set-screw type.
   a. Do not use indenter type connectors and couplings.

## 2.11 STAINLESS STEEL ELECTRICAL METALLIC TUBING (EMT)

A. Description: NFPA 70, Type EMT stainless steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797A.
B. Fittings:
   1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Connectors and Couplings: Use compression/gland or set-screw type.

## 2.12 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

A. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.
B. Fittings:
   1. Manufacturer: Same as manufacturer of conduit to be connected.
   2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

## 2.13 REINFORCED THERMOSETTING RESIN CONDUIT (RTRC)

A. Applications:
   1. Underground, Direct-Buried: Use belowground (BG), DB (direct-burial) RTRC or aboveground (AG) RTRC.
B. Description: NFPA 70, Type RTRC reinforced thermosetting resin conduit complying with NEMA TC 14 (SERIES).
   1. Aboveground (AG) RTRC: Comply with NEMA TC 14.AG and list and label as complying with UL 2515.
   2. Belowground (BG) RTRC: Comply with NEMA TC 14.BG and list and label as complying with UL 2420.
C. Supports: As recommended by manufacturer.
D. Fittings: Same type and manufacturer as conduit to be connected.

## 2.14 ACCESSORIES

A. Corrosion Protection Tape: PVC-based, minimum thickness of 20 mil, 0.020 inch (0.51 mm).
B. Conduit Joint Compound: Corrosion-resistant, electrically conductive compound listed as complying with UL 2419; suitable for use with conduit to be installed.
C. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.
D. Epoxy Adhesive for RTRC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.
E. Pull Strings: Use nylon or polyester tape with average breaking strength of not less than 1,250 lbf (5.6 kN).
F. Sealing Systems for Concrete Penetrations:
   1. Sleeves: Provide water stop ring or cement coating that bonds to concrete to prevent water infiltration.
   2. Rate for minimum of 40 psig; suitable for sealing around conduits to be installed.
G. Sealing Systems for Roof Penetrations: Premanufactured components and accessories as required to preserve integrity of roofing system and maintain roof warranty; suitable for conduits and roofing system to be installed; designed to accommodate existing penetrations where applicable.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. Verify that field measurements are as indicated.
B. Verify that mounting surfaces are ready to receive conduits.
C. Verify that conditions are satisfactory for installation prior to starting work.

### 3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions.
B. Install conduit in accordance with NECA 1.
C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
D. Install intermediate metal conduit (IMC) in accordance with NECA 101.
E. Install PVC-coated galvanized steel rigid metal conduit (RMC) using only tools approved by manufacturer.
F. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.
G. Conduit Routing:
    1. Unless dimensioned, conduit routing indicated is diagrammatic.
    2. When conduit destination is indicated without specific routing, determine exact routing required.
    3. Conduits in the following areas may be exposed, unless otherwise indicated:
        a. Electrical rooms.
        b. Mechanical equipment rooms.
        c. Within joists in areas with no ceiling.
    4. Conduits installed underground or embedded in concrete may be routed in shortest possible manner unless otherwise indicated. Route other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
    5. Arrange conduit to maintain adequate headroom, clearances, and access.
    6. Arrange conduit to provide no more than equivalent of four 90-degree bends between pull points.
    7. Arrange conduit to provide no more than 150 feet (46 m) between pull points.
    8. Route conduits above water and drain piping where possible.
    9. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
    10. Maintain minimum clearance of 6 inches (150 mm) between conduits and piping for other systems.
    11. Maintain minimum clearance of 12 inches (300 mm) between conduits and hot surfaces. This includes, but is not limited to:
        a. Heaters.
        b. Hot water piping.
        c. Flues.
H. Conduit Support:
    1. Secure and support conduits in accordance with NFPA 70 using suitable supports and methods approved by authorities having jurisdiction; see Section 260529.
    2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
    3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
    4. Use of wire for support of conduits is not permitted.
I. Connections and Terminations:
    1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
    2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
    3. Use suitable adapters where required to transition from one type of conduit to another.

4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
6. Provide insulating bushings, insulated throats, or listed metal fittings with smooth, rounded edges at conduit terminations to protect conductors.
7. Secure joints and connections to provide mechanical strength and electrical continuity.

J. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
2. Make penetrations perpendicular to surfaces unless otherwise indicated.
3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
4. Conceal bends for conduit risers emerging above ground.
5. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
6. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty.
7. Install firestopping to preserve fire resistance rating of partitions and other elements; see Section 078400.

K. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
2. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.
3. Where calculated in accordance with NFPA 70 for reinforced thermosetting resin conduit (RTRC) conduit installed above ground to compensate for thermal expansion and contraction.
4. Where conduits are subject to earth movement by settlement or frost.

L. Conduit Sealing:
1. Use foam conduit sealant to prevent entry of moisture and gases. This includes, but is not limited to:
   a. Where conduits enter building from outside.
   b. Where service conduits enter building from underground distribution system.
   c. Where conduits enter building from underground.
   d. Where conduits may transport moisture to contact live parts.
2. Where conduits cross barriers between areas of potential substantial temperature differential, use foam conduit sealant at accessible point near penetration to prevent condensation. This includes, but is not limited to:
   a. Where conduits pass from outdoors into conditioned interior spaces.
   b. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
   c. Where conduits penetrate coolers or freezers.

M. Provide pull string in each empty conduit and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches (300 mm) at each end.
N. Provide grounding and bonding; see Section 260526.
O. Identify conduits; see Section 260553.

## 3.3 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements for additional requirements.
B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
C. Where coating of PVC-coated galvanized steel rigid metal conduit (RMC) contains cuts or abrasions, repair in accordance with manufacturer's instructions.
D. Correct deficiencies and replace damaged or defective conduits.

## 3.4 CLEANING

A. Clean interior of conduits to remove moisture and foreign matter.

## 3.5 PROTECTION

A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

**END OF SECTION**

## SECTION 260533.16

## BOXES FOR ELECTRICAL SYSTEMS

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Outlet and device boxes up to 100 cubic inches (1,650 cu cm), including those used as junction and pull boxes.
B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches (1,650 cu cm).

### 1.2 RELATED REQUIREMENTS

A. Section 083100 - Access Doors and Panels: Panels for maintaining access to concealed boxes.
B. Section 260529 - Hangers and Supports for Electrical Systems.
C. Section 260533.13 - Conduit for Electrical Systems:
    1. Conduit bodies and other fittings.
    2. Additional requirements for locating boxes to limit conduit length and/or number of bends between pulling points.
D. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
E. Section 262726 - Wiring Devices:
    1. Wall plates.
F. Section 271000 - Structured Cabling: Additional requirements for communications systems outlet boxes.

### 1.3 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2016.
C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.
D. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.
E. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013 (Reaffirmed 2020).
F. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports; 2013 (Reaffirmed 2020).
G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
H. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
I. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
J. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.
K. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.
L. UL 514C - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers; Current Edition, Including All Revisions.

### 1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
    1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
    2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
    3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
    4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.

5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
6. Coordinate the work with other trades to preserve insulation integrity.
7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
8. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

## 1.5 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.
B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

## 1.6 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

# PART 2 – PRODUCTS

## 2.1 BOXES

A. General Requirements:
   1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
   2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
   3. Provide products listed, classified, and labeled as suitable for the purpose intended.
   4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
   5. Provide grounding terminals within boxes where equipment grounding conductors terminate.
B. Outlet and Device Boxes Up to 100 cubic inches (1,650 cu cm), Including Those Used as Junction and Pull Boxes:
   1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
   2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
   3. Use suitable concrete type boxes where flush-mounted in concrete.
   4. Use suitable masonry type boxes where flush-mounted in masonry walls.
   5. Use raised covers suitable for the type of wall construction and device configuration where required.
   6. Use shallow boxes where required by the type of wall construction.
   7. Do not use "through-wall" boxes designed for access from both sides of wall.
   8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
   9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
   10. Nonmetallic Boxes: Comply with NEMA OS 2, and list and label as complying with UL 514C.
   11. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
   12. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.

13. Minimum Box Size, Unless Otherwise Indicated:
    a. Communications Systems Outlets: Comply with Section 271000.
    b. Ceiling Outlets: 4 inch octagonal or square by 1-1/2 inch deep (100 by 38 mm) trade size.
14. Wall Plates: Comply with Section 262726.

C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
2. NEMA 250 Environment Type, Unless Otherwise Indicated:
3. Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
    a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
    b. Boxes 6 square feet (0.56 sq m) and Larger: Provide sectionalized screw-cover or hinged-cover enclosures.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. Verify that field measurements are as indicated.
B. Verify that mounting surfaces are ready to receive boxes.
C. Verify that conditions are satisfactory for installation prior to starting work.

### 3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions.
B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
D. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.
E. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.
F. Box Locations:
1. Locate boxes to be accessible. Provide access panels in accordance with Section 083100 as required where approved by the Architect.
2. Locate boxes so that wall plates do not span different building finishes.
3. Locate boxes so that wall plates do not cross masonry joints.
4. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
5. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches (150 mm) horizontal separation unless otherwise indicated.
6. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.
    a. Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches (610 mm) separation where wall is constructed with individual noncommunicating stud cavities or protect both boxes with listed putty pads.
    b. Do not install flush-mounted boxes with area larger than 16 square inches (0.0103 sq m) or such that the total aggregate area of openings exceeds 100 square inches (0.0645 sq m) for any 100 square feet (9.29 sq m) of wall area.
7. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 260533.13.

8. Locate junction and pull boxes in the following areas, unless otherwise indicated or approved by the Architect:
   a. Concealed above accessible suspended ceilings.
   b. Within joists in areas with no ceiling.
   c. Electrical rooms.
   d. Mechanical equipment rooms.

G. Box Supports:
   1. Secure and support boxes in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.
   2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
   3. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.

H. Install boxes plumb and level.

I. Flush-Mounted Boxes:
   1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch (6 mm) or does not project beyond finished surface.
   2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
   3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch (3 mm) at the edge of the box.

J. Install boxes as required to preserve insulation integrity.

K. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

L. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.

M. Close unused box openings.

N. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.

O. Provide grounding and bonding in accordance with Section 260526.

P. Identify boxes in accordance with Section 260553.

## 3.3 CLEANING

A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

## 3.4 PROTECTION

A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

**END OF SECTION**

## SECTION 260553

## IDENTIFICATION FOR ELECTRICAL SYSTEMS

### PART 1 – GENERAL

#### 1.1 SECTION INCLUDES
A. Electrical identification requirements.
B. Identification nameplates and labels.
C. Wire and cable markers.
D. Voltage markers.
E. Underground warning tape.
F. Floor marking tape.
G. Warning signs and labels.

#### 1.2 RELATED REQUIREMENTS
A. Section 099113 - Exterior Painting.
B. Section 099123 - Interior Painting.
C. Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.
D. Section 262726 - Wiring Devices - Lutron: Device and wallplate finishes; factory pre-marked wallplates.
E. Section 271000 - Structured Cabling: Identification for communications cabling and devices.

#### 1.3 REFERENCE STANDARDS
A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
B. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

#### 1.4 ADMINISTRATIVE REQUIREMENTS
A. Coordination:
   1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.
B. Sequencing:
   1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
   2. Do not install identification products until final surface finishes and painting are complete.

#### 1.5 QUALITY ASSURANCE
A. Comply with requirements of NFPA 70.

#### 1.6 FIELD CONDITIONS
A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

### PART 2 – PRODUCTS

#### 2.1 IDENTIFICATION REQUIREMENTS
A. Existing Work: Unless specifically excluded, identify existing elements to remain that are not already identified in accordance with specified requirements.
B. Identification for Equipment:
   1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
      a. Panelboards:
         1) Identify ampere rating.
         2) Identify voltage and phase.
         3) Identify power source and circuit number. Include location when not within sight of equipment.

4) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
5) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.

b. Transformers:
1) Identify kVA rating.
2) Identify voltage and phase for primary and secondary.
3) Identify power source and circuit number. Include location when not within sight of equipment.
4) Identify load(s) served. Include location when not within sight of equipment.

c. Enclosed switches, circuit breakers, and motor controllers:
1) Identify voltage and phase.
2) Identify power source and circuit number. Include location when not within sight of equipment.

d. Time Switches:
1) Identify load(s) served and associated circuits controlled. Include location.

2. Use voltage marker to identify highest voltage present for each piece of electrical equipment.
3. Use identification nameplate to identify disconnect location for equipment with remote disconnecting means.
4. Use identification label or handwritten text using indelible marker on inside of door at each fused switch to identify required NEMA fuse class and size.
5. Use identification label to identify overcurrent protective devices for branch circuits serving fire alarm circuits. Identify with text "FIRE ALARM CIRCUIT".
6. Use field-painted floor markings, floor marking tape, or warning labels to identify required equipment working clearances where indicated or where required by the authority having jurisdiction.
a. Field-Painted Floor Markings: Alternating black and white stripes, 3 inches (76 mm) wide, painted in accordance with Section 099123 and 099113.
7. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70, including but not limited to the following.
a. Service equipment.
8. Arc Flash Hazard Warning Labels: Use warning labels to identify arc flash hazards for electrical equipment, such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are likely to require examination, adjustment, servicing, or maintenance while energized.
9. Use warning labels, identification nameplates, or identification labels to identify electrical hazards for equipment where multiple power sources are present with the word message "DANGER; Hazardous voltage; Multiple power sources may be present; Disconnect all electric power including remote disconnects before servicing" or approved equivalent.

C. Identification for Conductors and Cables:
1. Color Coding for Power Conductors 600 V and Less: Comply with Section 260519.
2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.
3. Use wire and cable markers to identify circuit number or other designation indicated for power, control, and instrumentation conductors and cables at the following locations:
a. Within boxes when more than one circuit is present.
4. Use wire and cable markers to identify connected grounding electrode system components for grounding electrode conductors.
5. Use underground warning tape to identify direct buried cables.

D. Identification for Boxes:
   1. Use voltage markers to identify highest voltage present.
   2. Use identification labels or handwritten text using indelible marker to identify circuits enclosed.
E. Identification for Devices:
   1. Identification for Communications Devices: Comply with Section 271000.
   2. Wiring Device and Wallplate Finishes: Comply with Section 262726.
   3. Use identification label to identify fire alarm system devices.
   4. Use identification label or engraved wallplate to identify serving branch circuit for all receptacles.
   5. Use identification label to identify receptacles protected by upstream GFI protection, where permitted.
F. Identification for Luminaires:
   1. Use permanent red dot on luminaire frame to identify luminaires connected to emergency power system.

## 2.2 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:
   1. Materials:
      a. Indoor Clean, Dry Locations: Use plastic nameplates.
      b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
   2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch (1.6 mm); engraved text.
   3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.
   4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.
   5. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch (25 mm) high; Four, located at corners for larger sizes.
B. Identification Labels:
   1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
   2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.
C. Format for Equipment Identification:
   1. Minimum Size: 1 inch (25 mm) by 2.5 inches (64 mm).
   2. Legend:
      a. Equipment designation or other approved description.
   3. Text: All capitalized unless otherwise indicated.
   4. Minimum Text Height:
      a. Equipment Designation: 1/2 inch (13 mm).
   5. Color:
      a. Normal Power System: White text on black background.
D. Format for Receptacle Identification:
   1. Minimum Size: 3/8 inch (10 mm) by 1.5 inches (38 mm).
   2. Legend: Power source and circuit number or other designation indicated.
      a. Include voltage and phase for other than 120 V, single phase circuits.
   3. Text: All capitalized unless otherwise indicated.
   4. Minimum Text Height: 3/16 inch (5 mm).
   5. Color: Black text on clear background.
E. Format for Fire Alarm Device Identification:
   1. Minimum Size: 3/8 inch (10 mm) by 1.5 inches (38 mm).
   2. Legend: Designation indicated and device zone or address.

3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 3/16 inch (5 mm).
5. Color: Red text on white background.

## 2.3 WIRE AND CABLE MARKERS

A. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.
B. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.
C. Legend: Power source and circuit number or other designation indicated.
D. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.
E. Minimum Text Height: 1/8 inch (3 mm).
F. Color: Black text on white background unless otherwise indicated.

## 2.4 VOLTAGE MARKERS

A. Markers for Boxes and Equipment Enclosures: Use factory pre-printed self-adhesive vinyl or self-adhesive vinyl cloth type markers.
B. Minimum Size:
   1. Markers for Equipment: 1 1/8 by 4 1/2 inches (29 by 110 mm).
   2. Markers for Pull Boxes: 1 1/8 by 4 1/2 inches (29 by 110 mm).
   3. Markers for Junction Boxes: 1/2 by 2 1/4 inches (13 by 57 mm).
C. Legend:
   1. Markers for Voltage Identification: Highest voltage present.
D. Color: Black text on orange background unless otherwise indicated.

## 2.5 UNDERGROUND WARNING TAPE

A. Materials: Use non-detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.
B. Non-detectable Type Tape: 6 inches (152 mm) wide, with minimum thickness of 4 mil (0.1 mm).
C. Legend: Type of service, continuously repeated over full length of tape.
D. Color:

## 2.6 FLOOR MARKING TAPE

A. Floor Marking Tape for Equipment Working Clearance Identification: Self-adhesive vinyl or polyester tape with overlaminate, 3 inches (76 mm) wide, with alternating black and white stripes.

## 2.7 WARNING SIGNS AND LABELS

A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.
B. Warning Signs:
   1. Materials:
   2. Minimum Size: 7 by 10 inches (178 by 254 mm) unless otherwise indicated.
C. Warning Labels:
   1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
   2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
   3. Minimum Size: 2 by 4 inches (51 mm by 102 mm) unless otherwise indicated.

## PART 3 – EXECUTION

### 3.1 PREPARATION

A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

### 3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions.
B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
   1. Surface-Mounted Equipment: Enclosure front.
   2. Flush-Mounted Equipment: Inside of equipment door.
   3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
   4. Elevated Equipment: Legible from the floor or working platform.
   5. Branch Devices: Adjacent to device.
   6. Interior Components: Legible from the point of access.
   7. Boxes: Outside face of cover.
   8. Conductors and Cables: Legible from the point of access.
   9. Devices: Outside face of cover.
C. Install identification products centered, level, and parallel with lines of item being identified.
D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.
F. Install underground warning tape above buried lines with one tape per trench at 3 inches (75 mm) below finished grade.
G. Mark all handwritten text, where permitted, to be neat and legible.

### 3.3 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.
B. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

**END OF SECTION**

# SECTION 262200

# LOW-VOLTAGE TRANSFORMERS

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. General purpose transformers.

### 1.2 RELATED REQUIREMENTS
A. Section 260526 - Grounding and Bonding for Electrical Systems.
B. Section 260529 - Hangers and Supports for Electrical Systems.
C. Section 260533.13 - Conduit for Electrical Systems: Flexible conduit connections.
D. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

### 1.3 REFERENCE STANDARDS
A. 10 CFR 431, Subpart K - Energy Efficiency Program for Certain Commercial and Industrial Equipment - Distribution Transformers; Current Edition.
B. IEEE C57.94 - IEEE Recommended Practice for Installation, Application, Operation, and Maintenance of Dry-Type Distribution and Power Transformers; 2015.
C. IEEE C57.96 - IEEE Standard Guide for Loading Dry-Type Distribution and Power Transformers; 2013.
D. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
E. NECA 409 - Standard for Installing and Maintaining Dry-Type Transformers; 2015.
F. NEMA ST 20 - Dry Type Transformers for General Applications; 2021.
G. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.
H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
I. UL 506 - Standard for Specialty Transformers; Current Edition, Including All Revisions.
J. UL 1561 - Standard for Dry-Type General Purpose and Power Transformers; Current Edition, Including All Revisions.

### 1.4 ADMINISTRATIVE REQUIREMENTS
A. Coordination:
   1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances required by NFPA 70.
   2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   3. Coordinate the work with placement of supports, anchors, etc. required for mounting.
   4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
   5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

### 1.5 SUBMITTALS
A. See Section 013300 - Administrative Requirements, for submittal procedures.
B. Product Data: Include voltage, kVA, impedance, tap configurations, insulation system class and rated temperature rise, efficiency, sound level, enclosure ratings, outline and support point dimensions, weight, required clearances, service condition requirements, and installed features.
C. Project Record Documents: Record actual locations of transformers.

### 1.6 QUALITY ASSURANCE
A. Comply with requirements of NFPA 70.
B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

## 1.7 DELIVERY, STORAGE, AND HANDLING

A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to transformer internal components, enclosure, and finish.

## 1.8 FIELD CONDITIONS

A. Ambient Temperature: Do not exceed the following maximum temperatures during and after installation of transformers.
   1. Greater than 10 kVA: 104 degrees F (40 degrees C) maximum.

## 1.9 WARRANTY

A. See Section 017700 - Closeout Submittals, for additional warranty requirements.

# PART 2 – PRODUCTS

## 2.1 MANUFACTURERS

A. Source Limitations: Provide transformers produced by same manufacturer as other electrical distribution equipment used for project and obtained from single supplier.

## 2.2 TRANSFORMERS - GENERAL REQUIREMENTS

A. Description: Factory-assembled, dry type transformers for 60 Hz operation designed and manufactured in accordance with NEMA ST 20 and listed, classified, and labeled as suitable for the purpose intended.
B. Unless noted otherwise, transformer ratings indicated are for continuous loading according to IEEE C57.96 under the following service conditions:
   1. Altitude: Less than 3,300 feet (1,000 m).
   2. Ambient Temperature:
      a. Greater than 10 kVA: Not exceeding 104 degrees F (40 degrees C).
C. Core: High grade, non-aging silicon steel with high magnetic permeability and low hysteresis and eddy current losses. Keep magnetic flux densities substantially below saturation point, even at 10 percent primary overvoltage. Tightly clamp core laminations to prevent plate movement and maintain consistent pressure throughout core length.
D. Impregnate core and coil assembly with non-hydroscopic thermo-setting varnish to effectively seal out moisture and other contaminants.
E. Basic Impulse Level: 10 kV.
F. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap.
G. Isolate core and coil from enclosure using vibration-absorbing mounts.
H. Nameplate: Include transformer connection data, ratings, wiring diagrams, and overload capacity based on rated winding temperature rise.

## 2.3 GENERAL PURPOSE TRANSFORMERS

A. Description: Self-cooled, two winding transformers listed and labeled as complying with UL 506 or UL 1561; ratings as indicated.
B. Primary Voltage: 480 volts delta, 3 phase.
C. Secondary Voltage: 208Y/120 volts, 3 phase.
D. Insulation System and Allowable Average Winding Temperature Rise:
   1. 15 kVA and Larger: Class 220 degrees C insulation system with 150 degrees C average winding temperature rise.
E. Coil Conductors: Continuous copper windings with terminations brazed or welded.

F. Winding Taps:
   1. 15 kVA through 300 kVA: Two 2.5 percent full capacity primary taps above and four 2.5 percent full capacity primary taps below rated voltage.
G. Energy Efficiency: Comply with 10 CFR 431, Subpart K.
H. Sound Levels: Standard sound levels complying with NEMA ST 20.
I. Mounting Provisions:
   1. 75 kVA through 150 kVA: Suitable for wall, floor, or trapeze mounting.
J. Transformer Enclosure: Comply with NEMA ST 20.
   1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
      a. Indoor clean, dry locations: Type 2.
   2. Construction: Steel.
      a. 15 kVA and Larger: Ventilated.
   3. Finish: Manufacturer's standard grey, suitable for outdoor installations.
   4. Provide lifting eyes or brackets.
K. Accessories:
   1. Mounting Brackets: Provide manufacturer's standard brackets.
   2. Lug Kits: Sized as required for termination of conductors as indicated on the drawings.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. Verify that field measurements are as indicated.
B. Verify that suitable support frames and anchors are installed where required and that mounting surfaces are ready to receive transformers.
C. Perform pre-installation tests and inspections on transformers per manufacturer's instructions and as specified in NECA 409. Correct deficiencies prior to installation.
D. Verify that conditions are satisfactory for installation prior to starting work.

### 3.2 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship).
B. Install products in accordance with manufacturer's instructions.
C. Install transformers in accordance with NECA 409 and IEEE C57.94.
D. Use flexible conduit, under the provisions of Section 260533.13, 2 feet (600 mm) minimum length, for connections to transformer case. Make conduit connections to side panel of enclosure.
E. Arrange equipment to provide minimum clearances as specified on transformer nameplate and in accordance with manufacturer's instructions and NFPA 70.
F. Install transformers plumb and level.
G. Transformer Support:
   1. Provide required support and attachment in accordance with Section 260529, where not furnished by transformer manufacturer.
   2. Use integral transformer flanges, accessory brackets furnished by manufacturer, or field-fabricated supports to support wall-mounted transformers.
   3. Use trapeze hangers assembled from threaded rods and metal channel (strut) to support suspended transformers. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
H. Provide grounding and bonding in accordance with Section 260526.
I. Remove shipping braces and adjust bolts that attach the core and coil mounting bracket to the enclosure according to manufacturer's recommendations in order to reduce audible noise transmission.
J. Where not factory-installed, install lugs sized as required for termination of conductors as indicated.
K. Identify transformers in accordance with Section 260553.

## 3.3 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

## 3.4 ADJUSTING

A. Measure primary and secondary voltages and make appropriate tap adjustments.
B. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

## 3.5 CLEANING

A. Clean dirt and debris from transformer components according to manufacturer's instructions.
B. Repair scratched or marred exterior surfaces to match original factory finish.

**END OF SECTION**

**SECTION 262416**

**PANELBOARDS**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Lighting and appliance panelboards.
B. Overcurrent protective devices for panelboards.

### 1.2 RELATED REQUIREMENTS
A. Section 260526 - Grounding and Bonding for Electrical Systems.
B. Section 260529 - Hangers and Supports for Electrical Systems.
C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

### 1.3 REFERENCE STANDARDS
A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service; 2013e, with Amendment (2017).
B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
C. NECA 407 - Standard for Installing and Maintaining Panelboards; 2015.
D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.
E. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2008 (Reaffirmed 2020).
F. NEMA PB 1 - Panelboards; 2011.
G. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less; 2013.
H. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems; 2021.
I. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
J. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
K. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
L. UL 67 - Panelboards; Current Edition, Including All Revisions.
M. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.
N. UL 1053 - Ground-Fault Sensing and Relaying Equipment; Current Edition, Including All Revisions.

### 1.4 ADMINISTRATIVE REQUIREMENTS
A. Coordination:
   1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
   2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   3. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted panelboards where indicated.
   4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
   5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

### 1.5 SUBMITTALS
A. See Section 013300 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.

C. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.
D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.
   2. Panelboard Keys: Two of each different key.

## 1.6 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.
B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

## 1.7 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.
B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

## 1.8 FIELD CONDITIONS

A. Maintain ambient temperature within the following limits during and after installation of panelboards:
   1. Panelboards Containing Circuit Breakers: Between 23 degrees F (-5 degrees C) and 104 degrees F (40 degrees C).

# PART 2 – PRODUCTS

## 2.1 MANUFACTURERS

A. Match existing panel's manufacturer.

## 2.2 PANELBOARDS - GENERAL REQUIREMENTS

A. Provide products listed, classified, and labeled as suitable for the purpose intended.
B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
   1. Altitude: Less than 6,600 feet (2,000 m).
   2. Ambient Temperature:
      a. Panelboards Containing Circuit Breakers: Between 23 degrees F (-5 degrees C) and 104 degrees F (40 degrees C).
C. Short Circuit Current Rating:
   1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
D. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.
E. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.
F. Bussing: Sized in accordance with UL 67 temperature rise requirements.
   1. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
G. Conductor Terminations: Suitable for use with the conductors to be installed.
H. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
   1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
      a. Indoor Clean, Dry Locations: Type 1.
      b. Outdoor Locations: Type 3R.

2. Boxes: Galvanized steel unless otherwise indicated.
   a. Provide wiring gutters sized to accommodate the conductors to be installed.
3. Fronts:
   a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
   b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.
   c. Finish for Painted Steel Fronts: Manufacturer's standard grey unless otherwise indicated.
4. Lockable Doors: All locks keyed alike unless otherwise indicated.

I. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.

J. Panelboard Contactors: Where panelboard contactors are indicated, provide electrically operated, mechanically held magnetic contactor complying with NEMA ICS 2.
1. Ampere Rating: Not less than ampere rating of panelboard bus.
2. Short Circuit Current Rating: Not less than the panelboard short circuit current rating.
3. Coil Voltage: As required for connection to control system indicated.

K. Ground Fault Protection: Where ground-fault protection is indicated, provide system listed and labeled as complying with UL 1053.

L. Load centers are not acceptable.

## 2.3 LIGHTING AND APPLIANCE PANELBOARDS

A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

B. Conductor Terminations:
1. Main and Neutral Lug Material: Copper, suitable for terminating copper conductors only.
2. Main and Neutral Lug Type: Mechanical.

C. Bussing:
1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
2. Phase and Neutral Bus Material: Copper.
3. Ground Bus Material: Copper.

D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.

E. Enclosures:
1. Provide surface-mounted or flush-mounted enclosures as indicated.
2. Fronts: Provide door-in-door trim with hinged cover for access to load terminals and wiring gutters, and separate lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
3. Provide clear plastic circuit directory holder mounted on inside of door.

## 2.4 OVERCURRENT PROTECTIVE DEVICES

A. Molded Case Circuit Breakers:
1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
2. Interrupting Capacity:
   a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
      1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
      2) 10,000 rms symmetrical amperes at 480 VAC.
   b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
3. Conductor Terminations:
   a. Lug Material: Copper, suitable for terminating copper conductors only.

