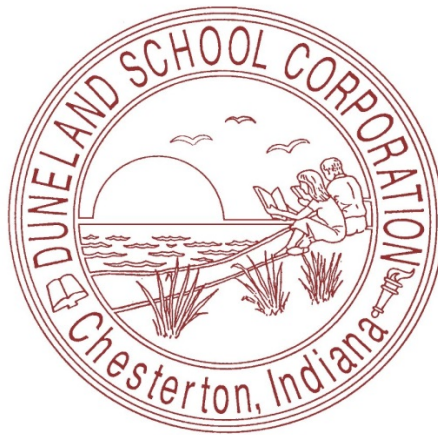


**Project Manual**  
Project Number: 17-005

**Duneland School Corporation**  
**2017 Pool Renovations at:**  
**Chesterton Middle School, 651 West Morgan**  
**Avenue, Chesterton, Indiana 46304**



For

**Board of School Trustees**  
**Duneland School Corporation**  
**601 West Morgan Avenue**  
**Chesterton, Indiana 46304**

**Issued for Bid and Permit: March 9, 2017**



**West Suburban Office:** 901 McClintock Drive, Suite 100, Burr Ridge, Illinois 60527  
**South Suburban Office:** 1820 Ridge Road, Suite 209, Homewood, Illinois 60430  
Company Main: 630.455.4500 Fax: 630.455.4040  
[www.TriaArchitecture.com](http://www.TriaArchitecture.com)



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## SECTION 00030

### NOTICE TO BIDDERS

#### ADVERTISEMENT FOR BIDS

##### 1.1 BID INFORMATION

- A. Notice is hereby given that sealed bids will be received by the Board of School Trustees of the Duneland School Corporation on March 23, 2017 until 10:00 a.m. CST (local time) for the: 2017 Pool Renovations at Chesterton Middle School. Bids will be opened and publicly read aloud at the Duneland School Corporation Administration Office, 601 West Morgan Avenue, Chesterton, Indiana 46304.
- B. A Mandatory Pre-Bid Conference will be held on March 16, 2017 at 1:30 p.m. CST (local time) at the Duneland School Corporation Administration Office, 601 West Morgan Avenue, Chesterton, Indiana 46304. A walk-through at Chesterton Middle School will immediately follow. All Bidders are required to attend and sign in at the meeting, which will also be attended by the Owner, Architect and Engineer. A walk-through of the school will immediately follow the pre-bid meeting.
- C. Anticipated Award of Contract date: April 10, 2017.
- D. Anticipated Start of Construction:
  - May 1, 2017 (Outside of Pool Area)
  - June 1, 2017 (Inside of Pool Area)
- E. Anticipated Substantial Completion date: August 9, 2017.
- F. Lump sum bid proposals will be received for this project at the scheduled time. Bids received after this time shall be returned unopened.
- G. Bid security in the form of a bid bond or certified check in an amount equal to 10 percent of the base bid amount shall be submitted with the bid. Should a bid bond be submitted, the bid bond shall be payable to the Duneland School Corporation.
- H. Bids shall be submitted on or before the specified closing time in an opaque sealed envelope addressed to: Mr. Greg Lindy, Director of Support Services, 601 W. Morgan Avenue, Chesterton, IN 46304, ATTENTION: 2017 POOL RENOVATIONS BID – CHESTERTON MIDDLE SCHOOL .
- I. The Board of School Trustees of the Duneland School Corporation reserves the right to reject any or all bids or parts thereof, or to waive any irregularities or informalities, and to make the award in the best interest of the Duneland School Corporation. No bid shall be withdrawn for a period of sixty (60) days after the scheduled bid opening date.
- J. All bidders must comply with all Board of School Trustees local policies as outlined in the bidding documents.
- K. The Architect for the above referenced project is Tria Architecture, Inc., (630) 455-4500.
- L. Bidding documents are on file and may be obtained upon receipt of deposit in the amount of \$100 for 1 set of the bidding documents consisting of 2 sets of plans, 2 Project Manuals, 1 Compact Disc containing PDF files of drawings and project manual, and 1 set of bid forms from: GRI Gill Repographics, Inc. 17W715 Butterfield Road, Suite B, Oakbrook Terrace, IL 60181, (630) 652-0800, [www.gillrepro.com](http://www.gillrepro.com) , [chicagoorders@gillrepro.com](mailto:chicagoorders@gillrepro.com).