4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
   a. Provide field-adjustable magnetic instantaneous trip setting for circuit breaker frame sizes 225 amperes and larger.
5. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
6. Do not use tandem circuit breakers.
7. Do not use handle ties in lieu of multi-pole circuit breakers.
8. Provide multi-pole circuit breakers for multi-wire branch circuits as required by NFPA 70.
9. Provide the following features and accessories where indicated or where required to complete installation:
   a. Shunt Trip: Provide coil voltage as required for connection to indicated trip actuator.
   b. Handle Pad-Lock Provision: For locking circuit breaker handle in OFF position.

## 2.5 SOURCE QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.
B. Factory test panelboards according to NEMA PB 1.

# PART 3 – EXECUTION

## 3.1 EXAMINATION

A. Verify that field measurements are as indicated.
B. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.
C. Verify that mounting surfaces are ready to receive panelboards.
D. Verify that conditions are satisfactory for installation prior to starting work.

## 3.2 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship).
B. Install products in accordance with manufacturer's instructions.
C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.
D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
E. Provide required support and attachment in accordance with Section 260529.
F. Install panelboards plumb.
G. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.
H. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches (2000 mm) above the floor or working platform.
I. Provide grounding and bonding in accordance with Section 260526.
J. Install all field-installed branch devices, components, and accessories.
K. Set field-adjustable ground fault protection pickup and time delay settings as indicated.
L. Provide filler plates to cover unused spaces in panelboards.
M. Provide circuit breaker lock-on devices to prevent unauthorized personnel from de-energizing essential loads where indicated. Also provide for the following:
   1. Emergency and night lighting circuits.
   2. Fire detection and alarm circuits.
   3. Communications equipment circuits.
   4. Intrusion detection and access control system circuits.
   5. Video surveillance system circuits.
N. Identify panelboards in accordance with Section 260553.

## 3.3 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.
B. Inspect and test in accordance with NETA ATS, except Section 4.
C. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for all main circuit breakers and circuit breakers larger than _____ amperes. Tests listed as optional are not required.
D. Ground Fault Protection Systems: Test in accordance with manufacturer's instructions as required by NFPA 70.
E. Test GFCI circuit breakers to verify proper operation.
F. Test shunt trips to verify proper operation.
G. Correct deficiencies and replace damaged or defective panelboards or associated components.

## 3.4 ADJUSTING

A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
B. Adjust alignment of panelboard fronts.
C. Load Balancing: For each panelboard, rearrange circuits such that the difference between each measured steady state phase load does not exceed 10 percent and adjust circuit directories accordingly. Maintain proper phasing for multi-wire branch circuits.

## 3.5 CLEANING

A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.
B. Repair scratched or marred exterior surfaces to match original factory finish.

**END OF SECTION**

**SECTION 262726**

**WIRING DEVICES**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Wall switches.
B. Wall dimmers.
C. Fan speed controllers.
D. Receptacles.
E. Wall plates and covers.

### 1.2 RELATED REQUIREMENTS
A. Section 260533.16 - Boxes for Electrical Systems.
B. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

### 1.3 REFERENCE STANDARDS
A. FS W-C-596 - Connector, Electrical, Power, General Specification for; 2014h, with Amendments (2017).
B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush Mounted (General Specification); 2014g, with Amendment (2017).
C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
D. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2016.
E. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (Reaffirmed 2020).
F. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2021.
G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
H. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.
I. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.
J. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.
K. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.
L. UL 1472 - Solid-State Dimming Controls; Current Edition, Including All Revisions.
M. UL 1917 - Solid-State Fan Speed Controls; Current Edition, Including All Revisions.

### 1.4 ADMINISTRATIVE REQUIREMENTS
A. Coordination:
   1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
   2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
   3. Coordinate the placement of outlet boxes for wall switches with actual installed door swings.
   4. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
   5. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.
B. Sequencing:
   1. Do not install wiring devices until final surface finishes and painting are complete.

### 1.5 SUBMITTALS
A. See Section 013300 - Administrative Requirements, for submittal procedures.

### 1.6 QUALITY ASSURANCE
A. Comply with requirements of NFPA 70.
B. Products: Listed, classified, and labeled as suitable for the purpose intended.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

## 1.7 DELIVERY, STORAGE, AND PROTECTION

A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

# PART 2 – PRODUCTS

## 2.1 WIRING DEVICE APPLICATIONS

A. Provide wiring devices suitable for intended use and with ratings adequate for load served.
B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.
C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.
D. Provide GFCI protection for receptacles installed within 6 feet (1.8 m) of sinks.
E. Provide GFCI protection for receptacles installed in kitchens.
F. Unless noted otherwise, do not use combination switch/receptacle devices.

## 2.2 WIRING DEVICE FINISHES

A. Provide wiring device finishes as described below unless otherwise indicated.
B. Wiring Devices, Unless Otherwise Indicated: White with white nylon wall plate.

## 2.3 WALL SWITCHES

A. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.
B. Standard Wall Switches: Industrial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

## 2.4 WALL DIMMERS

A. Wall Dimmers - General Requirements: Solid-state with continuous full-range even control following square law dimming curve, integral radio frequency interference filtering, power failure preset memory, air gap switch accessible without removing wall plate, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 1472; types and ratings suitable for load controlled as indicated on the drawings.

## 2.5 FAN SPEED CONTROLLERS

A. Description: 120 V AC, solid-state, full-range variable speed, slide control type with separate on/off switch, with integral radio frequency interference filtering, fan noise elimination circuitry, power failure preset memory, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 1917.
   1. Current Rating: 1.5 A unless otherwise indicated or required to control the load indicated on the drawings.

## 2.6 RECEPTACLES

A. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.

2. NEMA configurations specified are according to NEMA WD 6.

B. Convenience Receptacles:
   1. Standard Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
   2. Weather Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as weather resistant type complying with UL 498 Supplement SD suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.

C. GFCI Receptacles:
   1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
   2. Standard GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
   3. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SD suitable for installation in damp or wet locations.

## 2.7 WALL PLATES AND COVERS

A. Wall Plates: Comply with UL 514D.
   1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
   2. Size: Standard; _____.
   3. Screws: Metal with slotted heads finished to match wall plate finish.

# PART 3 – EXECUTION

## 3.1 EXAMINATION

A. Verify that field measurements are as indicated.
B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
D. Verify that final surface finishes are complete, including painting.
E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
F. Verify that conditions are satisfactory for installation prior to starting work.

## 3.2 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.
B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

## 3.3 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
B. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of wiring devices provided under this section.
   1. Mounting Heights: Unless otherwise indicated, as follows:
      a. Wall Switches: 48 inches (1200 mm) above finished floor.
      b. Wall Dimmers: 48 inches (1200 mm) above finished floor.
      c. Fan Speed Controllers: 48 inches (1200 mm) above finished floor.
      d. Receptacles: 18 inches (450 mm) above finished floor or 6 inches (150 mm) above counter.
   2. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.

3. Where multiple receptacles, wall switches, or wall dimmers are installed at the same location and at the same mounting height, gang devices together under a common wall plate.
4. Locate wall switches on strike side of door with edge of wall plate 3 inches (80 mm) from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.
5. Locate receptacles for electric drinking fountains concealed behind drinking fountain according to manufacturer's instructions.

C. Install wiring devices in accordance with manufacturer's instructions.
D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
E. Where required, connect wiring devices using pigtails not less than 6 inches (150 mm) long. Do not connect more than one conductor to wiring device terminals.
F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
H. Install wiring devices plumb and level with mounting yoke held rigidly in place.
I. Install wall switches with OFF position down.
J. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.
K. Do not share neutral conductor on branch circuits utilizing wall dimmers.
L. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.
M. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
N. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.
O. Identify wiring devices in accordance with Section 260553.

## 3.4 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.
B. Inspect each wiring device for damage and defects.
C. Operate each wall switch, wall dimmer, and fan speed controller with circuit energized to verify proper operation.
D. Test each receptacle to verify operation and proper polarity.
E. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
F. Correct wiring deficiencies and replace damaged or defective wiring devices.

## 3.5 ADJUSTING

A. Adjust devices and wall plates to be flush and level.
B. Adjust presets for wall dimmers according to manufacturer's instructions as directed by Architect.

## 3.6 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

**END OF SECTION**

**SECTION 265100**

**INTERIOR LIGHTING**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Interior luminaires.
B. Emergency lighting units.
C. Exit signs.
D. Ballasts and drivers.
E. Accessories.

### 1.2 RELATED REQUIREMENTS
A. Section 260529 - Hangers and Supports for Electrical Systems.
B. Section 260533.16 - Boxes for Electrical Systems.

### 1.3 REFERENCE STANDARDS
A. IES LM-79 - Approved Method: Optical and Electrical Measurements of Solid-State Lighting Products; 2019.
B. IES LM-80 - Approved Method: Measuring Maintenance of Light Output Characteristics of Solid-State Light Sources ; 2021.
C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
D. NECA/IESNA 500 - Standard for Installing Indoor Lighting Systems; 2006.
E. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; 2006.
F. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility; 2012 (Reaffirmed 2018).
G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
H. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
I. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.
J. UL 1598 - Luminaires; Current Edition, Including All Revisions.
K. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

### 1.4 ADMINISTRATIVE REQUIREMENTS
A. Coordination:
   1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.
   2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
   3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.
   4. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

### 1.5 SUBMITTALS
A. See Section 013300 - Administrative Requirements, for submittal procedures.
B. Shop Drawings:
   1. Provide photometric calculations where luminaires are proposed for substitution upon request.
C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.

1. LED Luminaires:
   a. Include estimated useful life, calculated based on IES LM-80 test data.

D. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.
   2. Extra Lenses and Louvers: Two percent of total quantity installed for each type, but not less than one of each type.

## 1.6 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

## 1.7 DELIVERY, STORAGE, AND PROTECTION

A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting), NECA/IESNA 502 (industrial lighting), and manufacturer's written instructions.

B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

## 1.8 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

## 1.9 WARRANTY

A. See Section 017700 - Closeout Submittals, for additional warranty requirements.

B. Provide 3-year manufacturer warranty for LED luminaires, including drivers.

C. Provide 5-year pro-rata warranty for batteries for emergency lighting units.

D. Provide 10-year pro-rata warranty for batteries for self-powered exit signs.

# PART 2 – PRODUCTS

## 2.1 LUMINAIRE TYPES

A. Furnish products as indicated in luminaire schedule included on the drawings.

## 2.2 LUMINAIRES

A. Manufacturers:
   1. Hubbell Lighting, Inc; _____: www.hubbelllighting.com/#sle.
   2. Substitutions: See Section 016000 - Product Requirements.

B. Provide products that comply with requirements of NFPA 70.

C. Provide products that are listed and labeled as complying with UL 1598, where applicable.

D. Provide products listed, classified, and labeled as suitable for the purpose intended.

E. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.

F. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.

G. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

H. Recessed Luminaires:
   1. Ceiling Compatibility: Comply with NEMA LE 4.
   2. Luminaires Recessed in Insulated Ceilings: Listed and labeled as IC-rated, suitable for direct contact with insulation and combustible materials.
I. LED Luminaires:
   1. Components: UL 8750 recognized or listed as applicable.
   2. Tested in accordance with IES LM-79 and IES LM-80.
   3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

## 2.3 EMERGENCY LIGHTING UNITS

A. Manufacturers:
   1. Hubbell Lighting, Inc; _____: www.hubbelllighting.com/#sle.
   2. Substitutions: See Section 016000 - Product Requirements.
B. Description: Emergency lighting units complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
C. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
D. Battery:
   1. Size battery to supply all connected lamps, including emergency remote heads where indicated.
E. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
F. Provide low-voltage disconnect to prevent battery damage from deep discharge.

## 2.4 EXIT SIGNS

A. Description: Exit signs complying with NFPA 101 and applicable state and local codes, and listed and labeled as complying with UL 924.
   1. Number of Faces: Single- or double-face as indicated or as required for installed location.
   2. Directional Arrows: As indicated or as required for installed location.
B. Powered Exit Signs: Internally illuminated with LEDs unless otherwise indicated.
   1. Manufacturers:
      a. Hubbell Lighting, Inc; _____: www.hubbelllighting.com/#sle.
      b. Substitutions: See Section 016000 - Product Requirements.

## 2.5 BALLASTS AND DRIVERS

A. Ballasts/Drivers - General Requirements:
   1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
   2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.
B. Dimmable LED Drivers:
   1. Dimming Range: Continuous dimming from 100 percent to five percent relative light output unless dimming capability to lower level is indicated, without flicker.
   2. Control Compatibility: Fully compatible with the dimming controls to be installed.

## 2.6 ACCESSORIES

A. Stems for Suspended Luminaires: Steel tubing, minimum 1/2" size, factory finished to match luminaire or field-painted as directed.
B. Threaded Rods for Suspended Luminaires: Zinc-plated steel, minimum 1/4" size, field-painted as directed.
C. Provide accessory plaster frames for luminaires recessed in plaster ceilings.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. Verify that field measurements are as indicated.
B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
C. Verify that suitable support frames are installed where required.
D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
E. Verify that conditions are satisfactory for installation prior to starting work.

### 3.2 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.
B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

### 3.3 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of luminaires provided under this section.
B. Perform work in accordance with NECA 1 (general workmanship).
C. Install products in accordance with manufacturer's instructions.
D. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).
E. Provide required support and attachment in accordance with Section 260529.
F. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
G. Suspended Ceiling Mounted Luminaires:
    1. Do not use ceiling tiles to bear weight of luminaires.
    2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.
    3. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.
    4. See appropriate Division 9 section where suspended grid ceiling is specified for additional requirements.
H. Recessed Luminaires:
    1. Install trims tight to mounting surface with no visible light leakage.
I. Install accessories furnished with each luminaire.
J. Bond products and metal accessories to branch circuit equipment grounding conductor.
K. Emergency Lighting Units:
    1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.
L. Exit Signs:
    1. Install lock-on device on branch circuit breaker serving units.
M. Install lamps in each luminaire.

### 3.4 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.
B. Inspect each product for damage and defects.
C. Operate each luminaire after installation and connection to verify proper operation.
D. Test self-powered exit signs, emergency lighting units, and fluorescent emergency power supply units to verify proper operation upon loss of normal power supply.
E. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

## 3.5 ADJUSTING

A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.
B. Aim and position adjustable emergency lighting unit lamps to achieve optimum illumination of egress path as required or as directed by Architect or authority having jurisdiction.
C. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Architect or authority having jurisdiction.

## 3.6 CLEANING

A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

## 3.7 CLOSEOUT ACTIVITIES

A. See Section 017700 - Closeout Submittals, for closeout submittals.
B. See Section 017900 - Demonstration and Training, for additional requirements.
C. Just prior to Substantial Completion, replace all lamps that have failed.

## 3.8 PROTECTION

A. Protect installed luminaires from subsequent construction operations.

**END OF SECTION**

**SECTION 265600**

**EXTERIOR LIGHTING**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Exterior luminaires.
B. Poles and accessories.

### 1.2 RELATED REQUIREMENTS
A. Section 033000 - Cast-in-Place Concrete: Materials and installation requirements for concrete bases for poles.
B. Section 260529 - Hangers and Supports for Electrical Systems.
C. Section 260533.16 - Boxes for Electrical Systems.

### 1.3 REFERENCE STANDARDS
A. IEEE C2 - National Electrical Safety Code(R) (NESC(R)); 2023.
B. IES LM-80 - Approved Method: Measuring Maintenance of Light Output Characteristics of Solid-State Light Sources ; 2021.
C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
D. NECA/IESNA 501 - Standard for Installing Exterior Lighting Systems; 2000 (Reaffirmed 2006).
E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
F. UL 1598 - Luminaires; Current Edition, Including All Revisions.

### 1.4 ADMINISTRATIVE REQUIREMENTS
A. Coordination:
   1. Coordinate placement of poles and associated foundations with utilities, curbs, sidewalks, trees, walls, fences, striping, etc. installed under other sections or by others. Coordinate elevation to obtain specified foundation height.
   2. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

### 1.5 SUBMITTALS
A. See Section 013300 - Administrative Requirements, for submittal procedures.
B. Shop Drawings:
   1. Provide photometric calculations where luminaires are proposed for substitution upon request.
C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.
   1. LED Luminaires:
      a. Include estimated useful life, calculated based on IES LM-80 test data.
D. Project Record Documents: Record actual connections and locations of pole foundations, luminaires, and any pull or junction boxes.

### 1.6 QUALITY ASSURANCE
A. Comply with requirements of NFPA 70.
B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

## 1.7 DELIVERY, STORAGE, AND HANDLING

A. Receive, handle, and store products according to NECA/IESNA 501 and manufacturer's written instructions.
B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

## 1.8 WARRANTY

A. See Section 017700 - Closeout Submittals, for additional warranty requirements.
B. Provide 5-year manufacturer warranty for all LED luminaires, including drivers.

# PART 2 – PRODUCTS

## 2.1 LUMINAIRE TYPES

A. Furnish products as indicated in luminaire schedule included on the drawings.

## 2.2 LUMINAIRES

A. Provide products that comply with requirements of NFPA 70.
B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
C. Provide products listed, classified, and labeled as suitable for the purpose intended.
D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.
F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

## 2.3 POLES

A. All Poles:
   1. Provide poles and associated support components suitable for the luminaire(s) and associated supports and accessories to be installed.
B. Metal Poles: Provide ground lug, accessible from handhole or transformer base.

# PART 3 – EXECUTION

## 3.1 EXAMINATION

A. Verify that field measurements are as indicated.
B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
C. Verify that suitable support frames are installed where required.
D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
E. Verify that conditions are satisfactory for installation prior to starting work.

## 3.2 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.
B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

## 3.3 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of luminaires provided under this section.
B. Install products in accordance with manufacturer's instructions.
C. Install luminaires in accordance with NECA/IESNA 501.
D. Provide required support and attachment in accordance with Section 260529.
E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
F. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
G. Pole-Mounted Luminaires:
    1. Maintain the following minimum clearances:
        a. Comply with IEEE C2.
        b. Comply with utility company requirements.
    2. Foundation-Mounted Poles:
        a. Provide cast-in-place concrete foundations for poles as indicated, in accordance with Section 033000.
            1) Install anchor bolts plumb per template furnished by pole manufacturer.
            2) Position conduits to enter pole shaft.
        b. Install foundations plumb.
        c. Install poles plumb, using leveling nuts or shims as required to adjust to plumb.
        d. Tighten anchor bolt nuts to manufacturer's recommended torque.
        e. Install non-shrink grout between pole anchor base and concrete foundation, leaving small channel for condensation drainage.
        f. Install anchor base covers or anchor bolt covers as indicated.
    3. Grounding:
        a. Bond luminaires, metal accessories, metal poles, and foundation reinforcement to branch circuit equipment grounding conductor.
    4. Install separate service conductors, 12 AWG copper, from each luminaire down to handhole for connection to branch circuit conductors.
H. Install accessories furnished with each luminaire.
I. Bond products and metal accessories to branch circuit equipment grounding conductor.
J. Install lamps in each luminaire.

## 3.4 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.
B. Inspect each product for damage and defects.
C. Operate each luminaire after installation and connection to verify proper operation.
D. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

## 3.5 ADJUSTING

A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.

## 3.6 CLEANING

A. Clean surfaces according to NECA/IESNA 501 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

## 3.7 CLOSEOUT ACTIVITIES

A. See Section 017700 - Closeout Submittals, for closeout submittals.

## 3.8 PROTECTION

A. Protect installed luminaires from subsequent construction operations.

**END OF SECTION**

## SECTION 270529

## HANGERS AND SUPPORTS FOR COMMUNICATIONS SYSTEMS

### PART 1 – GENERAL

#### 1.1 SECTION INCLUDES

A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other communications work.

#### 1.2 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete.

#### 1.3 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2023.
D. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2022.
E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023b.
F. BICSI ITSIMM - Information Technology Systems Installation Methods Manual (ITSIMM), 8th Edition; 2022.
G. BICSI N1 - Installation Practices for Telecommunications and ICT Cabling and Related Cabling Infrastructure, 1st Edition; 2019.
H. MFMA-4 - Metal Framing Standards Publication; 2004.
I. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
J. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
K. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
L. TIA-569 - Telecommunications Pathways and Spaces; 2019e.
M. UL 2043 - Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces; Current Edition, Including All Revisions.

#### 1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes and arrangement of supports and bases with actual equipment and components to be installed.
   2. Coordinate work to provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at installed locations.
   4. Coordinate arrangement of supports with ductwork, piping, equipment and other potential conflicts.
   5. Notify Architect of conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
B. Sequencing:
   1. Do not install products on or provide attachment to concrete surfaces until concrete has cured; see Section 033000.

#### 1.5 QUALITY ASSURANCE

A. Product Listing Organization Qualifications: Organization recognized by OSHA as Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

## PART 2 – PRODUCTS

### 2.1 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
   1. Comply with the following. Where requirements differ, comply with most stringent.
      a. TIA-569.
      b. NFPA 70.
      c. Requirements of authorities having jurisdiction.
   2. Provide required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for complete installation of communications work.
   3. Provide products listed, classified, and labeled as suitable for purpose intended, where applicable.
   4. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for load to be supported with minimum safety factor of _____. Include consideration for vibration, equipment operation, and shock loads where applicable.
   5. Do not use products for applications other than as permitted by NFPA 70 and product listing.
   6. Steel Components: Use corrosion-resistant materials suitable for environment where installed.
      a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
      b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
      c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
      d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Conduit Supports: Straps and clamps suitable for conduit to be supported.
   1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
   2. Conduit Clamps: Bolted type unless otherwise indicated.

C. Cable Supports: Suitable for cables to be supported, including but not limited to J-hooks, bridle rings, drive rings, and flexible harnesses/slings.
   1. Comply with TIA-569.
   2. Cable Supports Installed in Spaces Used for Environmental Air: Plenum rated; listed and labeled as complying with UL 2043, suitable for use in air-handling spaces.
   3. J-Hooks: Noncontinuous cabling support with removable top retainer clip.
      a. Material: Use galvanized steel, factory-painted steel, or stainless steel.
      b. Provide support surfaces with smooth, beveled edges and radius not less than minimum allowable bend radius of cables supported.
      c. Provide multitiered J-hooks where required to support multiple cabling systems.
   4. Bridle rings: Noncontinuous circular cabling support.
      a. Material: Use galvanized steel, painted steel, or stainless steel.

D. Outlet Box Supports: Hangers and brackets suitable for boxes to be supported.

E. Metal Channel/Strut Framing Systems:
   1. Description: Factory-fabricated, continuous-slot, metal channel/strut and associated fittings, accessories, and hardware required for field assembly of supports.
   2. Comply with MFMA-4.
   3. Channel Material:
      a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
      b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
   4. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch (2.66 mm).
   5. Minimum Channel Dimensions: 1-5/8 inch (41 mm) wide by 13/16 inch (21 mm) high.

F. Fiberglass Channel/Strut Framing Systems:

1. Description: Factory-fabricated, continuous-slot, fiberglass channel/strut and associated fittings, accessories, and hardware required for field assembly of supports.
2. Channel Material: Use polyester resin or vinyl ester resin.
3. Minimum Channel Dimensions: 1-5/8 inch (41 mm) wide by 1 inch (25 mm) high.
4. Flammability: Fire retardant with NFPA 101, Class A flame spread index, maximum of 25, when tested in accordance with ASTM E84; self extinguishing in accordance with ASTM D635.

G. Hanger Rods: Threaded, zinc-plated steel unless otherwise indicated.
1. Minimum Size, Unless Otherwise Indicated or Required:
   a. Single Conduit up to 1-inch (27 mm) Trade Size: 1/4-inch (6 mm) diameter.
   b. Single Conduit Larger than 1-inch (27 mm) Trade Size: 3/8-inch (10 mm) diameter.
   c. Trapeze Support for Multiple Conduits: 3/8-inch (10 mm) diameter.
   d. Outlet Boxes: 1/4-inch (6 mm) diameter.

H. Anchors and Fasteners:
1. Unless otherwise indicated and where not otherwise restricted, use anchor and fastener types indicated for specified applications.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. Verify that field measurements are as indicated.
B. Verify that mounting surfaces are ready to receive support and attachment components.
C. Verify that conditions are satisfactory for installation prior to starting work.

### 3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions.
B. Install hangers and supports in accordance with NECA 1, BICSI ITSIMM, and BICSI N1.
C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
E. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
G. Equipment Support and Attachment:
1. Use metal, fabricated supports or supports assembled from metal channel/strut to support equipment as required.
2. Use metal channel/strut secured to studs to support equipment surface mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
3. Use metal channel/strut to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

H. Secure fasteners in accordance with manufacturer's recommended torque settings.
I. Remove temporary supports.

### 3.3 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements for additional requirements.
B. Inspect support and attachment components for damage and defects.
C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
D. Correct deficiencies and replace damaged or defective support and attachment components.

**END OF SECTION**

**SECTION 270533.13**

**CONDUIT FOR COMMUNICATIONS SYSTEMS**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Galvanized steel rigid metal conduit (RMC).

### 1.2 RELATED REQUIREMENTS
A. Section 078400 - Firestopping.

### 1.3 REFERENCE STANDARDS
A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2020.
B. BICSI ITSIMM - Information Technology Systems Installation Methods Manual (ITSIMM), 8th Edition; 2022.
C. BICSI N1 - Installation Practices for Telecommunications and ICT Cabling and Related Cabling Infrastructure, 1st Edition; 2019.
D. BICSI TDMM - Telecommunications Distribution Methods Manual, 14th Edition; 2020.
E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
F. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2020.
G. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.
H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
I. TIA-568.0 - Generic Telecommunications Cabling for Customer Premises; 2020e.
J. TIA-569 - Telecommunications Pathways and Spaces; 2019e.
K. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.
L. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.
M. UL 2419 - Outline of Investigation for Electrically Conductive Corrosion Resistant Compounds; Current Edition, Including All Revisions.

### 1.4 ADMINISTRATIVE REQUIREMENTS
A. Coordination:
   1. Coordinate minimum sizes of conduits with actual type and quantity of cables to be installed.
   2. Coordinate arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts.
   3. Verify exact conduit termination locations required for boxes, enclosures, and equipment.
   4. Coordinate work to provide roof penetrations that preserve integrity of roofing system and do not void roof warranty.
   5. Notify Architect of conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
B. Sequencing:
   1. Do not begin installation of communications cables until installation of conduit between termination points is complete.

### 1.5 QUALITY ASSURANCE
A. Product Listing Organization Qualifications: Organization recognized by OSHA as Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

### 1.6 DELIVERY, STORAGE, AND HANDLING
A. See Section 017419 - Construction Waste Management and Disposal for packaging waste requirements.
B. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

## PART 2 – PRODUCTS

### 2.1 CONDUIT APPLICATIONS

A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70, TIA-569, BICSI ITSIMM, BICSI TDMM, manufacturers' instructions, and product listing.
B. Unless otherwise indicated and where not otherwise restricted, use conduit types indicated for specified applications. Where more than one listed application applies, comply with most restrictive requirements. Where conduit type for particular application is not specified, use galvanized steel rigid metal conduit.

### 2.2 CONDUIT - GENERAL REQUIREMENTS

A. Comply with NFPA 70 and TIA-569.
B. Provide conduit, fittings, supports, and accessories required for complete communications pathway.
C. Provide products listed, classified, and labeled as suitable for purpose intended.
D. Maximum Number of Communications Outlet Boxes per Continuous Conduit Homerun: Two.
E. Minimum Conduit Size, Unless Otherwise Indicated:
   1. Communications Outlet Box: 3/4-inch (21 mm) trade size.
   2. Continuous Conduit Homerun Serving One Communications Outlet Box: 1-inch (27 mm) trade size.
   3. Continuous Conduit Homerun Serving Two Communications Outlet Boxes: 1-inch (27 mm) trade size.
F. Where conduit size is not indicated, size to comply with NFPA 70, TIA-569, and BICSI TDMM, but not less than applicable minimum size requirements specified. Where specified standards differ, comply with most stringent.

### 2.3 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
B. Fittings:
   1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6.
   2. Material: Use steel or malleable iron.
   3. Connectors and Couplings: Use threaded fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.
   4. Conduit Bodies: Use only conduit bodies specifically designed for communications cabling. Standard conduit bodies designed for electrical raceways are not permitted.
      a. Comply with TIA-568.0 minimum bend radius requirements for fiber optic cables.

### 2.4 ACCESSORIES

A. Conduit Joint Compound: Corrosion-resistant, electrically conductive compound listed as complying with UL 2419; suitable for use with conduit to be installed.
B. Pull Strings: Use nylon or polyester tape with average breaking strength of not less than 1,250 lbf (5.6 kN).

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. Verify that field measurements are as indicated.
B. Verify that mounting surfaces are ready to receive conduits.
C. Verify that conditions are satisfactory for installation prior to starting work.

## 3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions.
B. Install conduit in accordance with NECA 1, BICSI ITSIMM, and BICSI N1.
C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
D. Conduit Routing:
   1. When conduit destination is indicated without specific routing, determine exact routing required.
E. Conduit Support:
   1. Secure and support conduits in accordance with NFPA 70 using suitable supports and methods approved by authorities having jurisdiction.
   2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
   3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
F. Connections and Terminations:
   1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
   2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
   3. Use suitable adapters where required to transition from one type of conduit to another.
   4. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
   5. Provide insulating bushings, insulated throats, or listed metal fittings with smooth, rounded edges at conduit terminations to protect cables.
   6. Secure joints and connections to provide mechanical strength and electrical continuity.
G. Penetrations:
   1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
   2. Make penetrations perpendicular to surfaces unless otherwise indicated.
   3. Provide sleeves and/or slots for penetrations as indicated or as required to facilitate installation.
   4. Conceal bends for conduit risers emerging above ground.
   5. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
   6. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty.
   7. Install firestopping to preserve fire resistance rating of partitions and other elements; see Section 078400.
H. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed cables or connected equipment. This includes, but is not limited to:
   1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
   2. Where conduits are subject to earth movement by settlement or frost.
I. Provide grounding and bonding.