Board of School Trustees of the Duneland School Corporation  
601 West Morgan Avenue  
Chesterton, Indiana 46304

**END OF SECTION**





## SECTION 00100

### INSTRUCTIONS TO BIDDERS

#### PART 1 – GENERAL

##### 1.1 PROPOSAL

- A. The Board of School Trustees of the Duneland School Corporation will receive sealed bids for the 2017 Pool Renovations at Chesterton Middle School.
- B. To receive full consideration bids must contain the following documents properly completed and signed:
  - 1. Bid Form.
  - 2. Bid Bond.
  - 3. Addendum to Contract for Construction.
  - 4. Certification Regarding Investment Activities in Iran.
  - 5. Contractor's Bid for Public Work - Form 96.
  - 6. Responsible Bidder Form.
  - 7. 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: Mr. Greg Lindy, Director of Support Services, 601 West Morgan Avenue, Chesterton, Indiana 46304.
    - a. Mark the envelope ATTENTION: 2017 Pool Renovations - BID.
  - 4. Sealed Bids will be received until 10:00 a.m. CST (local time), on March 23, 2017 for all specified work at Duneland School Corporation Administration Office, 601 West Morgan Avenue, Chesterton Indiana 46304.
  - 5. Bids received after this time shall be returned unopened.
  - 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. Do not detach Bid Proposal Forms from the Project Manual for use in submission of bids; use separate forms furnished by the Architect.
- G. 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

## SECTION 00100

### INSTRUCTIONS TO BIDDERS

Owner and Contractor where the Basis of Payment is a Stipulated Sum, 2007 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 examined at Gill Reprographics, Inc. (GRI), 17W715 Butterfield Road, Suite B, Oak Brook Terrace, IL 60181, (630) 652-0800, [www.gillrepro.com](http://www.gillrepro.com).
- B. General Contractors may obtain (1) set of the Bidding Documents, consisting of (2) sets of drawings, (2) project manuals, (1) Compact Disc containing PDF files of the drawings and the project manual, and (1) set of bid forms at Gill Reprographics, Inc. (GRI), 17W715 Butterfield Road, Suite B, Oak Brook Terrace, IL 60181, (630) 652-0800, [www.gillrepro.com](http://www.gillrepro.com), upon deposit of a check in the amount of \$100.00 made payable to the Duneland School Corporation. Deposit is refundable if a bid is submitted and if drawings are returned in good condition by April 23, 2017, as well as to the winning bidder.
- C. Contractors may obtain additional sets of plans and specifications directly from the Printer. Contractor shall be responsible for the reproduction costs. Amounts paid for additional sets are not refundable.
- D. All documents furnished for bidding purposes (including Compact Disc), obtained by deposit or purchase MUST BE RETURNED to the Printer, transportation prepaid, within ten days after opening of the Bids or deposit checks will not be returned.

#### 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 mandatory Pre-Bid Conference will be held on March 16, 2017, 1:30 p.m. at the Duneland School Corporation Administrative Office, 601 West Morgan Avenue, Chesterton, Indiana 46304. All Bidders are required to attend and sign in at the conference which will also be attended by the Owner, the Architect, and the Engineer. There will be a walk-through immediately following the pre-bid meeting at the school. 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.

## SECTION 00100

### INSTRUCTIONS TO BIDDERS

#### 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 Ten 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.

## **SECTION 00100**

### **INSTRUCTIONS TO BIDDERS**

1. Make Bid Security payable to: Duneland School Corporation.
- 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 section 11.4 of the AIA document A201 included in specification section 00700.
- 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 AIA A312.
  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. Addendum to Contract for Construction.
  2. Certification Regarding Investment Activities in Iran.
  3. Contractor's Bid for Public Work - Form 96.
  4. Responsible Bidder Form.
  5. Fully completed AIA document A305 providing the Contractor's qualifications and references.

#### **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. The Contractor must comply with all Board of School Trustees local policies as outlined in the bidding documents. See Document 00820 – Duneland School Corporation Responsible Bidder Form.
- 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 00300

BID FORM

THE PROJECT AND THE PARTIES

1.1 NAME OF BIDDER: \_\_\_\_\_

1.2 TO: **MR. GREG LINDY, DIRECTOR OF SUPPORT SERVICES**  
**DUNELAND SCHOOL CORPORATION**  
**601 WEST MORGAN AVENUE**  
**CHESTERTON, INDIANA 46304**

- 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 2017 Pool Renovations at Chesterton Middle School, 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 01230.

ALTERNATE NO. 1: **Paint Existing Pool Walls**

ADDED to the Lump Sum \$\_\_\_\_\_.