## 3.3 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements for additional requirements.
B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
C. Correct deficiencies and replace damaged or defective conduits.

## 3.4 CLEANING

A. Clean interior of conduits to remove moisture and foreign matter.

## 3.5 PROTECTION

A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of cables.

**END OF SECTION**

# SECTION 271000

# STRUCTURED CABLING

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Communications system design requirements.
B. Communications pathways.
C. Copper cable and terminations.
D. Fiber optic cable and interconnecting devices.
E. Communications outlets.
F. Communications grounding and bonding.
G. Communications identification.

### 1.2 RELATED REQUIREMENTS

A. Section 260526 - Grounding and Bonding for Electrical Systems.
B. Section 260533.16 - Boxes for Electrical Systems.
C. Section 260553 - Identification for Electrical Systems: Identification products.
D. Section 270533.13 - Conduit for Communications Systems.

### 1.3 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
B. TIA-455-21 - FOTP-21 - Mating Durability of Fiber Optic Interconnecting Devices; 1988a (Reaffirmed 2012).
C. TIA-526-7 - Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant, Adoption of IEC 61280-4-2 Edition 2: Fibre-Optic Communications Subsystem Test Procedures – Part 4-2: Installed Cable Plant – Single-Mode Attenuation and Optical Return Loss Measurement; 2015a (Reaffirmed 2022).
D. TIA-526-14 - Optical Power Loss Measurement of Installed Multimode Fiber Cable Plant; IEC 61280-4.1 Edition 3.1, Fiber Optic Communications Subsystem Test Procedures- Part 4-1: Installed Cable Plant- Multimode Attenuation Measurement; 2023d.
E. TIA-568 (SET) - Commercial Building Telecommunications Cabling Standard Set; 2020.
F. TIA-606 - Administration Standard for Telecommunications Infrastructure; 2021d.
G. TIA-607 - Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises; 2019d.
H. UL 514C - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers; Current Edition, Including All Revisions.
I. UL 1863 - Communications-Circuit Accessories; Current Edition, Including All Revisions.

### 1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate requirements for service entrance and entrance facilities with Communications Service Provider.
   2. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for communications equipment.
   3. Coordinate arrangement of communications equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
B. Arrange for Communications Service Provider to provide service.

### 1.5 SUBMITTALS

A. See Section 013300 - Administrative Requirements, for submittal procedures.
B. Field Test Reports.

## 1.6 QUALITY ASSURANCE

A. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

## 1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.
B. Keep stored products clean and dry.

## 1.8 WARRANTY

A. See Section 017700 - Closeout Submittals, for additional warranty requirements.
B. Correct defective Work within a 2 year period after Date of Substantial Completion.

# PART 2 – PRODUCTS

## 2.1 SYSTEM DESIGN

A. Provide a complete permanent system of cabling and pathways for voice and data communications, including cables, conduits and wireways, pull wires, support structures, enclosures and cabinets, and outlets.
   1. Provide fixed cables and pathways that comply with NFPA 70 and TIA-607 and are UL listed or third party independent testing laboratory certified.
   2. Provide connection devices that are rated for operation under conditions of 32 to 140 degrees F (0 to 60 degrees C) at relative humidity of 0 to 95 percent, noncondensing.
   3. In this project, the term plenum is defined as return air spaces above ceilings, inside ducts, under raised floors, and other air-handling spaces.
B. Main Distribution Frame (MDF): Centrally located support structure for terminating horizontal cables that extend to telecommunications outlets, functioning as point of presence to external service provider.
   1. Locate main distribution frame as indicated on the drawings.
C. Cabling to Outlets: Specified horizontal cabling, wired in star topology to distribution frame located at center hub of star; also referred to as "links".

## 2.2 PATHWAYS

A. Conduit: See section 270533.13.
B. Underground Service Entrance: Rigid polyvinyl chloride (PVC) conduit, Schedule 40.
C. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.

## 2.3 COPPER CABLE AND TERMINATIONS

A. Copper Cable Terminations: Insulation displacement connection (IDC) type using appropriate tool; use screw connections only where specifically indicated.
B. Jacks and Connectors: Modular RJ-45, non-keyed, terminated with 110-style insulation displacement connectors (IDC); high impact thermoplastic housing; suitable for and complying with same standard as specified horizontal cable; UL 1863 listed.
   1. Performance: 500 mating cycles.
   2. Voice and Data Jacks: 8-position modular jack, color-coded for both T568A and T568B wiring configurations.

## 2.4 FIBER OPTIC CABLE AND INTERCONNECTING DEVICES

A. Fiber Optic Interconnecting Devices:
   1. Connector Type: Type LC.
   2. Connector Performance: 500 mating cycles, when tested in accordance with TIA-455-21.
   3. Maximum Attenuation/Insertion Loss: 0.3 dB.

## 2.5 COMMUNICATIONS OUTLETS

A. Outlet Boxes: Comply with Section 260533.16.
   1. Provide depth as required to accommodate cable manufacturer's recommended minimum conductor bend radius.
B. Wall Plates:
   1. Comply with system design standards and UL 514C.
   2. Accepts modular jacks/inserts.
   3. Capacity:
      a. Voice Only Outlets: 1 ports.
      b. Data or Combination Voice/Data Outlets: 2 ports.

## 2.6 GROUNDING AND BONDING COMPONENTS

A. Comply with TIA-607.
B. Comply with Section 260526.

## 2.7 IDENTIFICATION PRODUCTS

A. Comply with TIA-606.
B. Comply with Section 260553.

## 2.8 SOURCE QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.
B. Factory test cables according to TIA-568 (SET).

# PART 3 – EXECUTION

## 3.1 INSTALLATION – GENERAL

A. Comply with Communication Service Provider requirements.
B. Grounding and Bonding: Perform in accordance with TIA-607 and NFPA 70.

## 3.2 INSTALLATION OF PATHWAYS

A. Install pathways with the following minimum clearances:
   1. 48 inches (1220 mm) from motors, generators, frequency converters, transformers, x-ray equipment, and uninterruptible power systems.
   2. 12 inches (300 mm) from power conduits and cables and panelboards.
   3. 5 inches (125 mm) from fluorescent and high frequency lighting fixtures.
   4. 6 inches (150 mm) from flues, hot water pipes, and steam pipes.
B. Outlet Boxes:
   1. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of telecommunications outlets provided under this section.
      a. Mounting Heights: Unless otherwise indicated, as follows:
         1) Telephone and Data Outlets: 18 inches (450 mm) above finished floor.
         2) Telephone Outlets for Side-Reach Wall-Mounted Telephones: 54 inches (1.4 m) above finished floor to top of telephone.
         3) Telephone Outlets for Forward-Reach Wall-Mounted Telephones: 48 inches (1.2 m) above finished floor to top of telephone.
         4) _____.
      b. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
      c. Provide minimum of 24 inches (600 mm) horizontal separation between flush mounted outlet boxes installed on opposite sides of fire rated walls.
      d. Unless otherwise indicated, provide separate outlet boxes for line voltage and low voltage devices.
      e. Locate outlet boxes so that wall plate does not span different building finishes.
      f. Locate outlet boxes so that wall plate does not cross masonry joints.

## 3.3 INSTALLATION OF EQUIPMENT AND CABLING

A. Cabling:
   1. Do not bend cable at radius less than manufacturer's recommended bend radius; for unshielded twisted pair use bend radius of not less than 4 times cable diameter.
   2. Do not over-cinch or crush cables.
   3. Do not exceed manufacturer's recommended cable pull tension.
   4. When installing in conduit, use only lubricants approved by cable manufacturer and do not chafe or damage outer jacket.

B. Service Loops (Slack or Excess Length): Provide the following minimum extra length of cable, looped neatly:
   1. At Distribution Frames: 120 inches (3000 mm).
   2. At Outlets - Copper: 12 inches (305 mm).
   3. At Outlets - Optical Fiber: 39 inches (1000 mm).

C. Copper Cabling:
   1. Category 5e and Above: Maintain cable geometry; do not untwist more than 1/2 inch (12 mm) from point of termination.
   2. For 4-pair cables in conduit, do not exceed 25 pounds (110 N) pull tension.
   3. Use T568B wiring configuration.

D. Fiber Optic Cabling:
   1. Prepare for pulling by cutting outer jacket for 10 inches (250 mm) from end, leaving strength members exposed. Twist strength members together and attach to pulling eye.
   2. Support vertical cable at intervals as recommended by manufacturer.

E. Wall-Mounted Racks and Enclosures:
   1. Install to plywood backboards only, unless otherwise indicated.
   2. Mount so height of topmost panel does not exceed 78 inches (1980 mm) above floor.

F. Identification:
   1. Use wire and cable markers to identify cables at each end.
   2. Use manufacturer-furnished label inserts, identification labels, or engraved wallplate to identify each jack at communications outlets with unique identifier.

## 3.4 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Comply with inspection and testing requirements of specified installation standards.

C. Visual Inspection:
   1. Inspect cable jackets for certification markings.
   2. Inspect cable terminations for color coded labels of proper type.
   3. Inspect outlet plates and patch panels for complete labels.

D. Testing - Copper Cabling and Associated Equipment:
   1. Test backbone cables after termination but before cross-connection.
   2. Test backbone cables for DC loop resistance, shorts, opens, intermittent faults, and polarity between connectors and between conductors and shield, if cable has overall shield.
   3. Test operation of shorting bars in connection blocks.
   4. Category 3 Backbone: Perform attenuation test.
   5. Category 3 Links: Test each pair for short circuit continuity, short to ground, crosses, reversed polarity, operational and ring-back, and dial tone.
   6. Category 5e and Above Backbone: Perform near end cross talk (NEXT) and attenuation tests.
   7. Category 5e and Above Links: Perform tests for wire map, length, attenuation, NEXT, and propagation delay.

E. Testing - Fiber Optic Cabling:
   1. Backbone: Perform optical fiber end-to-end attenuation test using an optical time domain reflectometer (OTDR) and manufacturer's recommended test procedures; perform verification acceptance tests and factory reel tests.
   2. Multimode Backbone: Perform tests in accordance with TIA-526-14.
   3. Single Mode Backbone: Perform tests in accordance with TIA-526-7.
   4. Links: Perform optical fiber end-to-end attenuation tests and field reel tests.

F. Final Testing: After all work is complete, including installation of telecommunications outlets, and telephone dial tone service is active, test each voice jack for dial tone.

**END OF SECTION**

**SECTION 311000**

**SITE CLEARING AND PREPARATION**

## PART 1 – GENERAL

### 1.1 SUMMARY

A. This Section includes the following:
   1. Protecting existing trees and vegetation to remain.
   2. Removing existing trees.
   3. Clearing and grubbing.
   4. Stripping and stockpiling topsoil.

### 1.2 DEFINITIONS

A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other non-soil materials.

### 1.3 MATERIAL OWNERSHIP

A. Except for stripped topsoil or other materials indicated to remain OWNER's property, cleared materials shall become CONTRACTOR's property and shall be removed from Project site

### 1.4 PROJECT CONDITIONS

A. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.

## PART 2 – PRODUCTS (Not used)

## PART 3 – EXECUTION

### 3.1 TREE PROTECTION

A. Locate and clearly flag trees and vegetation to remain.
B. Erect and maintain temporary fencing around drip line of individual trees or around perimeter drip line of groups of trees to remain before starting site clearing. Remove fence when construction is complete.
   1. Do not store construction materials, debris, or excavated material within fenced area.
   2. Do not permit vehicles, equipment, or foot traffic within fenced area.
   3. Maintain fenced area free of weeds and trash.
C. Do not excavate within tree protection zones, unless otherwise indicated.
D. Where excavation for new construction is required within tree protection zones, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.
   1. Cover exposed roots with burlap and water regularly.
   2. Do not cut main lateral roots, or taproots; cut only smaller roots that interfere with installation. Cut roots with sharp pruning instruments; do not break or chop.
   3. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
   4. Coat cut faces of roots more than 1 ½ inches in diameter with emulsified asphalt or other approved coating formulated for use on damaged plant tissues.
   5. Backfill with soil as soon as possible.
E. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by ENGINEER.
F. Tree protection shall not be paid for separately, but shall be considered incidental to the item of Work being performed.

## 3.2 TREE REMOVAL

A. Trees to be removed are indicated on the Plans; should additional tree removal become necessary for installation of the sewer system, prior written permission from the Village will be required.
B. CONTRACTOR shall completely remove tree above and below ground. This work shall be done as specified in Section 201 CLEARING, TREE REMOVAL AND PROTECTION, CARE, AND REPAIR OF EXISTING PLANT MATERIAL of the IDOT SSRBC.
C. Clearing and Grubbing
    1. Remove and dispose of obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction.
        a. Do not remove trees, shrubs, and other vegetation indicated to remain.
        b. A pre-clearing meeting shall be scheduled with the Engineer to review the planned limits of clearing and address Contractor questions related to clearing for sewer construction.
        c. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
        d. Grind stumps and remove roots, obstructions, and debris extending to a depth of 18 inches below exposed subgrade.
        e. Use only hand methods for grubbing within tree protection zone.
        f. Chip removed tree branches and dispose of off-site.
    2. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
        a. Place fill material in horizontal layers not exceeding a loose depth of 8 inches and compact each layer to a density equal to adjacent original ground.
D. Individual trees marked for removal (outside of the areas on the plan marked per acre), and additional trees removed with permission from the Village, shall not be paid for separately, but shall be considered incidental to the item of Work being performed.
E. This work will be paid for at the per acre price for Tree Removal.

## 3.3 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.
B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
    1. Remove subsoil and non-soil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.
C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water.
    1. Do not stockpile topsoil within tree protection zones.
    2. Dispose of excess topsoil as specified for waste material disposal.
    3. Stockpile surplus topsoil to allow for re-spreading.
    4. Maintain stockpile as not to obstruct the natural flow of drainage.
    5. Protect Stockpile from erosion
    6. Keep stockpile free from debris or trash.
D. Topsoil stripping shall not be paid for separately but shall be included in the Topsoil Furnish and Place pay item. Measurement and payment provisions set forth in the IDOT SSRBC do not apply to this section.

## 3.4 DISPOSAL

A. Removal and disposal shall not be paid for separately but shall be considered incidental to the item of Work being performed.
B. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off OWNER's property.
C. Burning is not an acceptable method of disposal.
D. Do not allow debris to accumulate on-site.

**END OF SECTION**

**SECTION 312316**

**EARTHWORK**

## PART 1 – GENERAL

### 1.1 SUMMARY

A. This Section includes the following:
   1. Preparing subgrades for walks, pavements, lawns, and plantings.
   2. Rough and Finish Grading
   3. Backfill of Proposed Structures
   4. Topsoil Excavation and Placement
   5. Field Quality Control/Assurance

### 1.2 DEFINITIONS

A. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
B. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
C. Fill: Soil materials used to raise existing grades.
D. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

### 1.3 SUBMITTALS

A. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance.

## 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: ASTM D 2487 Soil Classification Groups GW, GP, GM, SW, SP, and SM 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. Unsatisfactory soils also include satisfactory soils not maintained within 2% of optimum moisture content at time of compaction.

## 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 earthwork operations.
B. Underground utilities shall be located and protected as specified in Division 1 Section “Temporary Facilities and Controls”.
C. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Division 2 Section "Site Clearing."
D. Protect and maintain erosion and sedimentation controls, which are specified in Division 1 Section "Temporary Facilities and Controls," during earthwork operations.
E. Perform dewatering operations as specified in Division 1 Section “Temporary Facilities and Controls”.

## 3.2 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered.
   1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

B. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned by Engineer. The Contract Sum will be adjusted for rock excavation. Changes in the Contract time may be authorized for rock excavation.
   1. 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.

## 3.3 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. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

## 3.4 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.

C. Place soil fill on subgrades free of mud, frost, snow, or ice.

## 3.5 TOPSOIL EXCAVATION AND PLACEMENT

A. This Work shall be done as specified in Section 211 Topsoil and Compost, of the IDOT SSRBC. Measurement and payment provisions set forth in the IDOT SSRBC do not apply to this section.

B. After preparing and finishing the areas designated for topsoil to the required lines, grades, slopes and cross-section, place and spread the topsoil to a uniform depth of no less than six (6) inches.

C. This Work shall be paid for at the contract unit price per square yard (SY) for Topsoil Excavation and Placement.

## 3.6 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2% 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% and is too wet to compact to specified dry unit weight.

## 3.7 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 12 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D698.
   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%.

2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 92%.
3. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85%.
4. For utility trenches, compact each layer of initial and final backfill soil material at 90%.

**3.8 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 Grading: Slope grades to direct water away from buildings, structures and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
   1. Lawn or Unpaved Areas: Plus or minus 1 inch.
   2. Walks: Plus or minus 1 inch
   3. Pavements: Plus or minus ½ inch

**3.9 FIELD QUALITY CONTROL / ASSURANCE**

A. Testing Agency: CONTRACTOR will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.
B. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials testing, as documented according to ASTM D 3740.
C. Allow testing agency to inspect and test subgrades at each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
D. Testing agency will test compaction of soils in place according to ASTM D 6938, Nuclear Density Testing. 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 1 test for every 2,000 square feet or less of paved area or building slab, but in no case fewer than two (2) tests.
   2. Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each 150 feet or less of trench length, but no fewer than two (2) tests.
E. Prior to the placement of any excavated or borrowed soils, each type of soil approved for fill or backfill shall have a Standard Proctor Curve developed to indicate the moisture-density relationship required to obtain maximum density.
F. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.
G. All density tests and Proctor Curve results shall be submitted to the Engineer.
H. Reference to percent maximum density shall mean a soil density not less that the stated percentage of maximum density for soil as determined by ASTM D698, “Moisture Density Relations of Soils” Standard Proctor Method.
I. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of Division II, Section 20-EXCAVATION AND BACKFILL FOR UNDERGROUND CONDUITS and other applicable sections of the ILLINOIS SEWER SPECS. Measurement and payment provisions set forth in the ILLINOIS SEWER SPEC do not apply to work under this section.
J. 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.

K. Determine moisture density relations of soils encountered during construction in accordance with Standard Proctor Method. Provide graph of proctor soil density versus water content for all backfill material.

### 3.10 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 Engineer; 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.

### 3.11 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

## PART 4 – GENERAL

### 4.1 BASIS OF PAYMENT

A. Removal and disposal, including but not limited to, excavation, cleanup and restoration of directional drill pits shall not be paid for separately but shall be considered incidental to the item of Work being performed.
B. Field Quality Control/Assurance shall not be paid for separately but shall be considered incidental to the item of Work being performed.

**END OF SECTION**

**SECTION 312316.13**

**TRENCHING AND BACKFILLING**

## PART 1 – GENERAL

### 1.1 SUMMARY

A. This Section includes the following:
   1. Trenching and Backfilling
   2. Compaction

### 1.2 GENERAL

A. Where working conditions and the right-of-way is sufficient to accommodate traditional open cut construction methods, pipe line trenches with sloping sides may be used upon request and OWNERS written permission.
B. Safety and Protection: Shoring, sheeting, bracing shall be provided as required to protect the work and workmen from damage or injury by caving or sloughing. Laws and ordinances regulating health and safety measures shall be strictly observed.
C. Blasting: Blasting will not be permitted unless OWNER provides written permission to do so.

### 1.3 SUBMITTALS

A. Density Test Reports: Prior to acceptance of Work, the CONTRACTOR/Testing Agency shall provide Engineer with all reports for nuclear density testing that is performed under the quality control program.

### 1.4 FIELD QUALITY CONTROL / ASSURANCE

A. Testing Agency: CONTRACTOR will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.
B. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials testing, as documented according to ASTM D 3740.
C. Allow testing agency to inspect and test subgrades at each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
D. Testing agency will test compaction of soils in place according to ASTM D 6938, Nuclear Density Testing. Tests will be performed at the following locations and frequencies:
   1. Paved Areas: At subgrade and at each compacted fill and backfill layer, at least 1 test for every 2,000 square feet or less of paved area or building slab, but in no case fewer than two (2) tests.
   2. Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each 150 feet or less of trench length, but no fewer than two (2) tests.
E. Prior to the placement of any excavated or borrowed soils, each type of soil approved for fill or backfill shall have a Standard Proctor Curve developed to indicate the moisture-density relationship required to obtain maximum density.
F. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.
G. All density tests and Proctor Curve results shall be submitted to the Engineer.
H. Reference to percent maximum density shall mean a soil density not less that the stated percentage of maximum density for soil as determined by ASTM D698, “Moisture Density Relations of Soils” Standard Proctor Method.
I. Regulatory Requirements: Comply with materials, workmanship, and other applicable sections of the ILLINOIS SEWER SPECS. Measurement and payment provisions set forth in the ILLINOIS SEWER SPEC do not apply to work under this section.
J. 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.

K. Determine moisture density relations of soils encountered during construction in accordance with Standard Proctor Method. Provide graph of proctor soil density versus water content for all backfill material.

## PART 2 – PRODUCTS

### 2.1 SANITARY SEWER PIPE AND SERVICE LINE AGGREGATE BEDDING MATERIAL

A. Bedding material shall meet the gradation requirements of Coarse Aggregate Gradation CA-11 or CA-13, as specified in Section 1004 COARSE AGGREGATES of the IDOT SSRBC and as shown on the plans.

### 2.2 SANITARY SEWER PIPE AND SERVICE LINE AGGREGATE BACKFILLING MATERIALS

A. Backfilling Materials shall meet the following gradation requirements:
   1. Coarse Aggregate Gradation CA-11 or CA-13 as specified in Section 1004 COARSE AGGREGATES of the IDOT SSRBC and as shown on the plans.
   2. Aggregate Backfilling Materials shall not be paid separately, but shall be considered incidental to the item of Work being performed

### 2.3 WATER SERVICE BEDDING MATERIAL

A. Bedding material shall meet the gradation requirements of Coarse Aggregate Gradation CA-7, as specified in Section 1004 COARSE AGGREGATES of the IDOT SSRBC and as shown on the plans.

### 2.4 WATER SERVICE PIPE AGGREGATE BACKFILLING MATERIALS

A. Backfilling Materials shall meet the following gradation requirements:
   1. Coarse Aggregate Gradation CA-7, washed, as specified in Section 1004 COARSE AGGREGATES of the IDOT SSRBC and as shown on the plans.
   2. Aggregate Backfilling Materials shall not be paid separately, but shall be considered incidental to the item of Work being performed

### 2.5 STORM SEWER BEDDING MATERIAL

A. Bedding material shall meet the gradation requirements of Coarse Aggregate Gradation CA-7, as specified in Section 1004 COARSE AGGREGATES of the IDOT SSRBC and as shown on the plans.

### 2.6 STORM SEWER PIPE AGGREGATE BACKFILLING MATERIALS

A. Backfilling Materials shall meet the following gradation requirements:
   1. Coarse Aggregate Gradation CA-7, washed, 13 as specified in Section 1004 COARSE AGGREGATES of the IDOT SSRBC and as shown on the plans.
   2. Aggregate Backfilling Materials shall not be paid separately, but shall be considered incidental to the item of Work being performed

### 2.7 SANITARY SEWER PIPE, WATER SERVICE PIPE AND STORM SEWER SOIL BACKFILLING MATERIALS

A. Satisfactory Soils: Satisfactory soils for backfilling trenches shall be approved selected material taken from the trench or other excavation, suitable for compaction and meeting the following requirements:
   1. ASTM D 2487 Soil Classification Groups GW, GP, GM, SW, SP, and SM 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.

B. Unsatisfactory Soils: Unsatisfactory soils not suitable for backfilling trenches are defined as follows:
   1. Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487 or a combination of these groups.

2. Unsatisfactory soils also include satisfactory soils not maintained within 2% of optimum moisture content at time of compaction.
3. Material not suitable for embankment, fill, or backfill or in excess of requirements shall be disposed of off site at a location provided by the CONTRACTOR. Transportation of such material shall be provided by the CONTRACTOR. Disposal of such materials shall not be paid for separately but shall be considered incidental to the contract.

## 2.8 BORROW MATERIAL

A. Where suitable soil backfilling materials are not available in sufficient quantity from all required excavations under this contract, approved materials shall be obtained from approved sources off site at the CONTRACTOR's responsibility and expense. Borrow materials must meet the requirements of satisfactory soils as defined above.

## 2.9 TEMPORARY AGGREGATE SURFACE

A. This work consists of furnishing the labor, material, and equipment to fill in the area between the trench backfill limits and the existing pavement surface during installation of the water main, sanitary sewer and storm sewer.
B. Aggregate for Temporary Surface shall be Coarse Aggregate Gradation CA-6 as specified in Section 1004 COARSE AGGREGATES of the IDOT SSRBC. The width of the aggregate for temporary surface shall be equal to the width of the existing trench. The Engineer shall approve equipment for placing and compacting the Temporary Aggregate Surface.
C. During the course of the contract, the CONTRACTOR shall construct and maintain the Temporary Aggregate Surface to the length and width determined by the Engineer.
D. In the event that the Temporary Aggregate Surface is deemed deficient as noted by the Village or authorized individual, the CONTRACTOR will be notified of the deficiency. The CONTRACTOR has four (4) hours to repair or install aggregate to the satisfaction of the Village. Failure to do so will result in a penalty of one hundred dollars per hour ($100/hr) starting four (4) hours from the time of notification.
E. Temporary Aggregate Surface shall not be paid separately, but shall be considered incidental to the item of Work being performed.

# 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 trenching and backfilling operations.
B. Underground utilities shall be located and protected as specified in Division 1 Section "Temporary Facilities and Controls".
C. Preparation of subgrade for trenching operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Division 2 Section "Site Clearing and Preparation."
D. Protect and maintain erosion and sedimentation controls, which are specified in Division 1 Section "Environmental Protection," during earthwork operations.
E. Perform dewatering operations as specified in Division 1 Section "Temporary Facilities and Controls".

## 3.2 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.

## 3.3 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations necessary for proper laying of pipe.
B. Excavate trench walls vertically from trench bottom to a point 12 inches higher than top of pipe or conduit, unless otherwise indicated. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit.
   1. Width of Trench: The width of the trench at the top of the pipe shall be as follows:
      a. Minimum: 4/3 Pipe Outside Diameter plus 8 inches, or a minimum of 32 inches
      b. Maximum: Pipe Outside Diameter +36 Inches
C. Trench Bottoms: Excavate trenches 4 inches deeper than bottom of pipe elevation to allow for bedding course. Remove projecting stones and sharp objects along trench subgrade. Where firm foundation is not encountered at the grade established due to unsuitable soil, all such unsuitable material shall be removed and replaced with approved compacted granular material.
D. Sloping Sides: Where working conditions and the right-of-way is sufficient to accommodate traditional open cut construction methods, pipe line trenches with sloping sides may be used. The slopes shall extend to a point 12 inches above the top of the pipe, and trench excavations below this point shall be made with vertical sides with widths not exceeding those specified herein for the various sizes of pipe.

## 3.4 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. Stockpile soil materials away from edge of excavations.

## 3.5 BEDDING AND INITIAL BACKFILL REQUIREMENTS

A. Place bedding on subgrades free of mud, frost, snow, or ice.
B. For sanitary sewer, place and compact CA-11 or CA-13 bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
C. For sanitary sewer, place and compact initial backfill of CA-11 or CA -13, to a height of 12 inches over the utility pipe or conduit. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit.
D. For storm sewer, place and compact CA-7 washed gravel bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
E. For storm sewer, place and compact initial backfill of CA-7 washed gravel, to a height equal with the spring line of the pipe. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit.
F. For water service pipe, place and compact CA-7 washed gravel bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
G. For water service pipe, place and compact initial backfill of CA-7 washed gravel, to a height of 4 inches over the utility pipe. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit.

## 3.6 COMPACTION AND BACKFILLING OF TRENCHES

A. Whenever the excavation is in or within 2 feet of an existing or proposed street, parking area, driveway, curb and gutter, sidewalk, or other paved area or specifically called for on plans, the entire trench shall be backfilled with approved selected granular material IDOT CA-7 washed gravel, and compacted in place. Trench Backfill shall be compacted to 95% of maximum density at optimum moisture as determined by the Standard Proctor Test.

B. In all other areas, satisfactory native fill shall be used as backfill and shall be compacted in lifts. Suitable native fill shall be compacted to a minimum of 90% of maximum density at optimum moisture as determined by the Standard Proctor Test.
C. Place all backfill materials in layers not more than 12 inches in loose depth and mechanically compact.
D. All trenches are to be closed and backfilled at the end of each day. All surface drainage shall be restored to a like or better condition to that prior to starting construction.
E. Wherever sewers are installed under traveled roadways, driveways, sidewalks, or other traveled surfaces, a temporary surface of 12 inches depth shall be placed over the top of the trench backfill as soon as possible after compaction has been satisfactorily completed. The temporary surface shall be IDOT CA-7 washed gravel and shall be smooth and meet the grade of the adjacent undisturbed surface. The temporary surface shall be maintained by the CONTRACTOR until the final restoration of the surface is completed.
F. Clay Dam:
    1. Clay dams shall be constructed per the detail, at locations indicated on the plan and at other locations as determined by the ENGINEER.
    2. Clay dams shall not be paid for separately, but shall be considered incidental to the item of Work being performed.

## 3.7 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off OWNER's property. Removal and disposal of such materials shall not be paid for separately, but shall be considered incidental to the Contract.

**END OF SECTION**

**SECTION 317119**

**DIRECTIONAL DRILLING**

## PART 1 – GENERAL

### 1.1 GENERAL DESCRIPTION

A. This section covers the construction of the fire department connection service using directional drilling methods. The CONTRACTOR shall be sufficiently trained and knowledgeable of the construction techniques required by use of this methodology. The CONTRACTOR shall furnish all directional drilling equipment, qualified laborers and equipment operators, and materials necessary to complete the required work in accordance with these specifications, related contract documents and associated drawings. Work shall include and not be limited to proper installation, testing, restoration of underground utilities and environmental protection and restoration.

### 1.2 OTHER UTILITIES

A. Those involved with directional borings shall be knowledgeable about the methods to locate existing underground utilities both vertically and horizontally. The CONTRACTOR shall be able to interpret all available data so the completed sanitary main installation is accomplished safely and without damage to existing utilities, private well and septic systems, and all in accordance with these Contract Documents.

### 1.3 DEFINITIONS

A. The term directional drilling shall mean the drilling of a pilot hole, by means of horizontal directional drilling equipment, enlarging the pilot hole to a diameter suitable (no large than 1.5 times the outside diameter of the product pipe). The completed hole for pipe installation shall not be significantly bigger than necessary to pull the pipe including pipe bells and joints into the enlarged hole.

### 1.4 SUBMITTALS

A. The CONTRACTOR shall submit data, shop drawings, for the new pipe material, installation procedure, equipment to be used data, proof of licensure and experience, and other appurtenant materials or related information as requested by the ENGINEER.

B. The CONTRACTOR, unless otherwise necessary, is to use the directional boring method and equipment they deem appropriate for the installation of the specified sanitary mains, provided that the proposed method and equipment is approved by the ENGINEER. The ENGINEER's approval, however, shall in no way relieve the CONTRACTOR of their responsibility for completing the work satisfactorily and meeting the criteria set forth in these Contract Documents. Only workmen that have horizontal directional drilling experience shall be used in completing this work. The CONTRACTOR shall submit a statement of qualifications of the on-site foreman or the equipment operator to the ENGINEER for review and approval. The CONTRACTOR and this foreman/operator shall have at least 5,000 lineal feet of project equivalent diameter or larger and a minimum of 2 projects with 1,500 lineal feet continuous pulls of project equivalent diameter or larger with same equipment as required for pipe installation experience by means of directional drilling methods.

## PART 2 – PRODUCTS

### 2.1 EQUIPMENT

A. Directional drilling CONTRACTOR shall maintain equipment in good working condition, at all times during the project, and shall use all reasonable means to prevent and control the loss of circulation and to protect the pilot hole.

B. Directional drilling equipment shall have a capability of meeting the minimum lbs/pullback for the installation conditions and pipe size. The CONTRACTOR shall adhere to the pipe manufacturers most current calculations regarding tensile load limitations for trenchless installation. These calculations or data shall be part of the required shop drawing submittal for the pipe.

C. Direction control and sensing system shall be either a fixed or remote directional control system which is capable of monitoring and transmitting key equipment signals such as pitch, roll and azimuth. Walkover tracking systems or other types of location sensing systems shall be used to track the downhole assembly and shall be capable of pin-pointing the steering mechanism both horizontally and vertically and determining its depth, azimuth, pitch (inclination), roll and left/right deviations.
D. The steering tool, as well as other back-up tools used on this project, shall have been recently calibrated in the shop to ensure the equipment is within the manufacturer's specified tolerances, before the start of directional drilling operation. An on-site roll calibration check shall be carried out. Roll checks shall have a minimum of eight points checked. Occasional shoot-ins should be performed, at various locations along the drill path to check for magnetic changes and to confirm the course direction. All data received during these checks should be recorded and submitted for comparison during drilling operations.
E. The drilling fluid system shall meet all EPA and related requirements and shall be self contained, transportable, and have the necessary capacity to meet the planned drilling operation. The fluid shall be non-toxic and suitable for its intended use. The drilling fluid shall be used for hole support, pipe lubricity, and preservation of insitu soil permeability and porosity. The CONTRACTOR shall submit manufacturer's literature on the drilling equipment, and drilling fluid for review before directional drilling activities commence.
F. The drilling fluid pressure and flow rates shall be continuously monitored to prevent any slurry migration. Any migration or spilling of drilling slurry shall be promptly stopped or contained and cleaned up. The CONTRACTOR shall place a silt fence between all drilling operations and any drainage, waterways, or other area designated for such protection by state, federal, or local regulations. Additional environmental protection necessary to contain any hydraulic or drilling fluid spills shall be put in place, including berms, liners, turbidity curtains, and other measures. Upon completion of the directional drill project, the drilling mud and cuttings shall be disposed of by the CONTRACTOR at an approved dump site. The CONTRACTOR may use clean out locations as drilling mud pressure relief points by excavating pits at each location where the slurry may be collected.
G. All drilling equipment including drill pipe, reamers, bits, etc., shall be suitably sized to meet the sanitary main requirements and specific drilling location requirements. When in operation, the drilling machine shall be anchored to the ground to withstand the pulling, pushing, and rotating pressure required to complete the installation. The drilling rig shall have a system to monitor and record maximum pull-back pressures during pull-back operations.
H. Drilling CONTRACTOR's insurance shall cover any damage or destruction of surface or in-hole equipment, including, but not limited to, drill pipe, motors, bits, and reamers, regardless of when or how such damage or destruction occurs.

## PART 3 – EXECUTION

### 3.1 INSTALLATION

A. The CONTRACTOR shall install the sanitary mains at the planned locations and depths as noted on the Plans, along with tracer wire (tracer required for force main only) and related materials or equipment.
B. The CONTRACTOR may vary the depth of the force main installed by directional drilling methods to miss both public and private utilities; however, minimum bury depths identified on the plans shall be adhered to throughout the project as well as force main requirements regarding intermediate high points.
C. The CONTRACTOR shall be responsible for the restoration of all areas uplifted (pavement heaving, sidewalk uplifting, etc.) or significant settling areas that are a direct result of the directional drilling pipe installation method over the entire warranty period for the project.
D. The CONTRACTOR shall stop the directional drilling if pavement heaving begins. The OWNER or ENGINEER also has the option to stop the directional drilling if pavement heaving is evident.

E. The CONTRACTOR shall coordinate proposed drilling pit locations with the ENGINEER prior to excavating the drilling pit. If the CONTRACTOR intends to install the force main by a combination of open cut and directional drilling techniques, they shall coordinate these varied installation methods with the ENGINEER prior to beginning work in each respective area.
F. Should the pilot hole, at any point during the CONTRACTOR's performance of work, deviate excessively from the running line or inclination, the CONTRACTOR agrees to restore the hole to a condition satisfactory to the ENGINEER either by conventional open-cut methods and procedures, modifications of the drilling head alignment while drilling ahead, or by re-drilling. CONTRACTOR shall expose all pipeline or conduits, in advance of directional drilling work, that are to be crossed. These locations shall be checked and changes made to the proposed sanitary main vertical alignment to provide a minimum of 9 inches clearance except at water main crossings which require additional clearance requirements. Vertical alignment changes shall be made gradually and shall not exceed the pipe manufacturer's recommendations for bends.
G. If a substance or formation is encountered which precludes the typical guidance of the drilling assembly by means of jetting, the CONTRACTOR may, at their discretion, obtain suitable downhole tools necessary to the drilling of the pilot hole through the formation of substance. The CONTRACTOR may, in the event subsurface conditions encountered make drilling, reaming or product installation abnormally difficult, choose to install the sanitary main by open-cut methods unless otherwise specified.
H. Should the hole, for any cause attributable to be directional drilling CONTRACTOR's operations, be lost or damaged while they are engaged in the performance of the work, all such loss or damage to the hole shall be borne by the CONTRACTOR. The CONTRACTOR shall remedy the specific situation to the satisfaction of the ENGINEER or commence the drilling of a new hole at the CONTRACTOR's cost. The drilling of the new hole shall be completed under the same requirements of these contract documents as though it were the first hole. All redrilling costs are to be borne by the CONTRACTOR.
I. Unless otherwise provided herein, the drilling CONTRACTOR shall assume all responsibility for, including control and removal of, and shall protect, defend, and indemnify the OWNER and ENGINEER from and against all claims, demands, and causes of action of every kind and character arising from pollution or contamination, which originates above the surface of the land or water from spills of fuels, lubricants, motor oils, pipe dope, paints, solvents, ballast, bilge, and garbage wholly in the drilling CONTRACTOR's possession and control and directly associated with the drilling CONTRACTOR's equipment and facilities.
J. Upon completion of each directional drilling installation, the CONTRACTOR shall verify that all private and public utilities (including well and septic systems) still function. The CONTRACTOR shall arrive at a satisfactory method of checking that utility service is still available to each customer.
K. Site Restoration: Following drilling operations, the CONTRACTOR will demobilize equipment and restore the work site to the original conditions or better. All excavations will be backfilled and compacted according to these specifications.
L. The CONTRACTOR shall make the necessary allowances for thermal expansion or contraction of pipe "on hot days" by bunching up the installed pipe. This shall be done in accordance with pipe manufacturer's recommendations.
M. The Schedule of Prices included in the Bid Form shall govern payment for the directional drilling of sanitary sewer. Pit excavation, material disposal, restoration and other related Work shall not be paid for separately, but shall be considered incidental to the item of Work being performed.

## 3.2 RELATED WORK SPECIFIED ELSEWHERE

A. Trenching and backfilling are specified in Division 2 Section "Trenching and Backfilling."
B. Dewatering is specified in Division 1 Section "Temporary Facilities and Controls."

**END OF SECTION**

**SECTION 321313**

**CEMENT CONCRETE PAVEMENT**

## PART 1 – GENERAL

### 1.1 SUMMARY

A. This Section includes exterior cement concrete pavement for the following:
   1. Sidewalks.

### 1.2 SUBMITTALS

A. Product Data: For each type of manufactured material and product indicated.
B. Design Mixtures: For each concrete pavement mixture. Include alternate mixture designs when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

### 1.3 QUALITY ASSURANCE

A. Hot weather placement: When hot weather conditions exist, that will impair the quality and strength of concrete, place concrete in full compliance with ACI 305.
B. Cold weather placement: Protect all concrete work from physical damage or reduced strength, which could be caused by frost, freezing action, or low temperatures in full compliance with ACI 306.

## PART 2 – PRODUCTS

### 2.1 CONCRETE MATERIALS

A. Ready mix concrete conforming to ASTM C-94
B. Portland Cement shall be ASTM C 150. Fly ash and Calcium chloride shall not be used.
C. Curing Compound complying with ASTM C 903.
D. Concrete mix to comply with IDOT SSRBC standards and the following strength: 3,500 PSI at 14 days

## PART 3 – EXECUTION

### 3.1 CONCRETE CURB AND GUTTER (not anticipated for this project)

A. Any Village requirements regarding expansion and contraction joints shall govern construction. Where proposed curb connects to an existing curb, the existing curb shall be saw cut and then two (2) 18” long x ¾” (#6) dowel bars shall be drilled and installed 9” into the existing and proposed curb, as well as preformed expansion joints. Curb and gutter cross-section shall match the adjacent curb and gutter. Concrete curb and gutter shall be installed on 4” CA-6 aggregate base. Comply with materials, workmanship, and other applicable requirements of Section 606 CONCRETE GUTTER, CURB, MEDIAN, AND PAVED DITCH and other applicable sections of the IDOT SSRBC. Measurement and payment provisions set forth in the IDOT SSRBC do not apply to this Section. The Schedule of Prices included in the Bid Form shall govern payment for furnishing the labor, material, and equipment for the removal and/or replacement of concrete curb and gutter. CA-6 aggregate base is included in concrete curb and gutter pay item.

## 3.2 CONCRETE SIDEWALKS

A. Comply with materials, workmanship, and other applicable requirements of Section 424 PORTLAND CEMENT CONCRETE SIDEWALK and other applicable sections of the IDOT SSRBC. Measurement and payment provisions set forth in the IDOT SSRBC do not apply to this Section. Sidewalk width shall match the existing sidewalk adjacent to pour. Newly installed sidewalk shall be pitched at ¼'/ft to allow drainage or as shown on the plans. Sidewalk base shall be installed on subgrade that has been compacted to a least 90% of standard proctor density. Sidewalk shall be installed on 4" CA-6 aggregate base which has been compacted and rolled. PCC shall be finished with a light broomed surface. The Schedule of Prices included in the Bid Form shall govern payment for furnishing the labor, material, and equipment for the removal and/or replacement of concrete sidewalk. CA-6 aggregate base is included in concrete sidewalks pay item.

## 3.3 TESTING AND INSPECTION

A. Contractor will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.
B. Testing shall comply with ASTM C1077 – Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.
C. Testing shall comply with IDOT SSRBC Article 1020.
    1. Slump testing shall conform with AASHTO T 119.
    2. Air Content testing shall conform with AASHTO T 196.
    3. Strength testing shall conform with AASHTO T 23.
D. Contractor to provide testing results/report to OWNER.

**END OF SECTION**

**SECTION 323114**

**REMOVAL AND REPLACEMENT ITEMS**

## PART 1 – GENERAL

### 1.1 SUMMARY

A. This Section includes the removal and replacement of the following items:
   1. Fence

## PART 2 – PRODUCTS (Not used)

## PART 3 – EXECUTION

### 3.1 REMOVAL AND REPLACEMENT OF SITE IMPROVEMENTS

A. Fence Removal and Replacement: This work shall consist of removing and reinstalling fence as indicated on the plans to its preconstruction condition or better. All materials from the existing fence will be removed in a matter and may be salvaged. Any of the material damaged by the Contractor shall be replaced by the Contractor at his/her own expense. No allowances shall be made to the Contractor for varying material types and/or methods of construction.
   1. The removal and replacement of fencing shall be considered incidental to the item of Work being performed.

**END OF SECTION**

**SECTION 323119**

**DECORATIVE METAL FENCE AND GATES**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES
A. Aluminum T&G Fences.
B. Aluminum Gates.
C. Aluminum Trellis.
D. Excavation for posts.

### 1.2 RELATED SECTIONS
A. Section 033000 - Cast-in-Place Concrete.

### 1.3 REFERENCES
A. ASTM B-557 - Standard Test Methods for Tension Testing Wrought and Cast Aluminum- and Magnesium-Alloy Products
B. ASTM C 94 - Standard Specification for Ready-Mixed Concrete.
C. ASTM C 177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
D. ASTM E-1251 - Standard Test Method for Analysis of Aluminum and Aluminum Alloys by Spark Atomic Emission Spectrometry
E. FENCE WIND LOAD TESTING: STANDARDS: EN 1794-1, EN 1794-2, ASTM E1592, ASTM E330

### 1.4 DESIGN / PERFORMANCE REQUIREMENTS
A. Design Requirements: Design fence system to withstand 110 MPH steady wind load.
B. Engineering:
   1. GWF fence contractor to provide engineering of fences, gates, and trellis systems including:
      a. Concrete post foundations.
      b. Fence posts and panels.
      c. Aluminum fence panels.
      d. Aluminum trellis.
      e. All anchors and accessories.
   2. Loads:
      a. Ground Snow Load: 25 PSF
      b. Snow Exposure factor: 1.0
      c. Snow Importance factor: 1.0
      d. Wind Load: 110 mph
      e. Wind Exposure: C

### 1.5 SUBMITTALS
A. Submit under provisions of Section 013000 - Administrative Requirements.
B. Product Data: Manufacturer's data sheets on each product to be used indicating sizes, profiles, surface finishes, and performance characteristics, and including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.
   4. Instructions on care and cleaning of composite wood products.
C. Verification Samples: For each finish product specified, two samples, minimum size 9 inches square, representing actual product, color, and patterns.
D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
E. Closeout Submittals: Provide manufacturer's maintenance instructions that include recommendations for cleaning and maintenance.

## 1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and handle products in accordance with the manufacturer's instructions.
B. Store level and flat, off ground or floor, with supports at each end and maximum 24 inches on center.
C. Do not stack Aluminum Panels over 48” feet (203 mm) high.
D. Cover all aluminum with waterproof covering, vented to prevent moisture buildup.

## 1.7 WARRANTY

A. Provide manufacturer's 10-year commercial warranty providing coverage against any defects in manufacturing and/or finish

# PART 2 – PRODUCTS

## 2.1 MANUFACTURERS

A. Acceptable Manufacturer: Greenwood Fence Inc.; 1770 W Cortland Ct, Addison, IL 60101, 888-243-3623, www.greenwoodfence.com.
B. Requests for substitutions will be considered in accordance with the provisions of Section 016000 - Product Requirements.

## 2.2 MATERIALS

A. Aluminum Components
    1. Fence Posts: 6063 T5 Aluminum.
    2. Aluminum T&G Boards 6063 T5 Aluminum
    3. Trellis:
        a. Header Rails: 6063 T5 Aluminum.
        b. Trellis Rails: 6063 T5 Aluminum.

## 2.3 COMPONENTS

A. Fence System: Elite Aluminum Fence System.
    1. Fence height:
        a. Custom height as indicated on the Drawings.
    2. Components:
        a. 4” x 4” Aluminum Fence posts.
        b. Aluminum Post caps:
            1) Pyramid.
        c. Aluminum Top rail
        d. Aluminum bottom rail.
    3. Aluminum Finish
        a. Surface texture smooth
        b. Color: To be selected by Architect from Manufacturer’s standard color line.
B. Trellis System: To be custom engineered by fence contractor/supplier.
    1. Header Rails: Approximately 200mm X 100MM section, contractor/supplier to verify dimensions with final engineering.
    2. Trellis Rails: Approximately 200mm X 20mm, contractor/supplier to verify dimensions with final engineering.
    3. Aluminum Finish:
        a. Finish: Powder Coated.
        b. Pattern: Smooth on all Aluminum Components
        c. Color: To be selected by Architect.

## 2.4 ACCESSORIES

A. Fasteners: As recommended and engineered by manufacturer and contractor.
B. Concrete: Provide concrete conforming to ASTM C 94; minimum 2500 PSI compressive strength at 28 days, with a 3-to-5-inch slump.
C. Gate Hardware:
   1. Provide manufacturer's recommended pivot hinges, size to gate weight and conditions.
   2. Provide center gate stop and drop rod for double gates.
   3. Provide with latching mechanism unless noted otherwise on drawings.
   4. Coordinate and provide installation of hardware provided by allowance where noted on drawings.

# PART 3 – EXECUTION

## 3.1 EXAMINATION

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

## 3.2 PREPARATION

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

## 3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Cut and drill wood composite using carbide tipped blades.
C. Space posts maximum 74 ¾" inches on center.
D. Drill post holes into undisturbed or compacted soil; excavate deeper in soft or loose soils and for posts with heavy lateral loads.
E. Locate bottom of post 42 inches below grade or below frost line whichever is greater.
F. Place top of concrete flush with finished grade.
G. Cut top rails and bottom rails to lengths required.
H. Insert composite panels horizontally into post tracks, interlocking adjacent pieces.
I. Position top rail and attach to posts.
J. Place post caps over post tops and secure as recommended by manufacturer.
K. Install aluminum trellis header rails 74 ¾" inches on center maximum. Attach one end to fence posts and other end to existing masonry building.
L. Install aluminum trellis rails anchored to header rails as indicated on drawings.
M. Utilize anchors as recommended by manufacturer for use.

## 3.4 CLEANING

A. Clean aluminum to remove stains as recommended by manufacturer.
B. Touch-up and defects in finish after cleaning.

## 3.5 PROTECTION

A. Protect installed products until completion of project.
B. Touch-up, repair or replace damaged products before Substantial Completion.

**END OF SECTION**

**SECTION 329219**

**LAWNS: GENERAL SEEDING & SODDING**

## PART 1 – GENERAL

A. The landscape contractor shall furnish all labor, material and equipment required to complete the work described herein in strict accordance with the drawings and/or terms of the contract. All previously established grades shall be in conformance with the drawings and/or specifications.
B. The landscape contractor shall be familiar with the project premises and how the existing conditions will affect the work.

### 1.1 DESCRIPTION

Work included: Scope as defined for this work shall consist of, but not be limited to:
A. Related Work specified in other sections.
B. Landscape Plantings (Section 329300)

### 1.2 QUALITY ASSURANCE

Provide at least one person who shall be thoroughly trained and experienced in the skills required, who shall be completely familiar with the design and application of the work described for this section, and who shall be present at all times during progress of the work of this section and shall direct all work performed under this section.
A. Protection: Use all means necessary to protect site seeding areas before, during, and after installation and to protect the installed work and materials of all other trades.
B. Replacements: In the event of damage to the site seeding areas, immediately make all repairs or replacements necessary to the approval of the Owner and at all no additional cost to the Owner.
C. Seed: Conform to current U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act of August 9, 1939 and all subsequent revisions thereto, and the requirements of the state seed laws.
D. Sod: Comply with state and federal laws with respect to inspection for plant diseases and insect infestation.

### 1.3 SUBMITTALS

A. Samples and Analysis: Submit, for approval, samples and certified analysis by approved laboratory for seed, and fertilizer lime before delivery to the project. Manufacturer's analysis for standard products will be acceptable.
B. Approval of samples shall not be construed as final acceptance. The Landscape Architect reserves the right to have samples taken of the materials delivered to the site of the Work and analyzed for compliance with the Specifications.

### 1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Protect sod, seed, fertilizer limestone and other required materials against weather conditions and injuries during transit and job storage in such a manner that their effectiveness will not be impaired.
B. Deliver all items to the site in their original containers with all labels intact and legible at time of Owners representative inspection.
C. Use all means necessary to protect all items before, during and after installation and to protect the installed work and materials of all trades
D. Replacements: In the event of damage or rejection, immediately make all repairs and replacements necessary to the approval of the Owners Representative at no additional cost to the owner.

### 1.5 PROTECTION

A. Install necessary barricades, temporary fences or signs to protect newly seeded or hydro-seeded/mulched areas until acceptance of the Work.

### 1.6 GUARANTEE

A. Guarantee this portion of the through the maintenance period and until final acceptance (See 3.03 this section.)
B. Within the guarantee period, replace all lawn areas and/or groundcover areas, which have failed to flourish and produce a satisfactory stand of grass and/or groundcover due to inferior or defective materials or workmanship, or unfavorable weather conditions. The decision of the Owner for replacement Work shall be conclusive and binding upon the Contractor. The Contractor shall also be responsible for all damage to persons or property caused by defective workmanship or materials or by the re-working of areas not acceptable.

### 1.7 WORKMANSHIP

A. During seeding and sodding all areas shall be kept neat and clean and precautions shall be taken to avoid damage to existing plants, turf and structures.
B. Upon completion, all debris and waste material resulting from seeding operations shall be removed from the project and the area cleaned up.
C. Any damaged areas caused by the landscape contractor shall be restored to their original condition.

## PART 2 – PRODUCTS

### 2.1 WATER

A. Water will be furnished to the Contractor by the Owner from existing facilities such as hose bibs and street washers. The Contractor shall furnish all hose and connections necessary to water the lawn.
B. The Owner will furnish an Owner Water Meter to the Contractor where larger quantities of water are necessary for purposes of hydro-mulching or hydro-seeding, or where no existing water facilities exist. The cost of water shall be borne by the Owner.

### 2.2 TOPSOIL

A. Topsoil installed on grade shall attempt to match existing soil texture except for situations where a clay subsoil exists. Where a clay subsoil exists, use loam or silt loam topsoil.
B. Topsoil shall be free of stones, lumps, plants, roots and other debris over 1 ½". Topsoil must also be free of plants or plant parts of Bermuda grass, quack grass, Johnson grass, mugwort, nut sedge, poison ivy, Canada thistle or others as specified.
C. Topsoil shall not contain toxic substances harmful to plant growth (i.e. pesticide residues)

### 2.3 SOD

A. Sod shall be blended Blue Grass and shall not contain more than 5% of weeks or undesirable grasses. It shall be a good texture, free from obnoxious roots, stones and foreign materials. Sod shall be a fresh cultivated sod, weed, disease, and insect free. Sod to be cut in eighteen (18) inch widths, and a maximum length of six (6) feet.
B. Sod containing equal percentages of at least three of the following grass varieties: Adelphi, Glade, Parade, Ram I, or Majestic.
C. Sod shall be obtained from areas having growing conditions similar to areas to be covered. Sod shall have clean growth of acceptable grass, with not less than one (1) inch of soil firmly adhering to the roots. Cutting shall be rectangular strips of equal width and size to permit being lifted and rolled without breakage. If the soil is dry, sod shall be watered sufficiently to moisten soil to the depth at which sod is to be cut. Dumping from vehicle will not be permitted. Damaged sod or any sod that has turned yellow in color will be rejected. Re-planting sod shall be accomplished within forty-eight (48) hours after harvesting.

## 2.4 SEED

A. All seed shall be fresh and clean and shall be crop seed. All seed shall be delivered in the original packages, unopened, which shall bear a guaranteed analysis, by a recognized authority.
   1. Clesens Sunny Mix
      a. Grass seed mixture shall be composed of the following grass seeds mixed in proportions by weight and will be tested for the minimum percentages of purity and germination as indicated.

| Proportion By Weight | Purity Name of Grass | Percent | Germination |
|---|---|---|---|
| 60% | Navy Kentucky Bluegrass | 99% | 85% |
| 15% | Slugger 3GL Perennial Ryegrass | | |
| 15% | Apple 3GL Perennial Ryegrass | | |
| 10% | Fastball 3GL Perennial Ryegrass | | |

B. An additional 25 pounds of Perennial Ryegrass shall be included in the above seed mix. Separate sowing of the Perennial Ryegrass will be determined by the type of seeding equipment being used.
C. Wood Stakes: Stakes for sodding on slopes shall be wood lath or similar material, a minimum of 10 ½ inches long and pointed at one end.

## 2.5 FERTILIZER

A. All fertilizers shall be uniform in composition, free flowing and suitable for application with approved equipment.
B. All fertilizer shall be a commercial balanced 1:2:1 ratio fertilizer. Fertilizers shall be delivered to the site fully labeled according to applicable State Fertilizer laws and shall bear the name, trade name or trademark and warranty of the producer;
C. Commercial fertilizers shall be complete fertilizers, part of the elements of which are derived from organic sources and shall contain the following percentages by weight:

| Prior to Seeding – 6-24-24; * | | After seeding – 18-5-9; * | |
|---|---|---|---|
| Nitrogen | 6% | Nitrogen | 18% |
| Phosphoric Acid | 24% | Phosphoric Acid | 5% |
| Potash | 24% | Potash | 9% |

*Or as more adequately determined by soil analysis when so designated in the bid form.

D. Nitrogen: Shall be in the form of available nitrates, ammonium sulfate or phosphate and urea. A minimum of 30% of the available nitrogen shall be water-insoluble.
E. Phosphoric Acid: Shall be derived from super phosphates or ammonium phosphates.
F. Potash: Shall be in the form of potassium nitrate or potassium sulfate.
G. Fertilizer: Shall be delivered in standard size bags, showing weights, analysis and name of manufacturer, and shall be subject to the approval of the Landscape Architect.
H. Special Protection: If stored at the site, protect fertilizer from the elements at all times.

## 2.6 EROSION-CONTROL MATERIALS

A. Erosion-Control Blankets: Biodegradable, dyed green Aspen wood fiber mat constructed from curled excelsior, of which 80% is six inches or longer in length. It shall have a uniform color and consistent thickness, and fibers evenly distributed over the entire blanket. Each blanket shall be covered with a photodegradable, extruded plastic mesh and shall not contain any chemical additives. Include manufacturer's recommended steel wire staples, 6 inches (150 mm) long
   1. Weight 1.06 lbs./sq. yd.
   2. North American Green S75 or approved equal.

## PART 3 – EXECUTION

### 3.1 INSPECTION

A. Prior to beginning this Work, the Contractor shall be responsible for inspecting all final grades as completed under SITE GRADING and gaining approval of the Landscape Architect to commence the Landscape Architects operations. Any discrepancies in the final topsoil grades must be brought to the Landscape Architect's attention and corrected prior to beginning this Work.

### 3.2 PREPARATION

A. All areas within the limits of this project to be seeded or sodded shall be conditioned by loosening and finely pulverizing the soil to a depth of three (3) inches. The conditioning process shall consist of rototilling, discing, or harrowing with approved equipment, and bringing the finished grade to an acceptable surface in conformance with the plans and as approved by the Landscape Architect. All rocks and other debris over 1½ inches in any dimension shall be removed from the fine graded surface prior to seeding or sodding.

B. In the event that prior conditioned soil has become compacted by rain, equipment or other means, the entire area affected shall be reconditioned to a depth of not less than two (2) inches just prior to seeding or sodding time.

C. Generally, the fine grading and soil conditioning will be done just prior to seeding or sodding; however, if in the opinion of the Landscape Architect, soil or weather conditions are not suitable for seeding or sodding at that time, the Contractor shall recondition the soil and seed or sod when directed.

### 3.3 INSTALLATION AND APPLICATION

A. Planting Seasons:
   1. Seeded and Hydro-Seeded/Mulched Areas: Shall be seeded with the required mixture from March 15th to May 14th and from August 15th to October 1st.
   2. Sodded Areas: Lawns shall be sodded from March 15th to June 15th and from August 15th to November 1st.
   3. The actual planting of areas to be designated, however, shall be done during periods within these seasons as determined by weather conditions, by acceptable practices in the locality of the project, or as approved by the Landscape Architect.

B. Fertilizing:
   1. Commercial fertilizer shall be mechanically spread and mixed into the top three (3) inches of the topsoil at the rate of 20 lbs. Per 1000 square feet (870 lbs./acre).

C. Seeding:
   1. See Plans - Lawn areas so designated shall be seeded mechanically at the rate of 3.5 lbs. Per 1000 square feet of area (150 lbs./acre), or per manufacturer's recommendations. The seed shall be sown evenly and lightly mixed into the soil. In the event that seeding equipment does not compact, a separate rolling using a 500 lb. Roller shall be required.