ALTERNATE NO. 2: **Concrete Duct Sealing**

ADDED to the Lump Sum \$\_\_\_\_\_.

- C. Accompanying this proposal is a Bid Security payable to the Duneland School Corporation, 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, 2007 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.
- D. 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.
- E. Time of Completion: If awarded the Contract, the bidder agrees to complete all Construction Work and achieve Substantial Completion by August 9, 2017, 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.

## SECTION 00300

### BID FORM

- F. The space below of the desired Substantial Completion Date has been left blank for insertion of Contractor's own desired Substantial Completion Date, if he feels that the desired date as stated in the specifications cannot be met. Insertion of a date by the bidder does not change the specified Substantial Completion Date unless the Owner chooses to accept the bidder's date when awarding the contract.

1. Specified Substantial Completion Date: August 9, 2017, 5:00 p.m.
2. Contractor's Desired Substantial Completion Date: \_\_\_\_\_.

- G. 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):    | _____    |
| Division 09: | Finishes:                               | \$ _____ |
|              | Subcontractor (Legal Name, Address):    | _____    |

**SECTION 00300**

**BID FORM**

Division 15: Mechanical - HVAC: \$ \_\_\_\_\_  
Subcontractor (Legal Name, Address): \_\_\_\_\_

Division 15: Mechanical - Plumbing: \$ \_\_\_\_\_  
Subcontractor (Legal Name, Address): \_\_\_\_\_

Division 16: Electrical: \$ \_\_\_\_\_  
Subcontractor (Legal Name, Address): \_\_\_\_\_

Division 16: Electrical – Fire Alarm: \$ \_\_\_\_\_  
Subcontractor (Legal Name, Address): \_\_\_\_\_

Division 16: Electrical – Low Voltage: \$ \_\_\_\_\_  
Subcontractor (Legal Name, Address): \_\_\_\_\_

Division 17: Building Automation System: \$ \_\_\_\_\_  
Subcontractor (Legal Name, Address): \_\_\_\_\_

Miscellaneous Any items not identified above: \$ \_\_\_\_\_  
Subcontractor (Legal Name, Address): \_\_\_\_\_

TOTAL (Should equal base bid): \$ \_\_\_\_\_

**SECTION 00300**

**BID FORM**

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

\_\_\_\_\_  
Secretary (signature) Date (SEAL)

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

**END OF BID FORM**



SECTION 00410

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 Oblige, hereinafter called Oblige, 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: 2017 Pool Renovations at Chesterton Middle School.
- C. NOW, THEREFORE, if the Oblige shall accept the bid of the Principal and the Principal shall enter into a Contract with the Oblige 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 Oblige the difference not to exceed the penalty hereof between the amount specified in said bid and such larger amount for which the Oblige 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 00440**

**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 SPECIFIED | PROPOSED | ADD   | DEDUCT |
|-----|----------------------|----------|-------|--------|
| 1.  | _____                | _____    | _____ | _____  |
| 2.  | _____                | _____    | _____ | _____  |
| 3.  | _____                | _____    | _____ | _____  |
| 4.  | _____                | _____    | _____ | _____  |
| 5.  | _____                | _____    | _____ | _____  |
| 6.  | _____                | _____    | _____ | _____  |
| 7.  | _____                | _____    | _____ | _____  |
| 8.  | _____                | _____    | _____ | _____  |
| 9.  | _____                | _____    | _____ | _____  |
| 10. | _____                | _____    | _____ | _____  |
| 11. | _____                | _____    | _____ | _____  |

NAME OF BIDDER: \_\_\_\_\_

DATE: \_\_\_\_\_.

**END OF SECTION**



**SECTION 00495**

**ADDENDUM TO CONTRACT FOR CONSTRUCTION**

This following Addendum to THE Contract for Construction is made by \_\_\_\_\_ ("contractor") and the Duneland School Corporation ("School Corporation") this \_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_..

The contractor is party to a Contract for Construction with the School Corporation ("Agreement").

The contractor states that it is in compliance with the requirements of Indiana Code 22-5-1.7-11 in that it uses the E-Verify program, as such is defined by Ind. Code 22-5-1.7-3, as such may be amended from time to time, or that it is no longer required to verify the work eligibility status of all newly hired employees if the E-Verify program no longer exists.

Attached to this Addendum is an Affidavit signed on behalf of the contractor and executed in accordance with Ind. Code 22-5-1.7-11(b).

This Addendum is intended to supplement the Agreement between the School Corporation and the contractor, whether oral or in writing.