D. Sodding:
   1. Sod shall be handled and placed by hand with close joints and no overlapping. The sod shall be laid in strips, edge-to-edge, with the joints on the long dimension of the sod staggered. All openings in the sod shall be plugged with sod and all joints shall be filled with topsoil.
   2. Immediately after the sod is laid, it shall be sprinkled thoroughly and then tamped or rolled sufficiently to incorporate the sod with the sod beds and insure tight hand joints between the sod strips.
   3. Sod laid on slopes greater than 3:1 shall be staked with not less than four (4) stakes per square yard with at least one (1) stake per piece of sod. Stakes shall be driven with the flat side against the slope and 10" into the ground leaving ½ inch above ground.

## 3.4 MAINTENANCE (CLEAN UP AND ACCEPTANCE)

A. Maintenance: Provide continuous maintenance until the date of final acceptance, including but not limited to: reseeding, watering, mowing, weeding, and re-working as follows:

B. Seeded Areas:
   1. Proper and adequate watering as determined by the Contractor.
   2. Re-filling with topsoil and re-seeding of rainwashed gullies and rutted areas.
   3. Re-fertilizing with 18-5-9 commercial fertilizer at the rate of 15 lbs. Per 1000 square feet after the second mowing or prior to final acceptance. Re-fertilizing will be required only in areas seeded with Mixture “A.”
   4. Mowing to a height of 1½ to 2 inches when grass attains height of three (3) inches or when growth tends to smother new seedlings or as requested by Landscape Architect.
   5. Re-work any areas, which fail to show a uniform stand of grass. Re-seed with the same mixture applied at the same rate and repeat until all areas are covered with a satisfactory stand of grass. A uniform stand of grass shall be defined as a vigorous growth of grass plants evenly distributed throughout the entire seeded area. No area larger than one (1) foot void of grass plants will be accepted.
   6. Maintain seeded areas for a period of 60 days after installation or until a satisfactory stand of grass has been established.

C. Sodded Areas:
   1. Proper and adequate watering as determined by the Contractor.
   2. Re-fertilizing with 18-5-9 commercial fertilizer at the rate of 15 lbs. Per 1000 square feet after the second mowing or prior to final acceptance.
   3. Mowing to a height of 1½ to 2 inches when grass attains height of three (3) inches.
   4. Re-work areas which fail to show a uniform stand of grass or are otherwise unacceptable. Work shall be done with the same sod and repeated until satisfactory results are achieved.
   5. Maintain sodded areas for a period of 30 days after installation or until satisfactory results are achieved.

D. Clean Up:
   1. Remove from the site, all debris resulting from the Work herein specified.
   2. All pavements shall be left broom cleaned and all damaged areas in existing turf shall be restored to their original condition.

E. Final Inspection and Acceptance:
   1. Upon completion of the specified maintenance period, the Contractor shall request in writing that a final inspection be conducted by the Landscape Architect to determine final acceptance of the Work. The Contractor will be required to make said request five (5) days in advance. If acceptance is not granted, the Contractor is required to maintain those unacceptable areas until final approval has been given.

**END OF SECTION**

**SECTION 329220**

**NATIVE LANDSCAPE PLANTINGS**

## PART 1 - GENERAL

### 1.1 PURPOSE

A. The purpose of this plan is to provide native planting plan specifications for a water-quality stormwater detention basin BMP regarding the New Public Works Facility in Shorewood, Illinois. This plan includes planting of native wetland/swale seed, native mesic to dry tallgrass prairie seed, and low-profile prairie seed within the stormwater detention basin. These plantings will provide greatly improved water quality functions for stormwater infiltration and filtration, soil stabilization and erosion control, wildlife habitat, local watershed benefits downstream, and an aesthetically pleasing landscape for local residents and employees.

### 1.2 CONTRACTOR QUALIFICATIONS

A. The Native Landscape Contractor chosen for the establishment and enhancement of the natural areas must be experienced in the restoration, installation, and management of said areas. They must have a minimum of five years' experience conducting ecological installation, restoration and management projects.

B. There shall be a supervisor available at all times that can identify non-native and native plants by genus and species. The goal of installing successful native plant communities is a long-term process. Therefore, it is imperative that a qualified Native Landscape Contractor perform the initial installation and maintenance.

### 1.3 QUALITY AND CONDITION

A. Native seed shall be obtained from sources east of the Mississippi River within the same EPA Level III Ecoregion as the project site (Central Corn Belt Plains). Plant origins outside of the Ecoregion shall only be approved by the Wetland Consultant in writing prior to installation.

B. Native seeds shall be blended by the vendor, and the mixture and ratio shall be guaranteed in writing to be as specified. The amount of seed indicated on the specifications shall mean the total amount of pure live seed (PLS) per acre for all species listed. It is the sole responsibility of the Native Landscape Contractor to provide approved seed that meets industry-standard PLS requirements.

C. Native Landscape Contractor shall provide the Wetland Consultant with the name and location of the seed supplier, origin of the various kinds of plants, and a statement of the purity of the seed.

D. Seed shall conform to applicable State and Federal regulations as in effect on the date of letting. Unless otherwise specified, seed shall not contain in excess of 1 percent weed seeds; 0 percent is desirable.

E. All storage requirements, stratification, and scarification considerations shall be the sole responsibility of the Native Landscape Contractor.

F. Mycorrhizal inoculants shall be pelletized and mixed at 1 lb. per acre with the fine seeds before installation. The inoculants shall contain a diverse mixture of Glomales fungal species (*Glomus* spp.) in palletized form.

G. Under no circumstances shall Wheat (*Triticum aestivum*), Cereal Rye (*Secale cereale*), Perennial Rye (*Lolium perenne*), or Barley (*Hordeum vulgare*) be used as a temporary cover crop.

### 1.4 HANDLING

A. Native Landscape Contractor shall be solely responsible for the proper handling and storage of the seed according to the best seed handling and storage practices, including fungicide treatments and stratification considerations. Owner shall make no compensation for damage to the seed because of improper storage, cleaning, threshing, or screening operations.

B. All native seeds shall be packed and covered in such a manner as to ensure adequate protection against damage and maintain dormancy while in transit, storage, or during planting operations.

C. Seed shall be kept dry and unopened until needed for use. Seed shall not be stored or temporarily stored in locations or vehicles where the temperature will be in excess of 90 degrees F.

### 1.5 SITE PREPARATION

A. The General Contractor and/or Native Landscape Contractor shall be responsible for performing all work necessary to achieve and maintain an acceptable seedbed prior to seeding. All areas must be properly prepared before seeding begins. Underground utility location maps and plans should be reviewed prior to work. Equipment having low unit pressure ground contact shall be utilized within the planting areas.
B. Unless the Wetland Consultant agrees to another approach, the seedbed shall be prepared by working the topsoil to a depth of 3 inches. Site preparation equipment shall be of a design that can be utilized efficiently by the Native Landscape Contractor to meet the requirements for the work specified. The equipment proposed for use by the Native Landscape Contractor for disking and herbicide applications shall be subject to approval by the Wetland Consultant.
C. Prior to seeding, at least 6 inches of topsoil shall be present and free of all clods, stones, roots, sticks, rivulets, gullies, crusting, and cracking. The soil aggregate size will be no greater than 2 inches in the largest diameter.
D. If present, compacted soils shall be disked or raked prior to seeding. Remedial measures for the access area may, at the direction of the Wetland Consultant, involve ripping from 12 to 18 inches of the soil horizon prior to disking. If compaction is not a concern and the seedbed needs to be loosened prior to seeding to ensure good seed-soil contact, disking or raking shall be performed using equipment and the approach recommended by the Native Landscape Contractor, subject to approval by the Wetland Consultant.
E. If needed, cultivation shall occur within 24 hours prior to seeding. Seeding should occur immediately after the last cultivation preferably before a rain.

## PART 2 – PRODUCTS

### 2.1 PLANT MATERIALS

**SEE THE LANDSCAPE PLAN FOR SEED MIXES**

### 2.2 SEED INSTALLATION

A. Except where site conditions preclude their use, seeding shall be performed using a Truax drill, Truax Trillion seeder, or comparable equipment designed specifically for installation of native seed. For areas where site conditions preclude the use of specialized equipment, seed may be installed through hand broadcasting and lightly raking in the seed. **Hand broadcast seed shall be spread at twice the specified rate.** Other methods of seed installation may be used with prior written approval from the Wetland Consultant.
B. Seasonal Considerations:
    1. *November 1 through February 28*: Seed must be protected from displacement due to water and wind erosion. Seeding on bare, graded surfaces must be protected with double netted erosion control blankets on slopes. Less cover crop will be observed during the following spring due to frost damage.
    2. *March 1 through June 29*: Seeding during this period is appropriate but germination of a portion of the seed may not occur until the following season due to lack of cold stratification to break seed dormancy. Cover crop generally germinates within 2-3 weeks of seeding operation. Seeding on bare, graded surfaces must be protected with erosion control blankets on slopes.

3. *June 30 through September 15*: Installation of native seed should be suspended unless irrigation can be provided or unseasonably cool conditions persist. Also, any annual forbs planted with the mix during this time period may germinate but not have sufficient time to flower before fall senescence. Seeding on bare, graded surfaces must be protected with erosion control blankets on slopes.
4. *September 15 through October 31*: Seeding on bare, graded surfaces must be protected with double netted erosion control blankets on slopes. Less cover crop will be observed during the following spring due to frost damage.

C. Prior to starting work, all seeding equipment shall be calibrated and adjusted to sow seeds at the proper seeding rate. In general, the optimum seeding depth is 0.25 inch below the soil surface. Areas where the seed has not been incorporated into the soil to the proper depths will not be accepted, and no compensation for materials or labor for the rejected work will be made by the Owner.
D. Equipment shall be operated in a manner to ensure complete, uniform coverage of the entire area to be seeded and to avoid damage to existing woody plants. Any area inadequately covered, as solely determined by the Wetland Consultant, shall be retreated at no additional cost to the Owner.
E. Seeding and soil tracking/firming shall not be done during periods of rain, severe drought, high winds, excessive moisture, frozen ground, or other conditions that preclude satisfactory results.
F. To achieve best results, seed boxes should be kept more than one-quarter full at all times and ground speed should be no more than 2 to 3 mph.
G. Seeding operations must occur when soil moisture is appropriate for seeding operation.
H. Native plant seed shall not receive fertilizer.
I. Wet seed that is moldy or otherwise damaged in transit or storage shall not be used.
J. After seeding operation is completed, install erosion control blanket per manufacturer's specifications as necessary.

**2.3 PLUGGING IMPLEMENTATION**

A. Plugs shall be installed during the first growing season between the dates of May 15-August 15, unless otherwise specified by the Wetland Consultant.
B. Plugs shall be planted in a hole dug with a trowel, spade, planting bar, or suitable instrument such that the hole is of a minimum diameter and depth to accommodate the plug, with its roots, without damage.
C. The soil excavated from the planting hole should be used to backfill around the plant and lightly packed to secure the roots in the soil.
D. If planting is delayed more than six hours after delivery, store plugs in the shade, protect from the weather and mechanical damage, and keep them moist and cool. All plugs should be planted within 24 hours of delivery.
E. Plugs shall be obtained from a reputable nursery or grown from seed. Plugs shall not be collected from wild populations of plants.
F. Plugs shall be installed in areas approximately 8 feet by 12 feet in size. Waterfowl exclusion shall be constructed around plug areas in a manner to protect new plantings from depredation. Fencing shall be constructed of 1" wire mesh or comparable material 2-3 feet in height. Posts shall be metal t-post or 2"x 2" wood stakes. Posts shall be 4 to 6 feet in length dependent on soil structure within the emergent planting area. String shall be strung across the tops of the exclusion structures to prevent aerial entry by waterfowl.

## PART 3 – EXECUTION

### 3.1 EROSION CONTROL

A. The Native Landscape Contractor shall be fully responsible for implementing erosion control measures within prescribed planting areas.
B. All areas are recommended to be covered with erosion control blanket; North American Green S-75 or equivalent will be used at a minimum. Fall-winter plantings and/or 3:1 slopes require North American Green S-150 or equivalent. Erosion control blanket shall be installed within 24 hours after an area is seeded. See manufacturer's specifications for erosion control blanket composition.

### 3.2 CLEAN-UP AND PROTECTION

A. During landscape work, store materials and equipment where directed. Keep pavements clean and work areas and adjoining areas in an orderly condition.
B. Protect landscape work and materials from damage due to landscape operations or operations by other trades and trespassers. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged landscape work as directed by the Wetland Consultant.

### 3.3 INSPECTIONS AND ACCEPTANCE

A. Owner reserves the right to inspect all seeds and plants either at place of growth or at site before planting for compliance with requirements for name, variety, size, quantity, quality or mix proportion.
B. Native Landscape Contractor is to keep records of the certificates of composition or invoices of seed mixtures and integrity of plant materials with respect to species, variety, and source after purchase.
C. Native Landscape Contractor is to notify Owner within five days after completing initial and/or supplemental plantings in each area.

### 3.4 MONITORING METHODOLOGY

A. The native BMP planted areas will be monitored annually for a three-year period to ensure successful establishment of the plantings. The primary objective of the monitoring program is to track the success of the planted species over the 3-year period of regularly scheduled monitoring sessions. The monitoring documents changes in plant community composition and reveals the need for management changes to improve floristic quality, native species coverage, and soil stabilization. Specific goals of the monitoring are to determine the vegetative species present, the percent cover by vegetation, and identify hydrology and erosion problems.
B. Monitoring within the planted areas shall be conducted annually utilizing a meander survey methodology. The monitoring shall identify:
    1. The dominant vegetative species within each planting zone (wetland/swale, mesic to dry tallgrass prairie, and low-profile prairie),
    2. The approximate percent vegetative coverage by native species and non-native/invasive species within each designed planting zone,
    3. Observed wildlife usage and any animal depredation issues, and
    4. Water level or drainage problems.
C. Observations shall be made during the monitoring sessions to identify specific management strategies necessary to reach design goals. Site conditions shall be photo documented during monitoring sessions, preferably at the same location and direction each session.

## 3.5 PERFORMANCE CRITERIA

A. By the end of the first full growing season, the planted areas shall exhibit ≥75% vegetative cover, primarily by species contained in the temporary erosion control seed mix. There shall be no areas greater than 1.0 square meter devoid of vegetation and ≥25% of the species present as measured by aerial coverage shall be native and non-invasive.

B. By the end of the second growing season, >90% of the ground as measured by aerial coverage shall be vegetated and ≥50% of the species present as measured by aerial coverage shall be native and non-invasive. There shall be no areas greater than 0.50 square meter devoid of vegetation.

C. By the end of the third growing season, ≥90% of the ground as measured by aerial coverage shall be vegetated and ≥75% of the species present shall be native and non-invasive. There shall be no areas greater than 0.25 square meter devoid of vegetation. The native floristic quality index value (native FQI) must be greater than or equal to 20 as measured over the entire basin. The floristic quality assessment method is described in Swink and Wilhelm, Plants of the Chicago Region.

D. At the end of each growing season, none of the three most dominant species within the planted areas shall be non-native or invasive species, including but not limited to: Purple Loosestrife *(Lythrum salicaria)*, Reed Canary Grass (*Phalaris arundinacea*), Sweet Clover (*Melilotus* spp.), Common Buckthorn (*Rhamnus cathartica*), Kentucky Blue Grass *(Poa pratensis)*, Thistle *(Cirsium* spp.*)*, Honeysuckle (*Lonicera sp.*), Common Reed *(Phragmites australis)*, Sandbar Willow (*Salix interior*), Teasel (*Dipsacus* spp.), Cattails (*Typha* spp.), Foxtail (*Setaria* spp.), or Wild Carrot (*Daucus carota*).

E. One year after plug installation, 80% of the planted plugs shall be alive and apparent. If plug survivorship has not reached 80%, additional plugs will be replaced in-kind to meet this standard at no additional cost to the owner.

## 3.6 REPORTING

A. An annual vegetation monitoring report will be submitted to the Owner by December 31st following the monitoring season each year. This report will be used to determine if the natural areas are meeting performance criteria as listed above. The report shall include information on site location; methodology used (including monitoring dates); data results; summary relative to performance criteria; a summary of the annual monitoring observations; a description of the management performed during the year; a list of recommendations for management during the upcoming year; and representative photographs of the natural areas. The naturalized detention basin BMP shall meet certification requirements, associated performance criteria, and will be monitored and maintained for a period of three years or until performance standards have been met to ensure successful establishment.

**END OF SECTION**

**SECTION 329300**

**LANDSCAPE PLANTINGS**

## PART 1 – GENERAL

### 1.1 DESCRIPTION

A. The landscape contractor shall provide all materials, labor and equipment to complete all landscape work as shown on the plans and specifications.
B. Total number of plants shall be drawn on the landscape plan. The Landscape Contractor shall state the total number of each plant with the contract price. The plant list submitted with the bid will automatically become part of the contract documents. NOTE: If the Contractor bids according to the plant list, he/she should thoroughly check the plant list quantities with the symbols drawn on the plan, to be sure there are no discrepancies
C. Landscaping as defined for this work shall consist of, but not be limited to:
    1. Planting: To consist of digging and preparing plant holes, and of furnishing, transporting, and planting of trees, shrubs and other plant materials.
    2. Other: Work shall also include all incidental operations such as mulching, bracing required, wrapping, care of living plants and replacement of unsatisfactory plants.

### 1.2 SECTION INCLUDES:

A. Preparation of subsoil and topsoil.
B. Topsoil bedding.
C. Trees, plants, and ground cover.
D. Mulch.
E. Fertilizer.
F. Pruning.
G. Maintenance.

### 1.3 RELATED SECTIONS:

A. Section 329119 - Landscape Grading: Preparation of subsoil and placement of topsoil in preparation for the Work of this section.

### 1.4 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Plants:
    1. Basis of Payment: Includes preparation of subsoil topsoil, placing topsoil, planting, watering and maintenance to specified time period.

### 1.5 REFERENCES

A. Illinois Department of Transportation – Standard Specifications for Road and Bridge Construction – current edition (Standard Specifications)
B. American National Standards Institute:
    1. ANSI A300 - Tree Care Operations - Tree, Shrub and Other Woody Plant Maintenance - Standard Practices.
    2. ANSI Z60.1 - Nursery Stock.
C. Forest Stewardship Council:
    1. FSC Guidelines - Forest Stewardship Council Guidelines.

### 1.6 DEFINITIONS

A. Weeds: Vegetative species other than specified species to be established in given area.
B. Plants: Living trees, plants, and ground cover specified in this Section, and described in ANSI Z60.1.

### 1.7 SUBMITTALS

A. Section 013300 - Submittal Procedures: Requirements for submittals.
B. Product Data: Submit list of plant material sources, data for fertilizer and other accessories.

C. Samples and Analysis: When required under “Special Conditions,” samples and certified analysis by a recognized laboratory shall be submitted by the Contractor, at his/her own expense, for approval by the Landscape Architect for topsoil, humus, fertilizer, fungicide, insecticide, tree paint, and anti-desiccant before delivery to the project. Manufacturer’s analysis for standard products will be acceptable to the Landscape Architect.
D. Approval of samples shall not be construed as final acceptance. The Landscape Architect reserves the right to take samples of the materials delivered to the site and analyze them for comparison with the specification. The cost of these tests shall be borne by the Contractor.
E. Planting Schedule: Submit three copies of proposed planting schedule, indicating dates for each type of landscape work during normal seasons for such work in area of site. Correlate with specified maintenance periods to provide maintenance from date of substantial completion. Once accepted, revise dates only as approved in writing, after documentation of reasons for delays.

**1.8 CLOSEOUT SUBMITTALS**

A. Section 017300 - Execution and Closeout Requirements: Requirements for submittals.
B. Operation and Maintenance Data: Include pruning objectives, types and methods; types, application frequency, and recommended coverage of fertilizer.
C. Closeout Submittals: Submit maintenance instructions and schedules according to Section 017700 – Contract Closeout.

**1.9 QUALITY ASSURANCE**

A. Tree Pruning: ANSI A300 Pruning Standards for Woody Plants.
B. Perform Work in accordance with Standard Specifications
C. Qualification of workmen: Provide at least one person who shall be present at all times during execution of this portion of the work and who shall be thoroughly familiar with the type of materials being installed and the best methods for their installation and who shall direct all work performed under this section.
D. Codes and Reference Standards: All materials shall conform to the standards adopted by and published by the American Nursery & Landscape Association (ANLA).
E. All material shall be balled and burlapped.
F. Standards:
    1. When required herein or as specified under Special Conditions, provide analysis and tests of topsoil, fertilizer and humus in accordance with the requirements of the Association of Official Agriculture chemists.
    2. Plant names used in the plant list are in accordance with “Standardized Plant Names,” published by the American Joint Committee of Horticulture Nomenclature (current edition).
    3. Size and grading standards of plant materials shall be in accordance with the latest edition of “U.S.A. Standard for Nursery Stock” and The American Nursery & Landscape Association.
G. Source Quality Control:
    1. Ship landscape materials with certificates of inspection and analysis. Comply with all regulatory requirements for landscape materials, fertilizer, herbicide and pesticide composition and application.
H. Labeling Requirements:
    1. Label at least one plant of each variety with a securely attached waterproof tag bearing legible designation of botanical and common name.
    2. Fertilizer shall be labeled with content and manufacturer.
    3. Anti-desiccant shall have original label from manufacturer intact and legible.
    4. Pesticide shall have original label from manufacturer intact and legible.
I. Uniformity:
    1. Where formal arrangements or consecutive order of trees or shrubs are shown, select stock for uniform height and spread.

J. Inspection:
   1. The Landscape Architect may inspect trees and shrubs either at place of growth or at site before planting, for compliance with requirements for genus, species, variety, size, and quality. The Landscape Architect retains right to further inspect trees and shrubs for size and condition of balls and root systems, insects, injuries and latent defects, and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected plants immediately from project site.

**1.10 SUBSTITUTIONS: PRE-BID**

A. It is the Landscape Contractor's responsibility to make every reasonable effort to find the material specified by the Landscape Architect. The Landscape Contractor is responsible for qualifying his/her proposal to document any plant suitability or availability problems. The Landscape Contractor may offer substitutions to the Landscape Architect for his/her consideration. The Landscape Contractor will notify the Landscape Architect if there are known diseases or insect resistant species that can be substituted for a selected pest-prone plant. The Contractor shall submit in a base bid as per plan plus price clarifications for all recommended substitutions.

**1.11 SUBSTITUTIONS: POST-BID**

A. It is the intent to eliminate post-bid substitutions. However, in the event that the contract material has become unavailable, submit proof of non-availability to the Landscape Architect together with proposal for use of equivalent material. An appropriate substitution must be approved by the owner's representative and the Landscape Architect.

**1.12 UTILITIES AND UNDERGROUND FEATURES**

A. The Landscape Contractor shall notify J.U.L.I.E. and/or the general contractor in advance of construction to locate utilities.
B. Street lighting and other private utilities, including cable TV, communication lines, etc. shall be located by the owner or general contractor.
C. If there is a conflict with the utilities and the planting, the Landscape Architect shall be responsible for relocating plants prior to the planting process.
D. Underground features including – but not limited to – existing irrigation, septic systems, drain systems, invisible pet fencing, landscape lighting, underground natural gas and security systems shall be located by the owner or general contractor.

**1.13 CONCEALED CONTINGENCIES**

A. The correction of undisclosed subsurface conditions including but not limited to rock, roots, stumps, water, clay pan, soils contaminated with toxic substances or other obstacles encountered in excavation work, which are not apparent at the time of estimating, will result in additional costs to the owner, Upon discovery of undisclosed conditions, the Landscape Contractor shall notify the Landscape Architect in writing regarding any additional costs, before corrective measures are taken. No work shall commence without authorization to proceed.

**1.14 DRAINAGE**

A. If plants are to be installed in areas that show obvious poor drainage, and the plants are inappropriate for that condition, the Landscape Contractor shall notify the Landscape Architect. If deemed necessary, the plants shall be relocated; the contract shall be adjusted to allow for drainage correction at a negotiated cost, or the plant selection modified by the Landscape Architect to accommodate the poor drainage situation.

**1.15 WORKMANSHIP**

A. During delivery and installation, the Landscape Contractor shall perform in a professional manner; coordinating his/her activities so as not to interfere unduly with the work of other trades and leaving his/her work area(s) clean of litter and debris at the close of each work day.

B. During planting, all areas shall be kept neat and clean, and precautions shall be taken to avoid damage to existing plants, large trees, turf and structures. Where existing trees are to be preserved, additional precautions should be taken to avoid unnecessary accumulation of excavated materials, soil compaction or root damage.
C. Upon completion, all debris and waste material resulting from planting operations shall be removed from the project and the area cleaned up.
D. Any damaged areas caused by the Landscape Contractor shall be restored to their original condition.

## 1.16 QUALIFICATIONS

A. Nursery: Company specializing in growing and cultivating plants with three years' experience.
B. Installer: Company specializing in installing and planting plants with five years' experience.
C. Tree Pruner: Company specializing in performing work of this section with minimum three years' experience.
D. Maintenance Services: Performed by installer.

## 1.17 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Section 016000 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
B. Transportation:
    1. The Contractor shall exercise care to prevent injury and drying out of the plant material.
    2. Delivery and Storage:
        a. Deliver all items to the site in their original containers with all labels intact and legible at time of the Landscape Architect's inspection.
        b. Use all means necessary to protect all items before, during, and after installation, and to protect the installed work and materials of all other trades. Deliver plants after preparations for planting have been completed and plant immediately. If planting is delayed more than 6 hours after delivery, set plants in shade, protect from weather and mechanical damage, keep roots moist by covering with mulch, burlap or other acceptable means of retaining moisture.
        c. Balled and burlapped or container-grown plants may remain on the site only 72 hours prior to being planted or put in storage.
        d. Plants shall be kept moist and protected from freezing. Do not remove from containers until planting time.
        e. Pesticides: Deliver pesticide materials to the site in original unopened containers with legible label indicating Environmental Protection Agency (EPA) pesticides or anti-desiccants with other landscape materials.
        f. Plants: Provide container grown or boxed plants. Do not prune prior to delivery unless otherwise approved by Landscape Architect. Deliver branched plants with branches tied. Do not bend or bind-tie trees or shrubs in such manner as to damage bark, break branches, or destroy natural shape. Provide protective covering with material that allows air circulation during delivery.
    3. Replacements: In the event of damage or rejection, immediately make all repairs and replacements necessary to the approval of the Landscape Architect and at no additional cost to the owner.
    4. Storage of Materials: Fertilizer, humus, and spray materials shall be stored in weatherproof storage areas and in such a manner that their effectiveness will not be impaired.
    5. Inspections:
        a. All plants shall be subject to inspection and approval by the Landscape Architect. Plants required for the work may be inspected and tagged at the place of growth before being dug. Inspection and tagging at the place of growth shall not affect the Landscape Architect's right to reject such plants on or after delivery thereof to the site as well as in place.

b. Prior to the inspection of plant materials by the Landscape Architect, the Contractor shall select and tag with identification numbers, all tree specimen plants, and three (3) or more samples typical to each kind and size of all other plant materials proposed for use in accordance with types and designations as shown on the drawings.
c. Inspection of plants by the Landscape Architect at the place of growth or upon delivery will be for quality and size. Variety, color, and all other requirements shall be the responsibility of the Contractor. Inspection for size of ball or roots, latent defects and for other requirements will be made at the site during progress of the work by the Landscape Architect.
d. Tagged samples of plant materials shall be delivered to the site and planted in locations as shown on the drawings, or as designated by the Landscape Architect. These tagged samples shall be maintained, protected, and used as standards for comparison with the plants furnished for the work.
e. The Contractor shall make a written request to the Landscape Architect five- (5) working days in advance for all inspections at the various nurseries and collecting grounds. This request shall state the location of the nursery or collecting grounds and shall list the particular plants which are to be inspected, as well as the size of such plants.
f. If the plants and materials, which are required to be inspected by the Landscape Architect, are located outside a radius of fifty (50) miles from the project site, the entire cost of the inspectors will borne and paid for the Contractor.
g. The Contractor or the Landscape Architect's authorized representative shall be present during all required inspections as specified or as may be required by the Landscape Architect.

6. Digging and Handling of Plant Material:
   a. Plants marked "B&B" on the list shall be balled and burlapped with ball diameters as specified in the USA Standard for Nursery Stock. Container grown nursery stock will be accepted as approved by the Landscape Architect.
   b. NO plant will be accepted when the ball has been cracked or broken in moving, or during the process of planting, or when the burlap and ropes have been removed. All balled and burlapped plants that cannot be planted immediately on delivery shall be set on the ground and the balls well covered with soil or other acceptable mulch material and shall be kept moist until planted.
   c. Plants marked "POT" shall be pot grown with a well-established root system. Diameter spread determines standard inside diameter or pot in which they shall be grown for at least three (3) months prior to delivery.
   d. All plants shall be handled so that the roots are adequately protected at all times. During shipment, all plants shall be properly protected by a tarpaulin or other suitable covering. No plant shall be so bound with rope or wire at any time as to damage the bark, break branches, or destroy its natural shape.
   e. Plants shall be properly marked for identification and for checking as designated on the plant list. Each bundle of plants and all separate plants shall have legible waterproof labels securely attached thereto before delivery to the site.
7. Rejection:
   a. All plant material shall be inspected and should the roots be dried out, large branches broken, balls of earth broken or loosened, or areas of bark torn, the Landscape Architect may reject the injured materials.
   b. Plant material damaged as a result of delivery, storage or handling will be rejected.

C. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.
D. Protect and maintain plant life until planted.
E. Deliver plant materials immediately prior to placement. Keep plants moist.

## 1.18 PROTECTION

A. Protect all planted areas and plants from trespassing by individuals and from damage of any kind until completion of all contract work. If any plants are injured, they shall be treated or replaced as required by the Landscape Architect. No work shall be executed in or over prepared plant areas, or adjacent planting, without proper safeguards and protection.

## 1.19 WARRANTY

A. The Contractor shall further guarantee that during the period of the guarantee he will make good any defects to the work and all damage caused to the owner's property by such defects or by the work required to remedy such defects.

B. Within this period of the guarantee, replacements of plants or other materials or work shall be made as approved by the Landscape Architect and guaranteed for one (1) year thereafter, excluding bulbs, sod and annuals, commencing on the date of install acceptance. All plants shall be alive and in satisfactory growth at the end of the guarantee period.

C. At any time within the period of the guarantee, the Contractor shall replace any plant which has died or is in a dying condition, or which has failed to flourish in such a manner or is such a degree that its usefulness or appearance has impaired due to inferior or defective materials or workmanship, or unfavorable weather conditions. The decision of the Landscape Architect for making replacements shall be conclusive and binding upon the Contractor. The Contractor shall also make good damage to persons or property caused by defective workmanship or materials.
   1. Any trees, shrubs, or vines found to be unacceptable as described above shall be removed from the site and replaced during the next planting season.
   2. Plant replacements shall be of the same kind and size as specified in the itemized plant list. All plant replacements shall be inspected, furnished, planted and mulched as specified at the Contractor's expense. All sidewalks and other paved areas shall be kept clean at all times.
   3. Where trees are replaced, the Contractor shall be responsible for repairing any damage caused by this replacement to lawns or pavements.

D. During the guarantee period, the Contractor shall, from time to time, inspect the watering, cultivation, and other maintenance operations carried on by the owner, or its agents with respect to such work, and promptly report to the owner any methods, practices or operations which he considers unsatisfactory, and not in accord with the Landscape Architect's interests or good horticultural practices. The failure of the Contractor to so inspect or report shall be construed as an acceptance by him of the owner's maintenance operations, and he shall not thereafter claim or assert that any defects which may later develop are the results of such methods or practices or operations. The Contractor shall have the opportunity, together with the owner, to establish the maintenance program to be followed.

E. Any material that is 25% dead or more shall be considered dead and must be replaced at no charge. A tree shall be considered dead when the main leader has died back, or 25% of the crown is dead.

F. Perennials shall be guaranteed for one year after initial acceptance.

G. Warranty may be void if proper care, by owner or owner's maintenance contractor, is not maintained.

H. The Landscape Contractor shall be responsible for a one-time replacement only.

I. The Landscape Contractor will not be responsible for plant material that has been damaged by vandalism, fire, removal, relocation, wildlife, theft or other activities beyond the Landscape Contractor's control. Plant losses due to abnormal weather conditions such as floods, excessive wind damage, drought, severe freezing or abnormal rains will in no way be the responsibility of the Landscape Contractor.

J. Existing plant material transplanted shall not be guaranteed unless otherwise stated by the Landscape Contractor.

## 1.20 SITE CONDITIONS

A. Environmental Requirements:
   1. Do not install plants when the ambient temperatures may drop to below 35° degrees F or increase above 90° degrees F.
   2. Do not install plants when wind velocity exceeds 30 mph.

## 1.21 SEQUENCING AND SCHEDULING

A. Requirements: Coordinate the work of this Section with other site work including installation of underground irrigation system, utilities, piping and watering heads when required.
   1. Landscape Mulch: Shall not be placed until the required water distribution systems and planting operations have been completed within the area.
B. Planting: Install plants during the normal planting season.

## 1.22 MAINTENANCE

A. Section 017300 - Execution and Closeout Requirements: Requirements for maintenance service.
B. Instructions: Submit instructions for continuing maintenance under provisions of Section 017700 – Contract Closeout.
C. Schedule: Begin maintenance immediately after installation of plants and continue maintenance until final acceptance by the Landscape Architect.
D. Maintain plant life for six months after Date of Substantial Completion.
E. Maintain plant life immediately after placement until plants are well established and exhibit vigorous growing condition. Continue maintenance until termination of warranty period.
F. Maintenance includes:
   1. Cultivation and weeding plant beds and tree pits.
   2. Applying herbicides for weed control. Remedy damage resulting from use of herbicides.
   3. Remedy damage from use of insecticides.
   4. Irrigating sufficient to saturate root system.
   5. Pruning, including removal of dead or broken branches.
   6. Disease control.
   7. Maintaining wrapping, guys, turnbuckles, and stakes. Adjust turnbuckles to keep guy wires tight. Repair or replace accessories when required.
   8. Replacement of mulch.

## 1.23 PRE-INSTALLATION MEETINGS

A. Section 013300 - Administrative Requirements: Pre-installation meeting.
B. Convene minimum one week prior to commencing work of this section.

## 1.24 COORDINATION

A. Section 013300 - Administrative Requirements: Requirements for coordination.

# PART 2 – PRODUCTS

## 2.1 TREES, PLANTS, AND GROUND COVER

A. Plant Species: Provide trees, shrubs, ornamental grasses and ground cover of the size, genus, species, and variety shown on the drawing's tree plant schedule. Plants shall have been grown under climatic conditions similar to those in which they will be installed under this contract.
   1. Furnish nursery-grown plants with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully-branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions and disfigurement.
   2. Plants of a larger size may be used if acceptable to the Landscape Architect with a proportionate increase in size of roots or balls.

3. Shade trees shall be single-stem trees with straight trunk, well-balanced crown, and intact leader, of size indicated. Branching height shall be ½ of tree height, minimum.
4. Ornamental trees shall be small upright or spreading type multi-stem trees branched or pruned naturally according to species and type, and with appropriate relationship of caliper, height, and branching.
5. Deciduous shrubs shall have not less than the minimum number of canes appropriate for the type, shape, and height of shrub.
6. Broadleaf evergreens shall be normal-quality, well-balanced, of type, height, spread, and shape required.
7. Groundcovers shall be established and well rooted in removable containers or integral peat pots and with the appropriate number and length of runners for the pot size indicated.

## 2.2 WATER

A. Water will be furnished to the Contractor by the owner from existing facilities. The Contractor shall furnish all hose and connections necessary for watering plants.
B. The owner will furnish a water meter to the Contractor where larger quantities of water are necessary or where no existing water facilities exist; however the Contractor must obtain the meter from the Owner. The cost of water shall be borne by the owner.

## 2.3 HUMUS

A. Peat moss of partially decomposed fibrous or cellular stems and leaves of any of several species of sphagnum mosses shall be used, conforming to the following requirements:
   1. Texture and Composition: Texture may vary from porous fibrous to spongy fibrous, and crumbly or compact, but fairly elastic and substantially homogeneous. It shall be free from decomposed colloidal residue, excessive woody materials (roots and stems) and mineral matter such as iron and sulfur. It should be dark brown in color with shredded particles not exceeding ¼ inch in size.
   2. Acidity: pH value not less than 3.2 and not greater than 5.5 at approximately 25 degrees C.
   3. Ash: Based on oven dry weight, the ash content shall not exceed 5%.
   4. Water Holding Capacity: Shall not be less than 800% by weight, on an oven dry basis. When delivered to the site, the moisture content shall be between 35% and 50%.

## 2.4 FERTILIZER

A. All fertilizer shall be a commercial type fertilizer with the following approximate analysis:
   1. Nitrogen..... 6%
   2. Phosphoric Acid ..... 24%
   3. Potash ..... 24%

## 2.5 SHREDDED HARDWOOD BARK MULCH

A. Shredded bark similar to product called “Pay-Gro,” manufactured by Pay-Gro Division, Mead Corporation, Dayton, Ohio.
B. Shredded hardwood bark mulch shall be free of harmful chemicals, diseases, and insects. Mulch shall have a min. 1/8-inch dimension and a maximum length of 2-1/2”.

## 2.6 TREE WRAP

A. Burlap for Wrapping: Material for wrapping tree trunks shall be of burlap, first quality, at least eight (8) ounces in weight and six (6) inches in width.
B. Tree wrap for wrapping the trunks shall be either burlap strips, or first quality, 4-inch wide bituminous impregnated tape, corrugated or crepe paper, specifically manufactured for tree wrapping and having qualities to resist insect infestation.

**2.7 TREE STAKING AND GUYING (when applicable)**

A. Hose: Hose for tree guys shall be new black two-ply fiber-bearing garden hose, not less than ½ inch inside diameter.
B. Wire: Wire for tree guys shall be pliable #10 gauge twisted galvanized annealed steel wire.
C. Stakes: For guying trees shall be 2 inch by 4 inch construction grade lumber, 18 inches long and sharpened at one end.

**2.8 TREE PAINT**

A. Waterproof, adhesive, and elastic, free from kerosene, coal, tar, creosote, or any other materials injurious to the life of the tree. Tree paint shall contain an antiseptic.

**2.9 TREE WATERING BAG**

A. Deciduous Trees
    1. Treegator® Original or approved equal
        a. for all deciduous trees up to 8-inch caliper
B. Evergreen Trees
    1. Treegator® Jr. Pro or approved equal
    2. for all evergreen trees with branches more than 6-inches above the ground

**2.10 ANTI-DESICCANT**

A. An emulsion equal to “Wilt-Pruf,” which will provide a protective film over plant surfaces, permeable enough to permit transpiration. Anti-desiccant shall be delivered in the sealed containers of the manufacturer and shall be mixed and applied according to manufacturer’s instruction.

**2.11 INSECTICIDE**

A. An all-purpose spray equal to “Malathion” and shall be effective against all types of pests and insects. The spray should be delivered in the manufacturer’s containers and shall be mixed and sprayed according to manufacturer’s instructions.

**2.12 FUNGICIDE**

A. Fungicide: A dry powder form equal to mixture of 50% “Fermate” and 50% “Ferbem.” Fungicide shall be delivered in manufacturer’s containers and shall be mixed and applied according to the manufacturer’s instructions.

**2.13 HERBICIDE**

A. Shrub Beds: A granular form herbicide equal to “Ronstar G” as manufactured by Chipco. Apply only as recommended by manufacturer.
B. Groundcover Beds: A granular form herbicide equal to “Treflan” as manufactured by Elanco Products Co., a division of Eli Lilly and Co. Apply only as recommended by manufacturer.

**2.14 MUSHROOM COMPOST**

A. A 3-inch deep layer of approved mushroom compost will be added to the entire surface area of all mass planting beds. The mushroom compost will be from approved supplier. Contractor will supply product information regarding material properties. Submit sample.

**2.15 TOPSOIL**

A. All additional topsoil required for planting operations shall be furnished by the Contractor. The topsoil used shall be of the consistency and quality as approved by the Landscape Architect. Topsoil shall be new, fertile, friable, natural loam, surface soil, reasonably free of subsoil, clay lumps, bugs, roots, weeds, and stones larger than 2” diameter, stalks, debris, extraneous or toxic matter harmful to plant growth. All such undesirable material shall be disposed of by this Contractor off the premises or as directed by the Landscape Architect.

## 2.16 PLANTING MIXTURE

A. Soil for planting shall consist of seven (7) parts approved topsoil to one (1) humus with one (1) pound of fertilizer thoroughly mixed into each cubic yard of planting mixture.

## 2.17 WEED CONTROL

A. Non-Selective, pre-emergent weed control.

## 2.18 PLANT MATERIALS

A. Planting Stock:
   1. Species: In accordance with Standardized Plant Names, official code of American Joint Committee on Horticulture Nomenclature.
   2. Identification: Label individual plants or each bundle of plants when tied in bundles.
   3. Plants: No. 1 Grade conforming to “American Standard for Nursery Stock” of American Association of Nurserymen (AAN); well-branched, vigorous and balanced root and top growth; free from disease, injurious insects, mechanical wounds, broken branches, decay and other defects.
   4. Trees: Furnish with reasonably straight trunks, well balanced tops, and single leader.
   5. Deciduous plants: Furnish in dormant state, except those specified as container grown.
B. Trees Plants and Ground Cover: Species and size identifiable in plant schedule, grown in climatic conditions similar to those in locality of the Work.

# PART 3 – EXECUTION

## 3.1 EXAMINATION

A. Section 013300 - Administrative Requirements: Verification of existing conditions before starting work.
B. Verify prepared subsoil and planters are ready to receive work.
C. Saturate soil with water to test drainage.
D. Verify required underground utilities are available, in proper location, and ready for use.
E. The Contractor shall stake out all plant material locations as per the plans and specifications and gain the Landscape Architects approval of all layout work prior to any excavation for plant holes.
F. Locate all utilities prior to layout work.
G. Any conflicts between plant locations and existing utilities or other site elements shall be called to the attention of the Landscape Architect who will determine alternate locations.
H. Excavation:
   1. Perform all necessary excavations as required for planting operations. Contract prices shall include rock, broken concrete and similar excavations as may be required to fulfill the intent of the plans and specifications.
   2. All excess excavated materials shall be disposed of by the Contractor as desired.

## 3.2 INSTALLATION

A. Planting Seasons:
   1. Deciduous Plants:
      a. April 1st to June 15th.
      b. October 1st to December 15th.
   2. Evergreen Plants:
      a. April 1st to May 15th.
      b. September 1st to October 1st.
B. The actual planting, however, shall be done during good weather within these time periods to obtain acceptable results. If good weather is present outside the time frame, planting can occur with the approval of the Landscape Architect and Owner.
C. The planting periods designated above may be extended for container grown plants or as weather conditions allow as determined by the Landscape Architect.

D. Pruning, Painting and Spraying:
   1. Each tree and shrub shall be pruned to preserve the natural character of the plant and in a manner appropriate to its particular requirement in the landscape design. In general, at least 1/3 of the wood shall be removed by the thinning or shortening branches, but no leaders shall be cut. Pruning shall be heavier on collected plants and on nursery grown plants. Any sucker growth and broken or badly bruised branches shall be removed with clean cuts.
   2. Prune with sharp tools only. Make all cuts flush and clean; especially where lower branches have been removed from collected trees. Paint all pruning cuts over ¾ inches in diameter with tree paint.
   3. The Landscape Architect must be present to approve any exceptional pruning plants to fulfill a definite purpose. All pruning shall be completed on the site after delivery.
   4. Spraying will be required only as directed when conditions warrant additional protection.

E. Mulching and Herbicide Applications:
   1. All shade trees, ornamental trees, singularly planted shrubs and hedge plantings shall be mulched. The mulch as herein specified shall cover the entire planting pit or trench with a minimum of two (2) inches and not more than three (3) inches in depth.
   2. All massed or bedded plantings will be mulched as specified above Item 1. The entire bed shall be mulched under the plants. In addition, the Contractor shall be responsible for the application of a herbicide as herein specified. Application must follow the manufacturer's directions exactly.
   3. No mulching will be required in groundcover areas or trees planted within pavement areas. No herbicides shall be used on newly established groundcover beds. Once the beds are established, a pre-emergent granular herbicide, Treflan, or equal may be used according to manufacturer's directions on groundcovers that do not die back in winter. NO herbicides may be used on groundcovers that do die back each winter.

F. Wrapping:
   1. All tree trunks of 2-1/2" diameter or larger shall be wrapped with burlap. Wrapping shall start at the base of the tree and extend up the entire trunk to the height of the first branches. Burlap shall overlap the preceding wrap by 3- inches and shall be tied at the top and bottom and at 2- feet intervals with suitable twine.

G. Staking and Guying (where applicable):
   1. All guying and staking shall be done immediately after wrapping. Plants shall stand plumb after staking.
   2. All evergreen trees shall be staked and guyed. Deciduous trees 4- inches and over shall be staked and guyed.
   3. Other trees shall be staked as required by the Landscape Architect in special locations due to the unusual site conditions.
   4. Staking shall be done to conform to the standard landscape construction methods, using a three-point guying procedure with galvanized wires, hosed loops around tree trunks, turn buckles and wooden stakes driven eighteen (18) inches into the ground. Staking of trees in planters shall conform to detail on plan.

H. Watering Bags
   1. Install Treegator® watering bags on all deciduous trees up to 8-inch caliper and all evergreen trees 4-ft high and greater.
   2. Maintain water levels in all watering bags for first growing season.

## 3.3 SCOPE OF WORK

A. The Landscape Contractor shall be responsible for furnishing and installing all plant material shown on the drawings and plant list, as submitted with the contract. The Landscape Contractor shall have investigated the sources of supply and satisfied himself/herself that he/she can supply all the plants specified on the drawings in the size, variety and quality noted before submitting the bid. Failure to take this precaution will not relieve the successful bidder from the responsibility for furnishing and installing all the plant material in strict accordance with the contract requirements.

## 3.4 STANDARDS

A. Plants will be in accordance with the current ANLA's standards and conform in general to representative species.

B. Bare Root

1. Bare-rooted shrubs shall be dug with adequate roots and shall have minimum root spreads as follows:

| Height of Plant: | | | | | |
|---|---|---|---|---|---|
| 18in. | 2 ft. | 3 ft. | 4 ft. | 5 ft. | 6 ft. |

| Minimum Root Spread: | | | | | |
|---|---|---|---|---|---|
| 10 in. | 11in | 14 in. | 16 in. | 18 in. | 20 in. |

2. Roots shall be protected during handling and planting to guard against drying out and damage.

C. Balled and Burlapped (B&B)

1. Balled and burlapped plants shall be dug with firm root balls free of noxious weeds. There should be no excess soil on top of the root ball or around the trunk.
2. Ball sizes shall be in accordance with ANLA Standards.
3. Caliper and Height Measurement: In size grading B&B single-trunk trees, caliper shall take precedence over height. Caliper of the trunk shall be taken 6" above the ground level (up to and including 4" caliper size) and 12" above the ground level for larger trees. For multiple-trunk trees, height measurement shall take precedence over caliper.

D. Container-Grown Stock

1. The size of container-grown shrubs is measured by height and width of plant. Container-grown trees are measured by the same standards listed in section 3.02, C.3 above. Herbaceous perennials shall be measured by pot size, not top growth. The root system of container-grown plants shall be well-developed and well-distributed throughout the container.
2. All container-grown trees and shrubs that have circling and matted roots shall be treated in the following manner prior to planting: using a knife or sharp blade, make 4-5 cuts, 1" deep, the length of the root ball, to cut all circling roots.
3. All container-grown plants should be grouped and watered daily until they are planted in the landscape. To properly acclimate to new conditions after being planted in the landscape, container material must have ample soil moisture. Until roots penetrate the soil, soil must remain moist. Water twice weekly or at four-day intervals until the equivalent of one inch of rainfall or supplemental irrigation is received.

E. Root control bags – trees and shrubs: Plants grown in root control bags may be slightly larger than root ball sizes identified by ANLA standards. Before transplanting these into the landscape, the geotextile bag must be completely removed from around the root ball, and the tree properly staked. Adequate irrigation is essential to root control bag trees and shrubs.

F. Trees shall be nursery-grown unless otherwise specified. Pruning shall be done before planting or during the planting operations.

G. All plant material in transit shall be covered to keep material from drying out. The covering shall comply with state and local laws pertaining to the transport of materials.

## 3.5 PLANT MATERIAL INSPECTION

A. Plants may be subject to inspection and approval by the Landscape Architect or owner at the place of growth or holding yard for conformity to specification requirements as to quality, size and variety. It is the Landscape Contractor's responsibility to know his/her sources. The Landscape Contractor shall select plants ahead of inspection visits to prevent rejection of materials delivered to the site. Cost of the inspection visits shall be borne by each individual party.

B. Plants damaged in handling or transportation can be rejected by the Landscape Architect or the owner.

C. Any plant material inspected at the place of growth, accepted and tagged by the Landscape Architect or owner that has not been damaged during transportation, cannot be rejected at the site as long as the tag remains attached to the plant.
D. State nursery inspection certificates shall be furnished to the Landscape Architect upon request.

## 3.6 PLANT MATERIALS

A. Plant Materials: Nursery grown plants shall mean plants which are healthy, vigorous plants lined out in rows in a nursery and which are annually cultivated, sprayed, pruned and fertilized all in accordance with good horticultural practice as approved by the Landscape Architect. All plants shall be nursery grown unless specified to be collected. All plants shall have grown under climatic conditions similar to those in the locality of the project, or have been acclimated to the conditions of the locality for at least two (2) years.
B. All plants shall be freshly dug or container grown. Neither heeled-in plants nor plants from cold storage will be accepted. All nursery grown plants shall have been transplanted or root pruned at least once in the past three- (3) years. Balled and burlapped plants must come from soil which will hold a firm ball.
C. All plants shall be typical of their species or variety, shall have a normal habit of growth, and shall be first quality, sound, healthy vigorous, well branched and densely foliated. They shall be free of disease, insect pests, eggs or larvae.
D. All plants shall conform to the measurements specified in the plant list and shall conform to the U.S.A. Standards for Nursery Stock.
E. All plants and all tree trunks shall be measured when the branches are in their normal position. Dimensions for height and spread as contained herein refer to the main body of the plant and not from branch-tip to branch-tip. The heights of tree trunks need not be as specified if the required height can be obtained by pruning the lower branches without leaving unsightly scars or otherwise damaging the trunk. No pruning of branches to obtain the required height, however, shall be done before the plants are delivered to the site unless so approved in writing by the Landscape Architect.
F. All trees must have straight trunks with a single leader intact. There shall be no abrasion of the bark, and no fresh cuts of limbs over 1-1/4 inch, which have not completely callused over.
G. Specimen Plants: Whenever specimen plants are called for in the plant list, it shall denote plants of the specified size, symmetrical and full branched on all sides, exceptionally heavy and of uniform size.
H. No substitutions shall be made from the plants specified unless written request is received from the Contractor and permission is granted in writing by the owner.

## 3.7 PLANTING PROCEDURE FOR TREES

A. PREPARING TREE PIT
    1. Walls of tree pit shall be dug so that they are vertical, or sloping outward in heavy soils, and scarified and the bottoms horizontal.
    2. The tree pit must be a minimum of 9”-12” larger on every side than the ball of the tree. (Ball diameter plus 24”)
    3. The tree pit shall be deep enough to accommodate the ball depth to allow 1/8 of the ball to be above the existing grade. Plants shall rest on undisturbed existing soil or well-compacted backfill.
    4. Pits for bare-rooted trees shall only be broad enough to accommodate the roots fully extended and only deep enough so that the uppermost roots will be just below the original grade.
    5. If poor drainage is suspected, a percolation test may be required. A twelve-inch wide by eighteen-inch deep hole must be filled with water and eight hours later, the hole should be empty. Sub-drainage may be needed if the hole does not drain properly in eight hours.
B. PLACING TREE IN PIT
    1. Place the tree in the pit carrying the ball and then lowering it into the pit. Never lift the tree by the trunk or branches.

2. Set the tree straight and in the center of the pit with the most desirable side facing toward the prominent view.
3. For bare-rooted trees, set the tree in the pit so that all roots, when fully extended, will not touch walls of the planting pit and the uppermost root is just below the original grade.
4. All bare rootstock shall be planted in holes large enough to accommodate the full spread of the roots without crowding. Backfill the plant material (approximately ¾ of the hole) with the planting soil mixture and thoroughly water in place. Set all plants plumb and in straight lines when required. All bare root material shall be planted 1-1/2 inches lower than originally planted in the nursery. All material shall be root pruned to remove undesirable root growth and to improve characteristics.
5. Remove containers from all container-grown trees. Slash the edges of the root balls from top to bottom, at least 1" deep. The slashing of roots may not be required for containers pre-treated with copper coating or plants grown in a Cellugro system or in root containment bags.

C. BACKFILLING TREE PIT
1. Each site is unique. Soil tests should be used to identify special conditions. Backfill mixture for trees and shrubs shall be ¾ existing soil mixed with ¼ organic material, plus granular fertilizer. If compost is used, omit the granular fertilizer.
2. If any other additives are found to be needed at the time of planting, it shall be with the approval of the Landscape Contractor, Landscape Architect and owner or owner's representative at an additional negotiated cost.
3. Backfill tree pit with a soil mixture stated in the specifications, except where existing soil is suitable according to soil test results.
4. If trees are to be staked or guyed at the time of installation, you must cut and remove rope or wire off the top 50% of rootball and pull burlap back to the edge of the ball. Remove as much burlap, woven products and twine as possible. All plastic or synthetic film or twine must be removed from the rootball. Cut all twine away from trunk. If trees are not staked at the time of installation, the owner must be notified in writing to remove all rope and burlap from the top of the rootball one year from installation date.
5. The tree must remain straight during backfilling procedure.
6. Thoroughly mix soil amendments, if needed, either prior to filling pit or as pit is being filled.
7. Backfill sides of tree pit halfway with soil mixture and tamp as pit is being filled. Do not over compact top 2/3 of planting mixture.
8. Finish backfilling sides of tree pit and tamp firmly.
9. Never cover top of rootball with soil.
10. Form a saucer above existing grade, around the outer rim of the tree pit, especially on slopes and in heavy soils.
11. Mulch top of root ball and saucer to a minimum depth of 3", not to exceed 3". Do not place mulch against the trunk.
12. Water thoroughly on the interior of the tree saucer until it is filled, even if it is raining. A second watering may be necessary to insure saturation of the root ball and elimination of air pockets. An alternative watering method is to backfill half of the pit, flood the pit and completely backfill afterwards. Slow release watering devices or automatic drip irrigation systems will improve survival.
13. Remove all tags, labels, strings and wire from the tree, unless otherwise directed.

## 3.8 PLANTING PROCEDURES FOR SHRUBS

A. PLANTING SHRUBS
1. For a single shrub, the pit shall be dug 18 inches wider than the rootball diameter and deep enough to allow 1/8 of the rootball to set above existing grade.
2. For a shrub mass planting, the entire bed area shall be tilled 4-6" deep. Tilling should only be done in moist soil to avoid compaction. If the soil is in clay or silt or loam, organic material should be added. Each shrub pit shall be excavated for the proper setting of the rootball.

3. Place the shrub in the pit by lifting and carrying it by the rootball or container. Remove containers from all container-grown shrubs; slash the edges of the rootball from top to bottom 1: deep. The slashing of roots may not be required for containers pre-treated with copper coating or plants grown in a Cellugro system or in root containment bags.
4. Set the shrub straight and in the center of the pit with the most desirable side facing toward the prominent view.
5. For individual shrub planting, use a backfill mixture except when existing soil is suitable as determined by soil test.
6. The shrub must remain straight during backfilling procedure.
7. Backfill sides of the pit halfway up with soil mixture and tamp as the pit is being filled. Enough planting soil mixture shall be used to bring the surface when settled to the required grade.
8. Cut and remove rope or wire off the top of the rootball and pull burlap back to the edge of the ball. Remove as much burlap, woven products and twine as possible. All plastic or synthetic film or twine must be removed from the rootball. Cut all twine away from trunk.
9. Finish backfilling the sides of the shrub pit and tamp firmly.
10. The grading of the shrub pot shall form a saucer at least 4 inches in depth above the existing grade and completely around the planting pit.
11. Mulch tops of rootball and saucer a maximum depth of 2-inches.
12. Water shrub or shrub mass thoroughly even if it is raining. A second watering may be necessary to insure saturation of the rootball and elimination of air pockets. An alternative watering method is to backfill half of the pit, flood the pit and completely backfill afterwards. Slow release watering devices or automatic drip irrigation systems will improve survival.
13. Prune out any dead or broken branches. Prune hedge as directed by Landscape Architect.
14. Remove all tags, labels, strings, wire, etc. from the plant unless otherwise directed.

## 3.9 PLANTING PROCEDURES FOR ALL CONTAINER GROWN TREES & SHRUBS

A. CONTAINER REMOVAL
   1. Remove the plant either by cutting or inverting the container.
   2. For untreated plastic container-grown plants with circling roots, use a sharp knife to make 4-5 1” cuts the length of the rootball.
   3. Plant shrub or tree a minimum of 1/8 of the height of the rootball above existing grade.
   4. Apply a 2 to 3” thick layer of approved mulch.
   5. Plants grown in root containment bags must have the bags removed during the planting operation. No additional slashing of the rootball is necessary.

## 3.10 PLANTING PROCEDURES FOR GROUND COVER, PERENNIALS & ANNUALS

A. PREPARING GROUND COVER, PERENNIAL & ANNUAL BEDS
   1. The planting bed shall be loosened when the soil is moist prior to planting by tilling. Soil shall be loosened to a depth of 4 to 6-inches.
      a. Organic matter shall be spread over the bed to a depth of 2” for peat moss or 1” deep for compost, i.e., not to exceed 4 cubic yards of compost/1000 square feet, after the soil has been loosened. The organic matter shall then be worked into the bed by tilling
      b. Fertilizer shall be top dressed over bed area (except when compost is applied) based on soil test results. In the establishment stage, liquid fertilizer may be applied to annuals as directed by owner or Landscape Architect.
      c. Mulch entire bed to a minimum depth of 1”, 2”maximum, with approved mulch, such as pine fines, pine needles or unscreened compost.

## 3.11 PLANTING GROUND COVER, PERENNIALS & ANNUALS BEDS

A. Before planting, biodegradable pots shall be split, and non-biodegradable pots shall be removed. Root systems of all potted plants shall be split or crumbled.
B. Excavate all groundcover areas to a depth of 9- inches and replace with 6- inches of topsoil and 3- inches of mushroom manure or well-rotted manure thoroughly worked into the total depth of topsoil.