CONTRACTOR

By: \_\_\_\_\_

Its: \_\_\_\_\_

SECTION 00495

ADDENDUM TO CONTRACT FOR CONSTRUCTION

STATE OF INDIANA            )  
                                          )  
COUNTY OF \_\_\_\_\_ )

**AFFIDAVIT**

The undersigned, being duly sworn upon his oath, does state as follows:

1.     He/she is \_\_\_\_\_ (specify position) of \_\_\_\_\_  
      ("contractor") and has personal knowledge of the facts set forth in this Affidavit.
2.     The contractor provides services to the Duneland School Corporation.
3.     The contractor does not knowingly employ any unauthorized aliens, as such term is defined by  
      Indiana Code 22-5-1.7-9.
4.     This Affidavit is made for the purpose of complying with the requirements of Indiana Code 22-5-  
      1.7 et seq.

Dated this \_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_.

Further Affiant sayeth not.

\_\_\_\_\_

I affirm, under the penalties for perjury, that the foregoing representations are true to the best of  
my knowledge and belief.

\_\_\_\_\_

**SECTION 00496**

**CERTIFICATION REGARDING INVESTMENT ACTIVITIES IN IRAN**

The CONTRACTOR certifies to the Duneland School Corporation ("OWNER"), as a condition of its contract with the School Corporation that CONTRACTOR is not engaged in investment activities in Iran. Pursuant to Ind. Code §5-22-16.5-8, a firm is considered to be engaging in investment activities with Iran if: (1) it has provided goods or services of Twenty Million Dollars (\$20,000,000.00) or more in value in the energy section of Iran, including oil or liquefied natural gas; or (2) has extended Twenty Million Dollars (\$20,000,000.00) or more in credit to another party, for 45 days or more, if that other party will use the credit to provide goods or services in the energy section in Iran and is, at the time credit is extended, identified on the list developed by the State of Indiana of parties it has determined to be engaged in investment activities in Iran. Be advised that the CONTRACTOR is not listed on the list published and/or endorsed by the State of Indiana pursuant to Ind. Code §5-22-16.5-9 as a company engaged in investment activities with Iran.

Dated this \_\_\_\_\_ day of \_\_\_\_\_, 201\_\_.

CONTRACTOR:

By: \_\_\_\_\_

Its: \_\_\_\_\_





SECTION 00497

CONTRACTOR'S BID FOR PUBLIC WORK – FORM 96



**CONTRACTOR'S BID FOR PUBLIC WORK - FORM 96**

State Form 52414 (R2/2-13) / Form 9B (Revised 2013)

Prescribed by State Board of Accounts

PART I

*(To be completed for all bids. Please type or print)*

Date (month, day, year): \_\_\_\_\_

1. Governmental Unit (Owner): \_\_\_\_\_

2. County: \_\_\_\_\_

3. Bidder (Firm): \_\_\_\_\_

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

City/State/ZIP code: \_\_\_\_\_

4. Telephone Number: \_\_\_\_\_

5. Agent of Bidder (if applicable): \_\_\_\_\_

Pursuant to notices given, the undersigned offers to furnish labor and/or material necessary to complete the public works project of \_\_\_\_\_  
(Governmental Unit) in accordance with plans and specifications prepared by \_\_\_\_\_

\_\_\_\_\_ and dated \_\_\_\_\_ for the sum of

\_\_\_\_\_ \$ \_\_\_\_\_

The undersigned further agrees to furnish a bond or certified check with this bid for an amount specified in the notice of the letting. If alternative bids apply, the undersigned submits a proposal for each in accordance with the notice. Any addendums attached will be specifically referenced at the applicable page.

If additional units of material included in the contract are needed, the cost of units must be the same as that shown in the original contract if accepted by the governmental unit. If the bid is to be awarded on a unit basis, the itemization of the units shall be shown on a separate attachment.

The contractor and his subcontractors, if any, shall not discriminate against or intimidate any employee, or applicant for employment, to be employed in the performance of this contract, with respect to any matter directly or indirectly related to employment because of race, religion, color, sex, national origin or ancestry. Breach of this covenant may be regarded as a material breach of the contract.

SECTION 00497

CONTRACTOR'S BID FOR PUBLIC WORK – FORM 96

CERTIFICATION OF USE OF UNITED STATES STEEL PRODUCTS  
(If applicable)

I, the undersigned bidder or agent as a contractor on a public works project, understand my statutory obligation to use steel products made in the United States (I.C. 5-16-6-2). I hereby certify that I and all subcontractors employed by me for this project will use U.S. steel products on this project if awarded. I understand that violations hereunder may result in forfeiture of contractual payments.