C. The plants, either potted or bare root, shall be installed so that the roots are by soil below the mulch. Potted plants shall be set so that the top of the pot is even with the existing grade. The roots of bare root plants shall be covered to the crown. (Ground cover and perennial excavation shall be minimally the depth of the container plus 8 inches)
D. Spacing of plants shall be installed as noted on the landscape plan or contract.
E. The entire planting bed shall be thoroughly watered.
F. Treat the mulched and planted bed with a pre-emergent, soil-applied herbicide if directed by the owner or Landscape Architect. Apply the pre-emergent herbicide only when all foliage is dry to prevent foliar burn.

**3.12 PLANTING PROCEDURES FOR BULBS**

A. The planting bed shall be loosened when the soil is moist prior to planting by tilling. Depth of loosening depends on bulb species.
B. Spread Organic matter over the bed to a depth of 2-inches for peat moss or 1-inch deep for compost, i.e., not to exceed 4 cubic yards of compost/1,000 square feet, after the soil has been loosened. Work organic matter into the bed by tilling.
C. Incorporate fertilizer into the soil, except when compost is used, to the planting depth of perennials and bulbs. The fertilizer rate will be based on the results of the soil test.
D. Do not fertilize annual bulbs.
E. Mulch entire bed to a minimum depth of 2-inches with approved mulch.

**3.13 PLANTING BULBS**

A. Install bulbs by one of the following methods:
    1. When planting small quantities of bulbs or in crowded areas among other plants:
        a. Dig the bulb planting hole through the mulch with a hand trowel, bulb planter or power auger.
    2. When planting large quantities of bulbs in one area:
        a. Excavate to the recommended planting depth. Set out the bulbs and then cover the bulbs with soil.
    3. Bulbs used as a single season display may be planted at a lesser depth.
B. Plant bulbs so that the basal plate faces down in the planting hole.
C. Space bulbs as noted on the landscape plan or contract.
D. Treat mulched and planted bed with a pre-emergent approved for bulbs.

**3.14 OTHER MATERIALS**

A. All other materials not specifically described but required for complete and proper completion of the work of this section, shall be as selected by the Contractor subject to the approval of the Landscape Architect.
B. Method:
    1. Prune in such a manner as to preserve the natural growth habit of each plant.
    2. Procedure and percentage of growth to be removed shall be subject to the approval of the Landscape Architect.
    3. All wound surfaces larger than one inch in diameter shall be treated with a commercial pruning compound.
C. Deciduous Trees:
    1. Pruning shall consist of thinning the twigs or branches as indicated by the habit of growth of the species.
    2. Leader and terminal buds shall not be cut unless directed by the Landscape Architect.
D. Deciduous Shrubs:
    1. Cut back rapid growing or suckering shrubs 1/3.
    2. Prune slow-growing shrubs the same manner as deciduous trees.
E. Evergreens
    1. Do not prune evergreens except to remove broken branches.

## 3.15 MAINTENANCE, CLEAN UP AND ACCEPTANCE

A. Maintenance of Trees, Shrubs, and Groundcovers:
   1. Maintenance shall begin immediately upon completion of all planting and shall continue for sixty (60) days during the period of May 1st to November 1st, weather depending. If subsequent months prove to be warm dry months, the contractor shall continue to water the plant material to ensure proper establishment. Maintenance periods that are incomplete on November 1st shall be completed the following maintenance year unless approved by the Landscape Architect – weather permitting.
   2. During the maintenance period, the Contractor shall water, cultivate, weed, reset, upright, and straighten all plants as required for healthy growth.
   3. The Contractor shall water the plants to receive a 1 (one) inch of water per week. A rain gauge should be placed in the planting to catch both rainfall and irrigation water to verify the amount of application. Provide sufficient water to saturate root system.
   4. The Contractor shall maintain the planting area free from competing weeds. Apply herbicides in accordance with manufactures instructions. Replace plants damaged from use of herbicides.
   5. The Contractor shall regularly inspect the planting for insects and diseases, notifying the Landscape Architect of any noted occurrences. Apply pesticides in accordance with manufacturer instructions. Replace plants damaged from lack of pesticides.
   6. Trimming and pruning of dead or broken branches, treatment of pruned areas or other wounds, and removal of all debris.
   7. After the acceptance of the planting, the Contractor is responsible for settling of the planting beds.
   8. Furnish and apply all sprays necessary to correct and protect against disease and insect infestation.
   9. Protect all plantings against trespassing, damage, and theft.
   10. Protect landscaping from damage due to landscape operations, by other contractors and trades, and trespassers. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged landscape work as directed.
   11. Maintain by pruning, cultivating, and weeding as required for healthy growth. Restore planting saucers. Tighten and repair stake and guy supports and rest plants to proper grades or vertical position as required. Restore or replace damaged wrappings. Spray as required to keep trees and shrubs free of insects and disease.
   12. Maintain all plants until final acceptance following the warranty period.
   13. The owner will be responsible for all maintenance requirements for new plantings after this required sixty (60) day period and preliminary acceptance by the owner.

B. Clean Up:
   1. Remove from the site, all debris resulting from the work herein specified.
   2. All pavements and walks shall be left broom clean.

C. Preliminary Acceptance:
   1. There should be a verification of performance for work by contract documents to be conducted by the Landscape Architect or owner's representative on-site and in the presence of the Landscape Contractor, for the purpose of acceptance.
   2. Preliminary acceptance shall be given with regard to the completed planting operations for the purpose of the owner assuming the responsibility for maintenance of the project. This preliminary acceptance will be given only after the Contractor has completed all of the requirements as herein specified, but will not release the Contractor of his/her responsibilities.
   3. The Contractor shall make his/her written notification request for an inspection to determine preliminary acceptance to the Landscape Architect five (5) days in advance.
   4. During inspection for initial acceptance, the Landscape Contractor shall have an acceptance form to be signed by the owner or owner's representative.

5. Initial Acceptance: There should be an approval of the work inspected. Acceptance can be on partially completed work under the contract, if approved by the Landscape Architect or owner. If, for reasons beyond the Landscape Contractor's control, work has stopped, inspection shall be made on partially completed work. Warranty shall begin after landscape inspection and acceptance. Maintenance after initial inspection and acceptance shall be the responsibility of the owner, unless an optional maintenance contract has been specified.

D. Final Inspection and Acceptance:
   1. Upon completion of the guarantee period and all necessary replacement plantings, the Contractor will make their request for final inspection in writing giving a minimum of ten (10) days' notice.
   2. Upon completion of the final inspection and the Landscape Architect's approval of the findings, the Landscape Architect will certify to the owner that the project should receive Final Acceptance.

**END OF SECTION**

**SECTION 330110.58**

**DISINFECTING OF WATER UTILITY DISTRIBUTION**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Disinfection of site domestic water lines, site fire water lines, and potable water distribution system specified in Section 02510.
B. Testing and reporting results.

### 1.2 REFERENCE STANDARDS

A. AWWA B300 - Hypochlorites; American Water Works Association; 2010 (ANSI/AWWA B300).
B. AWWA B301 - Liquid Chlorine; American Water Works Association; 2004 (ANSI/AWWA B301).
C. AWWA C651 - Disinfecting Water Mains; American Water Works Association; 2005 (ANSI/AWWA C651).
D. Standard Specifications for Water and Sewer Construction in Illinois and city of Crystal Lake Standards.

### 1.3 SUBMITTALS

A. See Section 013300 – Submittal Procedures, for submittal procedures.
B. Test Reports: Indicate results comparative to specified requirements.
C. Disinfection report:
    1. Type and form of disinfectant used.
    2. Date and time of disinfectant injection start and time of completion.
    3. Test locations.
    4. Initial and 24 hour disinfectant residuals (quantity in treated water) in ppm for each outlet tested.
    5. Date and time of flushing start and completion.
    6. Disinfectant residual after flushing in ppm for each outlet tested.
D. Bacteriological report:
    1. Date issued, project name, and testing laboratory name, address, and telephone number.
    2. Time and date of water sample collection.
    3. Name of person collecting samples.
    4. Test locations.
    5. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.
    6. Coliform bacteria test results for each outlet tested.
    7. Certification that water conforms, or fails to conform, to bacterial standards per Standard Specifications for Water and Sewer Construction in Illinois and City of Crystal Lake Standards.
    8. Bacteriologist's signature and authority.

### 1.4 QUALITY ASSURANCE

A. Perform Work in accordance with AWWA C651.
B. Testing Firm: Company specializing in testing potable water systems, certified by governing authorities of the State in which the Project is located.

## PART 2 – PRODUCTS

### 2.1 DISINFECTION CHEMICALS

A. Chemicals: AWWA B300, Hypochlorite and AWWA B301, Liquid Chlorine, as specified in Standard Specifications for Water and Sewer Construction in Illinois and City of Crystal Lake Standards.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. Verify that piping system has been cleaned, inspected, and pressure tested.
B. Schedule disinfecting activity to coordinate with start-up, testing, adjusting and balancing, demonstration procedures, including related systems.

### 3.2 PRELIMINARY FLUSHING

A. Prior to chlorination, the water main shall be flushed as thoroughly as possible with the water pressure and outlets available. Flushing shall be done after the pressure test is made. It must be understood that such flushing removes only the lighter solids and cannot be relied upon to remove heavy material allowed to get into the main during pipe installation. If no hydrant is installed at the end of the main, a tap should be provided large enough to effect a velocity in the main of at least 2.5 feet per second.

### 3.3 DISINFECTION

A. Use method prescribed by the applicable state or local codes, or health authority or water purveyor having jurisdiction, or in the absence of any of these follow AWWA C651.
B. Provide and attach equipment required to perform the work.
C. Inject treatment disinfectant into piping system.
D. Maintain disinfectant in system for 24 hours.
E. Flush, circulate, and clean until required cleanliness is achieved; use municipal domestic water.
F. Replace permanent system devices removed for disinfection.

### 3.4 DISINFECTION

A. All new, cleaned or replaced water mains shall be disinfected in accordance with AWWA Standard C651 before being put into service.
B. Continuous Feed Method:
    1. Continuous feed method shall be used to disinfect PVC pipe and may be used for iron, steel, or concrete pipe. Use of chlorine powder not acceptable.
    2. The point of application of the chlorinating agent shall be at the beginning of the pipeline extension or any valved section of it and through a corporation stop in the top of the newly laid pipe. The injector for delivering the chlorine-gas into the pipe should be supplied from a tap on the pressure side of the gate valve controlling the flow into the pipeline extension.
    3. Flow water from the existing distribution system or other approved sources of supply into newly laid water line at a constant and measured rate.
    4. Water from the existing distribution system or other source of supply shall be controlled so as to flow slowly into the newly laid pipeline during the application of chlorine-gas. This water shall receive chlorine also at a constant and measured rate. The rate of chlorine mixture flow shall be in such proportion to the rate of water entering the pipe that the chlorine applied to the water entering the newly laid pipe shall be at least 50 ppm, or enough to meet the requirements during the retention period. This may require as much as 100 ppm of chlorine in the water left in the line after chlorination.
    5. Apply chlorine solution to the water line with a pump suitable for feeding chlorine solutions.
    6. Valves shall be manipulated so that the strong chlorine solution in the line being treated will not flow back into the existing line supplying water.
    7. Chlorine application shall be continuous until the entire main is filled.
    8. As the chlorinated water flows past tees and crosses, related valves not used for isolating the water line, shall be operated to disinfect all appurtenances.
    9. Treated water shall be retained in the pipe long enough to destroy all spore-forming bacteria. This retention period shall be at least twenty-four (24) hours. After the chlorine-treated water has been retained for the required time, and after proper flushing, the chlorine residual at the pipe extremities and at other representative points should be at least 1.0 ppm.

10. At the end of this 24 hour period, the treated water shall contain not less than 10 mg/l chlorine throughout the length of the main.
11. In the process of chlorinating newly laid pipe, all valves or other appurtenances shall be operated while the pipeline is filled with a chlorinating agent. Dechlorination may be required before discharging highly chlorinated water into the storm sewer.
12. Chlorine Solution:
    a. The chlorine water solution is prepared by using a vacuum-operated gas chlorinator and booster pump for chlorine-gas solution feed, by using a metering pump with liquid sodium hypochlorite, or by using a metering pump with a solution prepared by dissolving calcium hypochlorite in water in the proportion required for the desired concentration.
    b. A 1% chlorine solution requires approximately 1 pound of calcium hypochlorite (70% chlorine) in 8.5 gallons of water.
    c. The minimum rate of chlorine solution feed for a 1% chlorine solution for various water flow rates to obtain a 25 mg/l available chlorine content are: 0.25 GPM of solution at a 100 GPM feed rate, 0.50 GPM of solution at a 200 GPM feed rate, 0.75 GPM of solution at a 300 GPM feed rate, 1.00 GPM of solution at a 400 GPM feed rate, and 1.25 GPM of solution at a 500 GPM feed rate.
13. All water mains shall be disinfected and tested according to the requirements of the "Standards for Disinfecting Water Mains," AWWA C651-86, and shall be performed by an independent firm exhibiting experience in the methods and techniques of this operation, and shall be done in the presence of the Engineering Director. The Engineering Director shall be notified of the time of disinfection a minimum of twenty-four (24) hours prior to the Disinfection.

## 3.5 FINAL FLUSHING

A. After the applicable retention period, flush heavily chlorinated water from the main until the chlorine concentration of the water leaving the line is no higher than that generally maintained in the system or less than 1 mg/l.
B. Chlorinated water will be flushed from all terminations prior to sampling.
C. Determine the chlorine residual to ascertain that the heavily chlorinated water has been removed from the water line.
D. Do not discharge to waters of the State.

## 3.6 BACTERIOLOGICAL TESTS

A. Bacteriological samples shall be taken at each connection to the existing water main. In accordance with Section 7.1 of the AWWA Standard "at least one sample shall be collected from the new main and one from each branch. In case of extremely long mains it is desirable that samples be collected along the length of the line as well as at its end." The maximum distance allowed between samples in any situation shall be 1000 feet. All branch connections 3" in diameter or larger, greater than or equal to 20 feet in length including building services, are to be considered branches for application of this rule. Samples should never be taken from an unsterilized hose or from a fire hydrant, because such samples seldom meet current bacteriological standards.
B. If trench water has entered the new main during construction or if, in the opinion of the Engineer, excessive quantities of dirt or debris have entered the new main, bacteriological samples shall be taken at intervals of approximately 200 feet (61 m), and the location shall be identified. Samples shall be taken of water that has stood in the new main for at least 16 hours after final flushing has been completed.
C. Analyze samples after refilling the water line with potable water.
D. Install a standard corporation stop installed in the main with a copper tube goose neck assembly, if necessary.

E. Samples shall be taken by the firm performing the disinfection of the main and in the presence of the Engineering Director. Samples shall be transported iced from the construction site to the IEPA approved laboratory. The laboratory shall be instructed to notify the Engineering Division and the Public Works Department of all unsatisfactory results. Two successive satisfactory samples are required. Successive samples shall be taken at least 24 hours apart.
F. Test Failure:
    1. If the initial disinfection fails to produce satisfactory samples, repeat flushing and disinfection until satisfactory samples are obtained.
    2. Use continuous feed method in these subsequent disinfections.
G. When the samples are satisfactory, perform hydrostatic pressure test as described in Section 331416.

**END OF SECTION**

**SECTION 330513**

**SANITARY STRUCTURES**

## PART 1 – GENERAL

### 1.1 SUMMARY

A. This Section includes the following:
   1. Sanitary Manholes Type A.
B. The Work to be performed and included in this project shall include the furnishing of all labor, material, transportation, tools, supplies, materials, equipment, and appurtenances necessary for the complete and satisfactory construction of the Work described within these Specifications or as shown on the Plans.
C. It is the intent of these specifications to install a complete sanitary sewer system, and the CONTRACTOR shall furnish everything necessary to do this, whether or not all items are specifically called for in the Plans and Specifications.

### 1.2 REGULATORY REQUIREMENTS

A. Contractor shall comply with materials, workmanship, and other applicable requirements of Division III SANITARY AND STORM SEWERS and other applicable sections of the ILLINOIS SEWER SPECS. The Contractor shall comply with MWRD requirements and details within the plans.

### 1.3 SUBMITTALS

A. Product Data: For the following:
   1. Sanitary Manhole External/Internal Sealing Materials and Gasket Devices
   2. Manhole Rings and Covers
B. Shop Drawings for Precast Concrete Manhole Structures: Include plans, elevations, sections, details, attachments to other work, and accessories, including the following:
   1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
   2. Pipe entry provisions, including locations and pipe sizes
   3. Reinforcement details
   4. Frame and cover design and manhole frame support rings
   5. Manhole Step details
   6. Joint details
   7. Sealing and waterproofing details

### 1.4 DELIVERY, STORAGE, AND HANDLING

A. Store precast concrete underground utility structures at Project site as recommended by manufacturer to prevent physical damage. Arrange so identification markings are visible.
B. Lift and support precast concrete units only at designated lifting or supporting points according to manufacturer's written instructions.

## PART 2 – PRODUCTS

### 2.1 SANITARY MANHOLES TYPE A

A. Sanitary Manholes shall meet the requirements of Division III, Section 32 MANHOLES FOR STORM AND SANITARY SEWERS of the "Standards Specification for Water and Sewer Main Construction in Illinois" (latest revision) and also meet the MWRD requirements.
B. Normal-Traffic Precast Reinforced Concrete Manholes:
   1. Comply with ASTM C478.
   2. Diameter: 48 inches minimum, unless otherwise noted.
   3. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation. Precast manhole supplier must verify the buoyancy conditions have been met during shop drawing submission phase.

4. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, floor slab shall be precast with first riser section, as shown in the MWRD detail.
5. Riser Sections: 4-inch minimum thickness, as shown in the MWRD detail, and lengths to provide depth indicated,
6. Top Section: Eccentric-cone type, unless concentric-cone or flat-slab-type is indicated. Top of cone to have internal diameter of 24 inches.
7. Grade Rings: Include a maximum of three reinforced-concrete rings, of 2 inches minimum height and of 12 inches maximum total height, that match 24-inch diameter frame and cover.
8. Drop Manholes shall be installed as indicated on the Plans.
9. Pipe Connectors: A flexible boot, in accordance with ASTM C 923, resilient, or size required, for each pipe connecting into base section.
10. Steps: Non corrosive plastic coated cast iron manhole steps. The steps shall be cast into the riser sections on 16-inch centers, and the steps shall not be installed over pipes. The step design shall be such to prevent lateral slippage off step.
11. Concrete bench shall be formed as shown in details.
12. The exterior surface of each manhole shall be coated with approved coal tar epoxy meeting Federal Specification DOD-P-23236 or COE formula C-200. Two (2) 8 mil DFT of coal tar epoxy required.

C. Manhole Frames and Covers:
   1. All sanitary manholes shall have matching frames and heavy duty, self sealing closed lids; East Jordan Iron Works Frame 1050 in paved areas, and East Jordan Iron Works Frame 1020 in non-paved areas. The word “Sanitary” shall be cast in the lids.

D. Water tight Joints:
   1. Each joint shall have an external sealing device with gear tensioning ratchets, and shall be Mac-Wrap manufactured by Mar Mac Construction Products Inc. or equal and satisfying ASTM C877.
   2. Each joint shall also be sealed with one row of a butyl rubber gasket, ADCO WT-64 butyl rubber sealant or equal, and conform to ASTM C443.

E. External Chimney Seals:
   1. External Chimney Seals are required to be installed once the cover is set, use external chimney seal manufactured by Cretex Specialty Products or equal.

## PART 3 – EXECUTION

### 3.1 RELATED WORK SPECIFIED ELSEWHERE

A. Excavation, Trenching, and Backfill: Comply with Division 2 Section "Trenching and Backfilling."
B. Dewatering is specified in Division 1 Section “Temporary Facilities and Controls”

### 3.2 INSTALLATION OF CONCRETE MANHOLES

A. Precast Concrete Manhole Installation:
   1. Install manholes, complete with appurtenances and accessories indicated.
   2. Install units level and plumb and with orientation and depth coordinated with connecting pipes to minimize bends and deflections required for proper entrances.
   3. Support units on a 4 inch level bed of IDOT CA-11 or CA-13 aggregate and compacted to same density as adjacent undisturbed earth.
   4. Manhole Frame: In paved areas and traffic-ways, set frames flush with finished grade. Set other manhole frames 1 inch above finished grade.
   5. Lifting holes shall be sealed with non-shrink grout.
   6. Install precast concrete manhole sections with gaskets according to ASTM C 891.

B. In addition to the Work specified elsewhere under this Sanitary Structures section, the Schedule of Price items shall include labor, material and equipment to furnish trench backfill.

C. The Schedule of Prices included in the Bid Form shall govern payment for furnishing the labor, material, and equipment for the complete installation of concrete sanitary manholes, valve vaults and air release vaults.

**3.3 FIELD QUALITY CONTROL**

A. Perform Negative Air Pressure (Vacuum) Tests as specified in ASTM C1244-93 on each sanitary manhole assembly. Correct deficiencies and retest as specified above to demonstrate compliance.

B. Testing shall not be paid for separately but shall be considered incidental to the item of Work being performed.

**3.4 CLEANING**

A. Prior to Completion, Clean internal surfaces of manholes, including sump. Remove foreign material.

B. Cleaning shall not be paid for separately but shall be considered incidental to the item of Work being performed.

**END OF SECTION**

**SECTION 331416**

**WATER DISTRIBUTION**

## PART 1 – GENERAL

### 1.1 SECTION INCLUDES

A. Pipe and fittings for site water lines including domestic water lines and fire water lines.
B. Resilient Seated Gate Valves and Accessories.
C. Fire hydrants.
D. Thrust Restraint.
E. Hydrostatic Testing.

### 1.2 REFERENCES

A. Standard Specifications for Water and Sewer Construction in Illinois, latest edition.
B. AWWA C104/A21.4 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water; American Water Works Association; 2003 (ANSI/AWWA C104/A21.4).
C. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; American Water Works Association; 2005 (ANSI/AWWA C105/A21.5).
D. AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings, American Water Works Association; 2008 (ANSI/AWWA C110/A21.10).
E. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings; American Water Works Association; 2007 (ANSI/AWWA C111/A21.11).
F. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast, for Water; American Water Works Association; 2009 (ANSI/AWWA C151/A21.51).
G. AWWA C153/A21.53 - Ductile-Iron Compact Fittings for Water Service; American Water Works Association; 2006 (ANSI/AWWA C153/A21.53).
H. AWWA C500 - Gate Valves for Water and Sewerage Systems.
I. AWWA C502 - Dry Barrel Fire Hydrants; American Water Works Association; 2005 (ANSI/AWWA C502/C502a).
J. AWWA C509 - Resilient Seated Gate Valves for Water and Sewerage Systems.
K. AWWA C550 - Protective Epoxy Interior Coatings for Valves and Hydrants.
L. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances; American Water Works Association; 2010 (ANSI/AWWA C600).
M. AWWA C605 - Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water; American Water Works Association; 2005 (ANSI/AWWA C605).
N. AWWA C651 - Disinfecting Water Mains.
O. UL 246 - Hydrants for Fire-Protection Service; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

### 1.3 SUBMITTALS

A. See Section 013300 – Submittal Procedures, for submittal procedures.
B. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories.
C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
D. Project Record Documents: Record actual locations of piping mains, fittings, valves, hydrants, connections, and depth of cover. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.
E. Test Reports: Indicate results comparative to specified requirements.
F. Submit the following as appropriate for each valve and hydrant provided:
    1. Outline and installation Drawings for equipment and fixtures furnished.
    2. Equipment performance data and operating characteristics.
    3. Manufacturer's catalog data, marked to indicate materials being furnished as standard equipment, fixtures, specialties, and accessories.
    4. Shop Drawings on shop-fabricated systems.

## 1.4 QUALITY ASSURANCE

A. Perform Work in accordance with AWWA C600 and C651 requirements.
B. Pipe: Nominal pipe size, material code designation, standard dimension ratio, pressure rating, manufacturer's name or trade mark, National Sanitation Foundation seal, and appropriate ASTM designation numbers marked on pipe.
C. Fittings and Valves: Manufacturer's name and pressure rating marked on body.

## 1.5 DELIVERY, STORAGE, AND HANDLING

A. Arrange delivery of products in accordance with construction schedules and to allow inspection prior to installation.
B. Coordinate deliveries to avoid conflict with conditions at site.
C. Deliver products in undamaged condition in original containers or packaging, with identifying labels intact and legible.
D. Clearly mark to identify partial deliveries of component parts to facilitate assembly.
E. Store products immediately on delivery and protect until installed. Storage to be done according to manufacturer's instructions with seals and labels intact and legible.
F. Provide platforms, blocking or skids, or coverings required to protect products from deterioration or damage.
G. Arrange storage in a manner to provide easy access for inspection.
H. Maintain storage conditions to prevent deterioration or damage.
I. Protect products after installation to prevent damage from subsequent operations. Remove when no longer needed.
J. Provide equipment and personnel necessary to handle products by methods to prevent damage to products or packaging.
K. Handle products by methods to prevent bending or overstressing.

## 1.6 REGULATORY REQUIREMENTS

A. Conform to applicable Illinois Department of Natural Resources, State Health Department code or regulation, and Standard Specifications for Water and Sewer Construction in Illinois and Village of Hoffman Estates Standards for performing the work of this Section.

## 1.7 WARRANTY

A. Full warranty against defects in materials and workmanship for two years after substantial completion, including all parts, labor, and expenses.

# PART 2 – PRODUCTS

## 2.1 WATER PIPE

A. All buried pipe 4-inches and larger shall be ductile iron unless noted otherwise.
B. B. Manufacturers:
    1. American.
    2. Clow.
    3. Griffin.
    4. US Pipe.
    5. Engineer approved equivalent.
    6. Approval does not relieve compliance with the technical and quality standards, requirements, and certifications outlined herein.
C. Ductile Iron Pipe: AWWA C151: Thickness Class 52, inside nominal diameters as shown on Drawings.
    1. Exterior Coating: Asphaltic coating, 1-mil thickness.
    2. Interior Coating: AWWA C104 standard thickness cement lining with seal coat.

3. Restrained Joint Ductile Iron Pipe:
    a. Restrained joint design: Flexible type, capable of being deflected 3 degrees after assembly.
    b. Restrained joint design: Boltless "lock ring" type for DIP.
    c. Restraining gaskets not acceptable.
4. Joints: AWWA C111, rubber gasket with rods, push-on or mechanical joint type.
5. Jackets: AWWA C105 polyethylene jacket. Polyethylene encasement for ductile iron piping for water and other liquids.
6. Bolts and Nuts: Fluorocarbon coated cor-ten steel t-bolts and nuts equal to NSS cor-blue or approved equal low allow corrosion-resistant high-strength steel in accordance with ANSI/AWWA C111/A21.11.
7. All pipe shall be manufactured in the United States. The Material Supplier and/or Contractor shall furnish data certified by the Manufacturer that all pipe is of domestic manufacture.

D. Restraining mechanisms, tie rods, clamps or other components of dissimilar metal shall be protected against corrosion by hand application of a suitable coating or by encasement of the entire assembly with 8-mil thick (0.2 mm) loose polyethylene film in accordance with AWWA C105/A21.5.

## 2.2 FITTINGS

A. Manufacturers:
1. American.
2. Clow.
3. Griffin.
4. Sigma.
5. Star.
6. Tyler/Union.
7. US Pipe.
8. Engineer approved equivalent.
9. Approval does not relieve compliance with the technical and quality standards, requirements, and certifications outlined herein.

B. General:
1. Ductile iron compact fittings, mechanical joint, AWWA C153, 250 psi minimum pressure rating in cases where compact fittings are available; ductile iron standard fittings, mechanical joint, AWWA C110, (ANSI A21.4), 250 psi minimum pressure rating, only when C153 fittings are unavailable. Asphaltic exterior coating 1-mil thick, AWWA C104 standard thickness interior cement lining with seal coat.
    a. Fittings shall include gaskets, glands, bolts, and nuts.
2. Bolts and nuts as specified for ductile iron pipe.
3. Wrap fittings with polyethylene film, as specified for ductile iron pipe.
4. Restrained Joint Fittings - 4" through 48":
    a. Restraining mechanisms shall provide wedges or full circle contact and support of the pipe wall. Restraint shall be accomplished by a series of ring wedge segments mechanically restrained inside the gland housing and designed to grip the pipe wall in an even and uniform manner. Restrained devices shall be actuated by bolts featuring twist off heads to ensure proper installation torque is applied. All components of the restrainer, including the gland, bolts, and restraint segments shall be of high strength ductile iron, ASTM A536.
    b. Manufacturers:
        1) EBAA Iron Sales, Inc.: Series 1100 Mechanical Joint Restraint Gland.
        2) Engineer Approved Equivalent.

C. Mechanical Joint Retainer Glands: Install on all joints on all fittings, valves, and hydrants. Megalug by EBAA Iron Sales, Inc., Uni-Flange Series 1400 and 1500 mechanical joint retainer glands by The Ford Meter Box Company will be allowed, or Engineer approved equivalent.

D. Mechanical Joint Caps and Plugs: Install where indicated on the Drawings. MJ caps and plugs: F-1040 and F-1035 as manufactured by Clow Corporation, respectively, A-10800 by American Cast Iron Pipe Company, or Engineer approved equivalent.
E. Anchoring Pipe and Couplings: Install where indicated on the Drawings. Utilized for hydrant leads, branch line stubs, and dead ends, in conjunction with mechanical joint pipe, fittings, valves, and hydrants. Clow MJ anchoring pipe, couplings, and fittings or Engineer approved equivalent.
    1. Quality standards for specialty fittings: Use the following Clow Corporation catalog numbers, or Engineer approved equivalent: Anchoring Couplings F-1211; Anchoring Tees F-1217; Anchoring Elbows F-1218; Anchoring Pipe F-1216; and Hydrant Tees F-1224.
F. Mechanical Joint Tapping Sleeves and Crosses: Install where indicated on the Drawings. Ductile Iron or Cast iron two-section construction. Mechanical joint ends, flanged outlet for tapping valve. Ductile iron tapping sleeves are required on pipe 12" and larger, and for installations under pavement. Tapping sleeve and crosses: F-5205 as manufactured by Clow Corporation, H-615 & H-715 by Mueller Company, or Engineer approved equivalent.
G. Stainless Steel Tapping Sleeves: Install where indicated on the Drawings. All stainless steel two-section construction with stainless steel flanged outlet for tapping valve. Stainless steel bolts and nuts. Tapping Sleeves: 665 as manufactured by Smith-Blair, Inc., FAST by Ford Meter Box Company, Inc., or Engineer approved equivalent.