ACCEPTANCE

The above bid is accepted this \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_, subject to the following conditions: \_\_\_\_\_

Contracting Authority Members:

|       |       |
|-------|-------|
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |

PART II

(For projects of \$150,000 or more - IC 36-1-12-4)

Governmental Unit: \_\_\_\_\_

Bidder (Firm): \_\_\_\_\_

Date (month, day, year): \_\_\_\_\_

These statements to be submitted under oath by each bidder with and as a part of his bid. Attach additional pages for each section as needed.

SECTION I EXPERIENCE QUESTIONNAIRE

1. What public works projects has your organization completed for the period of one (1) year prior to the date of the current bid?

| Contract Amount | Class of Work | Completion Date | Name and Address of Owner |
|-----------------|---------------|-----------------|---------------------------|
|                 |               |                 |                           |
|                 |               |                 |                           |
|                 |               |                 |                           |
|                 |               |                 |                           |

SECTION 00497

CONTRACTOR'S BID FOR PUBLIC WORK – FORM 96

2. What public works projects are now in process of construction by your organization?

| Contract Amount | Class of Work | Expected Completion Date | Name and Address of Owner |
|-----------------|---------------|--------------------------|---------------------------|
|                 |               |                          |                           |
|                 |               |                          |                           |
|                 |               |                          |                           |
|                 |               |                          |                           |

3. Have you ever failed to complete any work awarded to you? \_\_\_\_\_ If so, where and why?

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4. List references from private firms for which you have performed work.

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SECTION II PLAN AND EQUIPMENT QUESTIONNAIRE

1. Explain your plan or layout for performing proposed work. (Examples could include a narrative of when you could begin work, complete the project, number of workers, etc. and any other information which you believe would enable the governmental unit to consider your bid.)

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2. Please list the names and addresses of all subcontractors (i.e. persons or firms outside your own firm who have performed part of the work) that you have used on public works projects during the past five (5) years along with a brief description of the work done by each subcontractor.

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**SECTION 00497**

**CONTRACTOR'S BID FOR PUBLIC WORK – FORM 96**

3. If you intend to sublet any portion of the work, state the name and address of each subcontractor, equipment to be used by the subcontractor, and whether you will require a bond. However, if you are unable to currently provide a listing, please understand a listing must be provided prior to contract approval. Until the completion of the proposed project, you are under a continuing obligation to immediately notify the governmental unit in the event that you subsequently determine that you will use a subcontractor on the proposed project.

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4. What equipment do you have available to use for the proposed project? Any equipment to be used by subcontractors may also be required to be listed by the governmental unit.

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5. Have you entered into contracts or received offers for all materials which substantiate the prices used in preparing your proposal? If not, please explain the rationale used which would corroborate the prices listed.

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**SECTION III CONTRACTOR'S FINANCIAL STATEMENT**

Attachment of bidder's financial statement is mandatory. Any bid submitted without said financial statement as required by statute shall thereby be rendered invalid. The financial statement provided hereunder to the governing body awarding the contract must be specific enough in detail so that said governing body can make a proper determination of the bidder's capability for completing the project if awarded.

**SECTION IV CONTRACTOR'S NON- COLLUSION AFFIDAVIT**

The undersigned bidder or agent, being duly sworn on oath, says that he has not, nor has any other member, representative, or agent of the firm, company, corporation or partnership represented by him, entered into any combination, collusion or agreement with any person relative to the price to be bid by anyone at such letting nor to prevent any person from bidding nor to include anyone to refrain from bidding, and that this bid is made without reference to any other bid and without any agreement, understanding or combination with any other person in reference to such bidding.

He further says that no person or persons, firms, or corporation has, have or will receive directly or indirectly, any rebate, fee, gift, commission or thing of value on account of such sale.

SECTION 00497

CONTRACTOR'S BID FOR PUBLIC WORK – FORM 96

SECTION V OATH AND AFFIRMATION

I HEREBY AFFIRM UNDER THE PENALTIES FOR PERJURY THAT THE FACTS AND INFORMATION CONTAINED IN THE FOREGOING BID FOR PUBLIC WORKS ARE TRUE AND CORRECT.

Dated at \_\_\_\_\_ this \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_

\_\_\_\_\_  
(Name of Organization)

By \_\_\_\_\_

\_\_\_\_\_  
(Title of Person Signing)

ACKNOWLEDGEMENT

STATE OF \_\_\_\_\_ )  
COUNTY OF \_\_\_\_\_ ) ss

Before me, a Notary Public, personally appeared the above-named \_\_\_\_\_ and swore that the statements contained in the foregoing document are true and correct.

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

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

My Commission Expires: \_\_\_\_\_

County of Residence: \_\_\_\_\_

SECTION 00497

CONTRACTOR'S BID FOR PUBLIC WORK – FORM 96

Part of State Form 52414 (R2/2-13) / Form 96  
(Revised 2013)

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**BID OF**

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*(Contractor)*

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*(Address)*

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**FOR**

**PUBLIC WORKS  
PROJECTS**

**OF**

---

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Filed

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Action taken

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## **SECTION 00700**

### **GENERAL CONDITIONS**

#### **FORM OF GENERAL CONDITIONS**

- 1.1 AIA Document A201, General Conditions of the Contract for Construction, 2007 Edition, attached, is the General Conditions between the Owner and Contractor.**
- 1.2 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™ – 2007

## General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)

«Duneland School Corporation - General»

« \_ »

THE OWNER:

(Name, legal status and address)

«Duneland School Corporation»« \_ »

«601 West Morgan Ave.

Chesterton, Indiana 46304»

THE ARCHITECT:

(Name, legal status and address)

«Tria Architecture, Inc.»« \_ »

«901 McClintock Drive, Suite 100

Burr Ridge, Illinois 60527»

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## ARTICLE 1 GENERAL PROVISIONS

### § 1.1 BASIC DEFINITIONS

#### § 1.1.1 THE CONTRACT DOCUMENTS

The Contract Documents ~~are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, 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, ~~Specifications, Addenda 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 of the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) 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.~~ Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding requirements.work issued by the Architect.

#### § 1.1.2 THE OWNER

The term "Owner" shall refer to the Duneland School Corporation, which shall also be referred to as the "School Corporation."

#### 1.1.3 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 PROJECTTHE WORK

~~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.~~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.

#### § 1.1.5 THE DRAWINGSTHE PROJECT

~~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.~~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.

#### § 1.1.6 THE SPECIFICATIONSTHE DRAWINGS

~~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.~~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 shall be checked against field measurements of existing conditions to be taken by the Contractor.



#### § 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. 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.

#### § 1.1.8 INITIAL DECISION MAKER

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.

#### § 1.1.9 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 and certify termination of the Agreement under Section 14.2.2.

#### 1.1.10. MISCELLANEOUS DEFINITIONS

1.1.10.1 The term "Fabricated" as used throughout the Contract Documents is hereby defined to mean items specifically assembled or made of selected materials or components to meet individual design requirements.

1.1.10.2 The term "Furnish" as used throughout the Contract Documents is hereby defined to mean materials or items to be furnished.

1.1.10.3 The term "Install" as used throughout the Contract Documents is hereby defined to mean materials or items furnished by other trades shall be installed only. Such materials or items shall be received at the site, unloaded, stored, protected, and installed in place, including connections, auxiliary items, and other work required for a complete and functioning installation, unless any such work is specifically excluded.

1.1.10.4 The term "Provide" as used throughout the Contract Documents is hereby defined to mean "furnish and install."

1.1.10.5 The phrase "Shop Fabricated" or "Shop Made" as used throughout the Contract Documents is hereby defined as items made by a contractor or subcontractor in their own Shop.

1.1.10.6 The words "Contractor shall" are implied and shall be so understood wherever a direction or instruction is stated in the imperative sense.

#### § 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

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

§ 1.2.1.1 Where conflicts exist within or between parts of the Contract Documents, or between the Contract Documents and applicable standards, codes and ordinances, the more stringent, or higher quality or greater quantity requirements shall apply. Large-scale drawings take precedence over small-scale drawings, figured dimensions over scaled dimensions and noted materials over graphic representations.

§ 1.2.1.2 The specifications are of the abbreviated type and may include incomplete sentences. Omissions of phrases such as "The Contractor shall" or "conforming to the requirements of" is intentional; omitted words or phrases shall be supplied by inference in the same manner as they are when a "note" occurs on the drawings. 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.

§ 1.2.3.2 In the case of an inconsistency between Drawings and Specifications or within either Document not clarified by addendum, the better quality or greater quantity of work shall be provided in accordance with the Architect's interpretation. Large scale drawings shall take precedence over small scale drawings; figured dimensions on the drawings over scaled dimensions and noted material over graphic representations.

### § 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 will retain all common law, statutory and other reserved rights, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment 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 this 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 material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them 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 material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect's consultants.