## 2.3 POLYETHYLENE ENCASEMENT

A. Polyethylene encasement, flat sheet or split tube, 8 mil (0.20mm) thickness, as per AWWA C105, for use with all buried ductile iron and steel pipe, fittings, valves and operators, and hydrants.
B. Polyethylene shall be cut 2 feet longer than the pipe section and shall overlap the ends of the pipe by 1 foot.
C. Gather and lap the polyethylene to provide a snug fit and secure at quarter points and each end with polyethylene tape.

## 2.4 VALVES

A. Resilient Seated Gate Valves: Conforming to AWWA C500. All valves shall be of the iron-body resilient-wedge type with non-rising stems, sizes 3" NPS through 24" NPS in diameter.
    1. All valves by the same manufacturer.
    2. Body, Bonnet, Stuffing Box: Cast iron or ductile iron.
    3. Bolts and Nuts: Stainless steel.
    4. Valve Ends: Flanged for above-ground or Mechanical joint for buried.
    5. Wedge: Cast iron or ductile iron, resilient coated.
    6. Stem: Manganese bronze, non-rising stem.
    7. Seals: Synthetic rubber O-rings.
    8. Stem Extensions: Steel, provide for buried valves with valve boxes; 2" square operating nut, if required.
    9. Coating: Buried valves shall have manufacturer's standard exterior asphalt or epoxy coating.
    10. Pressure Rating: 200 psi, bubble-tight closure.
    11. Direction of Operation: Counterclockwise to open.
    12. Smooth, unobstructed waterway with a diameter not less than the full nominal diameter of the valve.
    13. Wrap all buried valves with polyethylene encasement in accordance with Section 33 1116.
    14. Approved Manufacturers:
        a. Mueller, Model: Resilient Wedge 2360 with stainless trim.
        b. Engineer approved equal
B. Buried Service Bolts: Fluorocarbon coated cor-ten steel t-bolts and nuts equal to NSS cor-blue or approved equal low allow corrosion-resistant high-strength steel in accordance with ANSI/AWWA C111/A21.11

C. Valve Boxes: Furnish valve boxes for all buried valves. Boxes shall include standard or oval base as required, center section(s) and top section with cover. Boxes cast iron with screw type adjustment. For valves on finished water system, the cover shall be marked WATER. Provide Tyler series 6855 for valves less than 12" diameter, and Tyler series 6860 for valves 12" diameter and larger, or Engineer approved equivalent.
   1. Adaptor: Furnish valve box adaptor for all buried valves. Provide Butterfly Valve Adaptor or Adaptor II by Adaptor Inc. or approved equal.
      a. Furnish in lieu of hard wood blocking.
      b. Adaptor shall be incidental to valve.

**2.5 FIRE HYDRANTS**

A. Hydrants: AWWA C502
   1. All hydrants shall be Mueller Centurion Fire Hydrants A423 (5-1/4" Barrel) in accordance with the detail on the plans.
   2. Each hydrant shall include auxiliary valve, 6" gate valve No. A-2370-20 modified wedge resilient seat.
   3. Hydrants shall have two (2), two and one-half inch (2-1/2”) hose nozzles and one (1), four and one-half (4-1/2”) National standard pumper nozzle. Hose threads shall be the standard NSHT.
   4. Hydrants shall be painted red.
B. Wrap hydrant base and barrel up to finish grade with polyethylene encasement. Slit film at hydrant base at drain-back opening.
C. Approved manufacturers:
   1. Mueller Centurion.

**2.6 CURB STOP**

A. Curb Stop, Ball Type, Mueller, McDonald or approved equal.
B. Curb stop to be furnished with Minneapolis Pattern curb box, McDonald or approved equal with 1-1/2” upper barrel section.

**2.7 WATER SERVICE PIPE LESS THAN 3”**

A. Water service pipe less than 3” shall be Type K copper.
B. Service connection to the water main shall be with a Mueller double strap bronze service clamp and corporation stop Mueller H-15020 or approved equal.

**2.8 THRUST RESTRAINT**

A. Mechanical Restraint:
   1. Mechanical joint retainer glands, Megalug by EBAA Iron Sales, Inc. or Engineer approved equivalent, shall be used on all joints on all fittings, valves, and hydrants.
B. Concrete Restraint:
   1. Use concrete thrust blocks for all joints, even if joints include mechanical joint retainer glands.
   2. Minimum compressive strength of 3000 psi.

**2.9 BEDDING AND COVER MATERIALS**

A. Bedding: As specified in Section 02350.
B. Cover: As specified in Section 02350.

## PART 3 – EXECUTION

**3.1 EXAMINATION**

A. Verify that trench cut and excavation base are ready to receive work and excavations, dimensions, and elevations are as indicated on Drawings.

B. Verify that piping system has been cleaned, inspected and pressure tested.
C. Perform scheduling and disinfection activity with startup, testing, adjusting and balancing, demonstration procedures, including coordination with related systems.

## 3.2 PREPARATION

A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs.
B. Remove scale and dirt on inside and outside before assembly.
C. Prepare pipe connections to equipment with flanges or unions.

## 3.3 TRENCHING

A. See Section 02350 for additional requirements.
B. Hand trim excavation for accurate placement of pipe to elevations indicated.
C. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling. Do not displace or damage pipe when compacting.

## 3.4 INSTALLATION - PIPE

A. Install pipe to slope gradients noted on drawings.
B. Install pipe and appurtenances in accordance with AWWA C600 or C605.
C. Handling: Handle pipe and appurtenances in such a manner as to ensure delivery to the trench in a sound, undamaged condition. Use of web slings or end hooks not allowed.
D. Inspection for Defects: Before installation, inspect pipe and appurtenances for defects and, when applicable, tap the pipe with a light hammer to detect cracks. Reject defective, damaged, or unsound pipe and appurtenances.
E. Cutting: Cut pipe, when necessary, in a neat and workmanlike manner without damage to the pipe, interior lining, and exterior coating. Perform cutting with an approved mechanical cutter, using a wheel cutter when applicable and practicable.
F. Beveling: Grind smooth and bevel cut ends and rough edges using methods recommended by the manufacturer and approved by Engineer.
G. Pipe Joints: Pipe joints in accordance with AWWA C600 or C605 and as recommended by manufacturer; use minimum amount of gasket lubricant; apply to gasket only; do not apply lubricant to inside of bell.
H. Cleaning and Protection: Thoroughly clean each piece of pipe, valve, and fitting before lowering into trench; keep clean at all times; when pipe laying is not in progress, including lunch breaks, nights, weekends, and other non-working periods, securely close open ends of pipe and fittings with watertight plugs.
I. Pipe Deflections:
    1. Deflections from a straight line or grade, as required by vertical curves, horizontal curves, or offsets, shall not exceed the manufacturer's recommendations for the type and size of pipe and joint being used.
    2. If the alignment requires deflections in excess of the manufacturer's limitations, then bend fittings or a sufficient number of shorter lengths of pipe shall be utilized to provide angular deflections within the limits set forth.
J. Pipe Gradient:
    1. In certain instances, it may be required that a positive gradient be maintained for pressure lines. All such locations are noted on the Drawings.
    2. Where changes from positive to negative grades occur, air release or combination air release and air/vacuum valves and manholes required as shown on the Drawings.
K. Depth of Cover: The depth of cover over water mains from the top of the pipe to the ground surface shall be sufficient to prevent freezing. The minimum depth shall be 6'-0", or otherwise as shown on the Drawings.
L. Polyethylene Encasement shall be utilized when ductile iron pipe and fittings are utilized in accordance with AWWA C105 / A21.5
M. Install access fittings to permit disinfection of water system performed under Section 02540.

## 3.5 SEWER CONFLICT

A. Water Supply Interconnection:
   1. There shall be no physical connection between a public or private potable water supply system and a sewer, or appurtenance thereto, which would permit the passage of any sewage or polluted water into the potable water system. Water main bleeders into sanitary sewers are prohibited. No water pipe shall pass through or come in contact with any part of a sewer manhole.

B. Relation to Water Works Structures:
   1. While no general statement can be made to cover all conditions, sewers shall be at least 75 feet from shallow water supply wells, 50 feet from underground water reservoirs, and 30 feet from a well if the sewer is constructed per the special condition listed below.

C. Horizontal separation:
   1. Sewers shall be laid at least 10 feet horizontally from any existing or proposed water main. The distance shall be measured edge to edge. Should local conditions prevent a lateral separation of 10 feet, a sewer may be laid closer than 10 feet to a water main if:
      a. The sewer is laid in a separate trench.
      b. The sewer is laid in the same trench with the water main located at one side on a bench of undisturbed earth.
      c. In either case, the elevation of the crown of the sewer is at least 18 inches below the invert of the water main.
   2. Other regulating authorities may require more stringent limitations.

D. Vertical Separation:
   1. Sewers crossing under water mains: The sewer shall be laid at such an elevation that the top of the sewer is at least 18 inches below the bottom of the water main. The crossing shall be arranged so the sewer joints will be equidistant and as far as possible from the water main joints.
      a. When the elevation of the sewer cannot be buried to meet the above requirement, the water main shall be relocated to provide this separation and reconstructed with slip-on or mechanical joint cast iron pipe, asbestos-cement pressure pipe, or prestressed concrete cylinder pipe for a distance of 10 feet on each side of the sewer. One full length of water main shall be centered over the sewer so that both joints will be as far from the sewer as possible.
   2. Other regulating authorities may require more stringent limitations.

E. Special Conditions: When it is impossible to obtain proper horizontal and vertical separation as stipulated above, the water main should be constructed of slip-on or mechanical joint cast-iron pipe, asbestos-cement pressure pipe or prestressed concrete cylinder pipe and the sewer constructed of mechanical joint cast iron pipe, schedule 40 ABS or PVC or equal and both services should be pressure tested to assure water tightness in accordance with AWWA standard for leakage testing. following methods must be utilized:
   1. As an alternative, it is permissible to encase either the water or the sewer main with 6 inches of concrete for a distance of 10 feet on each side of the crossing; or if PVC or cast iron is used as encasement material, the ends shall be adequately sealed with concrete as well as any joints within the 20 foot section.

## 3.6 INSTALLATION - VALVES AND HYDRANTS

A. Set valves and hydrants on solid bearing and support independently or from piping.
B. Center and plumb valve box over valve. Set box cover flush with finished grade.
C. Install all buried valves and operators and hydrants with polyethylene encasement, 8-mil (0.20 mm) thickness, as per AWWA C105.
D. Install in accordance with manufacturer's instructions as shown on the plans by qualified craftsmen.
E. Location, orientation, and quantities as shown on the plans.
F. Include all required related items necessary for a complete installation.
G. Install with stem between 9:00 and 3:00 position (stem shall not be inverted).

H. Surface preparation shall follow the piping surface preparation specification. Contractor shall be responsible for compatibility of manufacturers shop coating and final finish.

## 3.7 PROTECTION

A. Protect finished installation under provisions of Section 01500.

## 3.8 DISINFECTION

A. Test in accordance with Section 02540.

## 3.9 HYDROSTATIC TEST

A. Test all pressure lines for leakage after satisfactory completion of cleaning, flushing, and disinfection of piping and appurtenances.
B. Test using Ashcroft Model 1082 with 4.5" dial face at 1 psi increments.
C. Subject newly laid piping or any valved section of piping to a hydrostatic pressure test for at least two hours.
D. Conduct pressure tests on individual piping sections between valves in order to test the integrity of the valves as well as the piping.
E. The test pressure shall be 150 psi, or as directed by Engineer. The test pressure not less than 1.25 times the working pressure at the highest point along the test section and not less than 1.5 times the working pressure at the point of testing.
F. Pressure shall be maintained for a minimum of 2 hours.
G. Before applying the pressure, completely expel air from the system being tested.
H. Install, at Contractor's expense, corporation cocks as required at all high points in the system if necessary to completely expel all air.
I. After all the air has been expelled, remove corporation cocks and plug or close prior to testing. Owner to determine whether the corporation cocks are removed or left in place.
J. Perform leakage test if requested in writing by Engineer. Leakage tests will be required after unsatisfactory hydrostatic pressure tests.
K. Satisfactory hydrostatic pressure results are 1 psi or less of pressure loss over 2 hours.
L. At the option of the Engineer, pressure and leakage tests may be conducted simultaneously.
M. Determine amount of leakage by adding water to the system by means of a pump where pressure within the system is maintained within 5 psi of the test pressure.
N. Allowable leakage shall not exceed the Village of Hoffman Estates regulations. See plans for additional information.
O. Perform the test against closed hydrant, with the auxiliary valve open.
P. Determine acceptance on the basis of allowable leakage.
Q. If any test of pipe laid discloses leakage greater than that specified above, the Contractor shall, at his expense, locate and repair the defective material until the leakage is within the specified allowance.
R. Repair all visible leaks regardless of the amount of leakage.
S. Damaged or defective pipe, fittings, valves, hydrants, or joints discovered in the pressure test shall be replaced by the Contractor and the test repeated until the test results are satisfactory.

## 3.10 RESTRAINT

A. Mechanical Restraint:
   1. Provide mechanical joint retainer glands, Megalug by EBAA Iron Sales, Inc. or Engineer approved equivalent, on all joints of all fittings, valves, and hydrants.
B. Restrained Joint Ductile Iron Pipe:
   1. Provide restrained joint ductile iron pipe as indicated on the Drawings.
   2. Submit restrained joint styles and detailed designs by the pipe manufacturer to Engineer prior to manufacture. Include detailed laying schedules.
C. Concrete Thrust Block:
   1. Provide concrete thrust blocks at bends, tees, and dead ends placed against undisturbed soil.
   2. See Thrust Block Details on the drawings.

## 3.11 CONSTRUCTION TESTING

A. Perform field inspection and testing in accordance with Section 01400.
B. The testing shall be done on a daily basis in a timely manner with the progress of the work to insure acceptable construction workmanship. Subsequent work shall not proceed without acceptable test results of the previous work. Testing of embankment or backfill shall occur at the time of placement and compaction. Coming back later to perform testing is unacceptable.
C. Test reports shall include the following:
    1. Project name.
    2. HRG project number.
    3. Location/Client.
    4. Street name.
    5. Street location per plan stationing.
    6. Offset distance left or right of centerline.
    7. Depth below finish grade and/or elevation.
    8. Results of tests performed.
    9. Comparison of test results to the project specifications.
    10. Conclusion as to meeting or failing to meet the project specifications.
    11. If failing, retest results to confirm compliance with the project specifications.
    12. If failing, recommendations for corrective action.
D. The following minimum testing shall be performed:
    1. Trench backfill (main line and services).
        a. Standard Proctor: One minimum.
        b. In-place Density and Moisture: 1 per 8 inch lift per 400 LF.
    2. Granular material:
        a. Gradation: 1/2000 TN.
        b. Standard Proctor: One minimum.
        c. In-place Density and Moisture: 1/500 LF.

**END OF SECTION**

**SECTION 331416.10**

**WATER MAIN DIRECTIONAL DRILL**

## PART 1 – GENERAL

### 1.1 SUMMARY
A. This Section includes water main for remote fire department connection.
B. The CONTRACTOR shall be responsible for providing water main meeting the standards identified below, pipe diameters shown on the plans.
C. PVC DR 18 Certa-Lok, or approved equal, is the base bid.
D. HDPE DR 11 IPS is the alternate bid.

### 1.2 SUBMITTALS
A. Product Data: For the following:
   1. PVC DR 18 pipe, gaskets, restrained joint integral bell and mechanical jointing
   2. HDPE DR 11 IPS and jointing, valves and transition fittings (pressure services)
   3. Tracer Wire and Connectors (submit 3 samples of connector to be employed)
B. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.
C. Record Drawings: Database with locations of all points of change in vertical and horizontal alignment, material and structure locations.

### 1.3 DELIVERY, STORAGE, AND HANDLING
A. Protect pipe, pipe fittings, and seals from dirt and damage.
B. Protect valves against damage to threaded ends or flange faces.
C. Do not store HDPE/PVC pipe and fittings in direct sunlight for extended periods of time.

### 1.4 PAYMENT
A. The Schedule of Prices included in the Bid Form shall govern payment for the installation of water main including all labor, materials and equipment.

## PART 2 – PRODUCTS

### 2.1 POLYVINYL CHLORIDE PRESSURE WATER PIPE AND FITTINGS
A. Pipe and Fittings: DR 18 PVC shall conform to AWWA C-900. Pipe shall be Certa-Lok with restrained joint integral bell or approved equal. Conforming with ASTM D1784.
B. Gaskets: Rubber rings for push on joints shall conform with ASTM F477 and ASTM D3139
C. Mechanical Joints: For non-directional drilling joint, mechanical joints shall be Megalug Retainers as manufactured by EBAA Iron Inc., or equal, and shall conform to ANSI/AWWA C111/A21.11 and AWWA C600.

### 2.2 HIGH DENSITY POLYETHYLENE EXTRUDED WATER MAIN
A. High Density Polyethylene Extruded (HDPE) Materials.
   1. Comply with ANSI/AWWA C906, ANSI/AWWA C901 and NFPA 13.
   2. Pipe compound to conform to PE4710, ASTM D3350, Cell Class 445574 C/E.
B. Wall Thickness: DR 11 minimum.
C. Color: Provide a black color HDPE with a blue stripe for water applications.
D. Identification: Provide pipe with cell classification and DR rating stamped on pipe.

### 2.3 HDPE TO PVC WATER MAIN TRANSITION
A. Mechanical Joints: Provide mechanical joint adapter with kit, Independent Pipe Products, Inc. or equal.
   1. Mechanical joint adapter shall not be paid separately, but shall be considered incidental to construction of the water main.

## 2.4 TRACER WIRE AND CONNECTORS

A. Detectable Tracer Wires: Shall be Copperhead copper-clad steel 10-AWG Extra High Strength, minimum 45 mil HDPE insulation, Manufactured by Copperhead Industries, or approved equal. Direct bury wire connectors shall include three-way lockable Copperhead SnakeBite Locking Connectors and Copperhead Mainline-to-Service Connectors or approved equal. Non-locking, friction fit, or taped connectors are prohibited. One (1) tracer wire to be installed on all directional drill water main.

B. Location wire access points shall be installed as indicated on the Plans, Specifications, or directed by the Engineer.
   1. Termination: Mamba style sixty (60) inch round marker posts or approved equal, with security sleeve cap style, built-in access point, and magnesium ground rod (12-AWG wire) shall be installed at termination of fire department connection water main and at building.
   2. Installation and attachment of tracer wires to the pipe to be in conformance with the with the manufacturer guidelines.
   3. Tracer wire shall be installed with all water main. The tracer system components, including tracer wire, connectors, ground rods and access points, must be compatible. The system shall be installed in conformance with the manufacturer's recommendations
   4. Tracer wire and all access point products shall be blue. All new tracer wire installations shall be located using typical low frequency line tracing equipment, witnessed by the contractor, engineer, and facility owner as applicable, prior to acceptance of ownership. Continuity testing, in lieu of actual line tracing, shall not be accepted.
   5. If CONTRACTOR fails to properly install the tracer wires or the wire breaks during the installation process, the CONTRACTOR will be required to install said tracer wire in a ½ inch to 1 inch PVC conduit securely attached to the top of the mains.
   6. The CONTRACTOR shall demonstrate to the ENGINEER a check of the completed trace wire installations for “continuity” to verify the tracer wires were installed properly. The CONTRACTOR will be required to remedy any “pipe tracing problems found” at no additional cost to the Owner.

C. Tracer Wires and system components shall not be paid for separately, but shall be considered incidental to the item of Work being performed.

## 2.5 DUCTILE IRON PRESSURE WATER PIPE AND FITTINGS

A. Pipe and Fittings: Class 52 ductile Iron Pipe (DIP) shall conform to ANSI 21.51 (AWWA C-151). Class thickness shall be designated per ANSI A 21.50 (AWWA C-150), and tar coated and cement lined per ANSI A 21.4 (AWWA C-104).

B. Gaskets: Rubber rings for push on joints shall conform with ANSI/AWWA C111/A21.11 and AWWA C600.

C. Mechanical Joints: Mechanical joints shall be Megalug Retainers as manufactured by EBAA Iron, Inc. or equal, and shall conform to AWWA C111 and C600. (mechanical joint transitions from HDPE to PVC are specified in paragraph 2.04)

# PART 3 – EXECUTION

## 3.1 RELATED WORK SPECIFIED ELSEWHERE

A. Trenching and backfilling are specified in Division 2 Section "Trenching and Backfilling."

B. Dewatering is specified in Division 1 Section “Temporary Facilities and Controls.”

## 3.2 PIPING INSTALLATION

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewerage piping. Location and arrangement of piping layout take design and utility easement considerations into account. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

B. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.
C. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected.
D. Install one (1) length of tracer wire on each length of water main installed.
E. Install water mains according to the following:
   1. Install PVC DR18 C900 as specified on the plans where indicated.
   2. Install piping with restrained joints at tee fittings and at horizontal and vertical changes in direction. Use concrete thrust blocks on all fittings and where specified.
   3. Watermains shall have a minimum of 6.0 feet of cover unless otherwise noted on the plans.
   4. Water main shall be installed as not to create intermediate high points.
F. Clear interior of piping and manholes of dirt and superfluous material as work progresses. Place plug in end of incomplete piping at end of day and when work stops.
G. Requirements for the Protection of Water Mains from Sewers shall be in accordance with IEPA Standards and as set forth in Section 41 – PIPE INSTALLATION FOR WATER MAINS of the ILLINOIS SEWER SPECS.

## 3.3 HDPE JOINT CONSTRUCTION

A. HDPE Water Pipe and Fittings:
   1. Electrofusion Sleeves:
      a. Electrofusion sleeves are not specified for this project.
   2. Couplings:
      a. Make joints using system manufacturer’s couplings, unless otherwise indicated.
      b. Join pipe made of different materials or dimensions with couplings made for this application. Use couplings that are compatible with and that fit both system’s materials and dimensions.

## 3.4 FIELD QUALITY CONTROL

A. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
   1. Test completed piping systems according to requirements of authorities having jurisdiction.
   2. Schedule tests and inspections by authorities having jurisdiction with at least 48 hours advance notice. The CONTRACTOR shall have successfully performed the following tests prior to requesting the ENGINEER to witness the official test.

## 3.5 PRESSURE TESTING

A. All water main, fittings, valves and services shall be subject to a hydrostatic pressure as listed in Specification Section 331416 and on the plans. The CONTRACTOR shall provide all labor, materials, tools and equipment necessary to perform the pressure test. The CONTRACTOR shall satisfactorily perform the pressure tests prior to request the Village ENGINEER to witness the official test.
B. Water for water main testing is available at the public works facility at no charge.
C. This Work shall not be paid for separately, but shall be considered incidental to the item of Work being performed.

## 3.6 CLEANING

A. Clean interior of piping of dirt and superfluous material, and flush with potable water prior commissioning.
B. This Work shall not be paid for separately, but shall be considered incidental to the item of Work being performed.

**END OF SECTION**

**SECTION 333133**

**GRAVITY FLOW SANITARY SEWERS**

## PART 1 – GENERAL

### 1.1 SUMMARY
A. This Section includes the requirements for gravity-flow sanitary sewers.

### 1.2 REGULATORY REQUIREMENTS
A. Contractor shall comply with materials, workmanship, and other applicable requirements of Division III SANITARY AND STORM SEWERS and other applicable sections of the ILLINOIS SEWER SPECS.

### 1.3 SUBMITTALS
A. Product Data: For the following:
   1. SDR 26 PVC pipe and gaskets.
B. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.
C. Record Drawings: Database with locations of all points of connections of sanitary services to the sewer main.

### 1.4 DELIVERY, STORAGE, AND HANDLING
A. Do not store PVC pipe and fittings in direct sunlight.
B. Protect pipe, pipe fittings, and seals from dirt and damage.

## PART 2 – PRODUCTS

### 2.1 POLYVINYL CHLORIDE, GRAVITY SEWER PIPE AND FITTINGS
A. Sewer Pipe and Fittings: Polyvinyl Chloride (PVC) sewer pipe shall conform to ASTM D-3034, type PSM. Standard Dimension Ratio shall be SDR 26 as indicated in the specifications. The pipe shall be made of PVC plastic having a minimum cell classification of 12454-C, and shall have a minimum pipe stiffness of 46 lbs. per inch per inch.
B. Joints: All PVC pipe joints shall be gasketed with flexible elastomeric seals, bell-and-spigot, and push-on type conforming to ASTM D-3212 and F-477. Lubricant shall be as recommended by the pipe manufacturer.

## PART 3 – EXECUTION

### 3.1 RELATED WORK SPECIFIED ELSEWHERE
A. Excavating, trenching, bedding, and backfilling are specified in Section 312316.13 "TRENCHING AND BACKFILLING".
B. Dewatering is specified in Section 015000"TEMPORARY FACILITIES AND CONTROLS."

### 3.2 PIPING INSTALLATION
A. Pipe shall be installed in accordance with Division III, Section 31 "PIPE LAYING, JOINTING AND TESTING of the ILLINOIS SEWER SPECS and the Village of Hoffman Estates Ordinance.
B. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewerage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.
C. Aggregate material for bedding, haunching, and initial backfill per the typical detail in the plans shall be included in the cost of sewer pipe per foot.
D. Install gravity-flow sewer according to the following:
   1. Install SDR 26 PVC as shown on plans.

E. Requirements for the Protection of Water Mains from Sewers shall be in accordance with IEPA Standards and as set forth in Section 41 – PIPE INSTALLATION FOR WATER MAINS of the ILLINOIS SEWER SPECS.

**3.3 SANITARY SERVICE INSTALLATION**

A. SDR 26 PVC Service Lines shall be provided per Plans. Service diameter shall be as indicated on the plan.
B. Trench Backfill used during sanitary service installation shall be included in the cost of the sanitary service installation.
C. In addition to the Work specified elsewhere under this Sanitary Service Installation section, the Schedule of Price Item “Sanitary Sewer Service shall include all labor, materials, and equipment to complete the following items:
   1. Excavation
   2. Trench Backfill
D. Locations of the service wye shall be noted by the Contractor and submitted to the Engineer for the purpose of Record Drawings.
E. The Schedule of Prices included in the Bid Form shall govern payment of the installation of sanitary sewer services including all labor, materials, and equipment.

**3.4 CONNECTIONS**

A. Make connections to existing sanitary sewer service in the following manner:
   1. Connection to the existing sanitary sewer service will be accommodated by the use of a proposed sanitary sewer manhole. A rubber watertight boot with mechanical straps shall be installed in the manhole (Kor-N-Seal or equal).
   2. Protect existing piping to prevent debris from entering while making connections. Remove debris or other extraneous material that may accumulate.
B. The Schedule of Prices included in the Bid Form shall govern payment for the Connection of proposed sewer to existing structures.
C. Gravity sewer connections to existing manholes are not anticipated for this project.

**3.5 FIELD QUALITY CONTROL**

A. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
   1. Test completed piping systems according to requirements of authorities having jurisdiction.
   2. Schedule tests and inspections by authorities having jurisdiction with at least 48 hours advance notice. The Contractor shall have successfully performed the following tests prior to requesting the Engineer to witness the official test.
   3. Gravity flow sewer shall be tested as follows:
      a. Air Tests: Each gravity sewer shall be Air Tested by the Contractor in accordance with Division III, Section 31 of the ILLINOIS SEWER SPECS.
      b. Deflection Testing of Pipe:
         1) Deflection testing shall be performed by the Contractor on all sanitary sewer installed for the first 1,200 feet of the project. If the initial 1,200 feet passes the test, then not less than 10% of the remainder of the sewer project will be tested at random. If the initial 1,200 feet fails, than the remainder of the sewer project will be tested.
         2) If the deflection test is to be run using a rigid ball or mandrel, it shall have a diameter equal to 95% of the base diameter of the pipe as established in proposed ASTM D-3034. The test shall be performed without mechanical pulling devices.
         3) The individual lines to be tested shall be so tested no sooner than 30 days after they have been installed.
         4) Whenever possible and practical, the testing shall initiate at the downstream lines and proceed towards the upstream lines.
         5) No pipe shall exceed a deflection of 5%

6) Where deflection is found to be in excess of 5% of the original pipe diameter, the contractor shall excavate to the point of excess deflection and carefully compact around the point where excess deflection was found. The line shall then be retested for deflection; however, after the initial testing, should the deflected pipes fail to return to the original size (inside diameter), the line shall be replaced.

c. Televising: After the installation of the gravity sewer is complete, the Contractor shall have each section of sanitary sewer televised. The Contractor will submit to the Engineer and Owner, three thumb drive copies of the televised sewer along with a detailed report. All defects shown on the televised records shall be repaired at the Contractor's expense.

## 3.6 CLEANING

A. Clear interior of piping of dirt and superfluous material as work progresses. Place plug in end of incomplete piping at end of day and when work stops. Flush piping to remove collected debris, if required by Engineer.

B. Clean interior of piping of dirt and superfluous material, and flush with potable water prior commissioning.

**END OF SECTION**