### § 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

## ARTICLE 2 OWNER

### § 2.1 GENERAL

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

~~§ 2.1.2 The Owner shall furnish to the Contractor within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of or enforce mechanic's lien rights. Such~~

information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

## § 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

~~§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or the portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.~~

~~§ 2.2.2 Except for permits, Permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities. Documents.~~

§ 2.2.3 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.

§ 2.2.4 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.

§ 2.2.5 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.

## § 2.3 OWNER'S RIGHT TO STOP THE WORK

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or ~~repeatedly~~ fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3. This right shall be in addition to and not in restriction or derogation of the Owner's rights under Article 14 hereof

## § 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ~~ten day~~ seven day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner ~~may, may immediately~~ without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the ~~reasonable~~ cost of correcting such deficiencies, ~~including Owner's expenses and including, but not limited to, attorney's fees,~~ compensation for the Architect's additional services ~~and expenses~~ made necessary by such default, neglect or failure. Such ~~action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If Change Order shall be deemed signed by the Contractor for the purposes stated in Section 7.2.1 even if the Contractor fails to physically sign such Change Order. If the~~ payments then or thereafter due the Contractor are not sufficient to cover such ~~amounts, the Contractor shall pay the difference to the Owner, amount,~~ 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.

## § 2.5 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 obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

### § 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, ~~become generally familiar with~~ has inspected the local conditions under which the Work is to be ~~performed and correlated personal observations with requirements of the Contract Documents~~ performed, 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 he believes are not satisfactory for the use shown, he shall so notify the Architect at least 5 days before bids are due. Signing of the contract and starting work by the Contractor shall indicate his agreement with all details, construction procedures, and materials so shown and/or specified and shall indicate his willingness to construct the project in strict accordance with these Documents and to guarantee the complete project in full compliance with the warranty provisions of the Contract Documents. By executing this contract, the Contractor further acknowledges that he has satisfied himself as to the nature and location of the Work, the general and local conditions, 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 under the Contract. Any failure by the Contractor to acquaint himself with all the available information concerning these conditions will not relieve him from any obligations with respect to the Contract.

§ 3.2.1.3 If work is required in a manner to make it impossible to produce work of the quality required by the Contract, or should discrepancies appear among the Contract Documents, the Contractor shall request in writing an interpretation from the Architect before proceeding with the Work. If the Contractor fails to make such a request, the Architect shall determine the quality of the work required, consistent with the Contract Documents, or which of the conflicting requirements shall govern. 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 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. ~~These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering~~ The Contractor shall promptly report to the Owner and the Architect any errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form

as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents. 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.

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

§ 3.2.2.1 The exactness of grades, elevations, dimensions, existing conditions, or locations given on any drawings issued by the Architect or the work installed by other contractors, is not guaranteed by the Architect or Owner.

§ 3.2.2.2 The Contractor shall, therefore, satisfy himself as to 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.

§ 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 make 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 as would have been avoided if the Contractor had performed such obligations. If the Contractor performs ~~those obligations, 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-inconsistencies,~~ or omissions in the Contract Documents, ~~Documents or~~ for differences between field measurements or conditions and the Contract Documents, ~~or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, unless the Contractor recognized or should have recognized the error, inconsistency, omission, or difference and failed to report it.~~

### § 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, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and 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 written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. ~~If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner required 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.~~
- (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 replacements of the Work and economic losses which proximately result from the breach of this duty. The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, ~~Subcontractors~~ 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~~ Contractor, 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 this 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 any and all labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

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

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
- .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.

§ 3.4.3 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 Contract 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

The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not

~~conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.~~

### **§ 3.6 TAXES**

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

§ 3.5.1 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 an alternative guaranty is specified in a particular division of the Specifications that is longer in duration than one (1) year, the Work shall be guaranteed by the Contractor against defect 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).

### **§ 3.7 PERMITS, FEES, NOTICES AND COMPLIANCE WITH LAWS**

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

§ 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 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 to be addressed by the Architect and Owner. 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 damages, losses, costs 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 and in no event later than 21 days after first observance of the conditions, 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 an equitable adjustment 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 in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed 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~~ competent, English speaking superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor. 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 supervise the job properly shall be deemed as a default 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 furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. ~~The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply within the 14 day period shall constitute notice of no reasonable objection.~~

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

§ 3.9.4 The Contractor's superintendent must be dedicated solely to this project and must be at the project site each day and 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 fourteen (14) days after the date of Substantial Completion. Failure by the Contractor to provide full-time on-site supervision shall constitute grounds for termination of the Contract by the Owner with seven days written notice.



### § 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's ~~information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised~~ review the Contractor's Construction Schedule for the Work of the Contractor. Such Construction Schedule shall not exceed the completion dates, delivery dates or time limits included in the Contract Documents. The Construction Schedule, with the Owner's and Architect's review, shall be revised by the Contractor at appropriate intervals as required by the conditions of the Work and Project, ~~shall be related to the entire Project to the extent required by the Contract Documents,~~ and shall provide for expeditious ~~and practicable~~ execution of the Work.

§ 3.10.2 The Contractor shall prepare ~~a submittal schedule, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect's approval. The Architect's approval shall not unreasonably be delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals, and keep current, for the Architect's record only, a schedule of submittals (the "Submittal Schedule") which is coordinated with the Contractor's 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 silence 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 silence 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, of progress is behind schedule, the Contractor's plan to recover the original 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 schedule. The Contractor shall require subcontractors currently working at the site(s) to have a representative present for such meetings.

§ 3.10.6 Within twenty-one (21) days of the award of the Contract, 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 maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. ~~These-These, along with all operating manuals for all equipment, shall be available to the Architect and shall be at all times and delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed, after completion of the Work but before the final Application for Payment.~~

§ 3.11.1 The Contractor shall maintain at the site(s) one record copy for the Owner and Architect the plans and specifications of concealed work, particularly concealed piping and conduit. Any deviations from conditions shown on the Contract Drawings shall be shown and dimensioned on these field record drawings. 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 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 and their Subcontractors shall maintain at the site(s) an accurate record of deviations and changes from the Contract Documents which occur in the work; 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 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 shall record all changes or deviations in their work from what appears on the Contract Documents. The electronic AutoCAD base plan backgrounds shall be furnished by the Architect. The cost of recording and transferring the changes or deviations to the transparencies shall be included in the contract price 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.

§ 3.11.2.1 From the field record prints of the Contract Drawings, the Contractor shall furnish and prepare on compact disk in AutoCAD format, a complete set of field record drawings, completely dimensioned to show all changes made during the course of the Work. Mechanical and Electrical field record drawing shall locate by dimensions each run of concealed pipe and conduit. Upon completion of the Work, the Contractor and each Subcontractor shall deliver and submit to the Architect a full set of all field record drawings, relating to the Work, on compact disk in AutoCAD format and two sets of full size prints.

## § 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 the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

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

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

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

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing 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 written 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. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall specify all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents on the accuracy and completeness of such certifications.~~

### § 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, and 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.

§ 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 and patching shall be restored to the condition existing prior to the cutting, fitting and 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 such construction by the Owner or a separate contractor except with prior written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work. Contractor's consent shall not be 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 or 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 in accordance with these General Conditions.

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

§ 3.15.3 All exterior and interior work shall be cleaned 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.

#### § 3.16 ACCESS TO WORK

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

#### § 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

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

#### § 3.18 INDEMNIFICATION

§ 3.18.1 To the fullest extent permitted by ~~law the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against law~~, Contractor waives any right of contribution against and shall defend, indemnify and hold harmless Owner, any Owner's Representative, the Architect and their 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 ~~is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a (these are collectively referred to as "claims") is caused in whole or in part by any negligent act or omission of Contractor, any~~ Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts ~~they any of them~~ may be liable, regardless of whether or not ~~such claim, damage, loss or expense it~~ is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate,

abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a otherwise reduce any other right or obligation of indemnity or contribution which would otherwise exist as to any party or person described in this Section 3.18. Contract. The Contractor shall have exclusive responsibility to comply with the requirements of the Structural Work Act. 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 under the requirements of the Illinois Structural Work Act. It is understood that this excludes use by Owner, Architect or his Agents or Employees.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts. The Contractor shall, and hereby covenants and agrees to indemnify, defend, save and hold harmless the following indemnitees: The Owner, its Architects, Board Members, Officers, Agents, 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 contract, as a result of any act or omission of either the Contractor or any Subcontractor, or any of their employees or agents. Contractor and Subcontractor shall name the Owner, its Architects, Board Members, Officers, Agents and Employees, individually and collectively, as additional insured as primary coverage without limitation on their general liability policies. 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 in this Contract 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, etc. incurred by the party being indemnified or its employees, agents or consultants.

§ 3.18.4 In the event that any party is requested but refuses to honor the indemnity obligations hereunder, 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 plus cost of travel, long distance telephone calls and reproduction of documents to the party requesting indemnity.

§ 3.18.6 Contractor shall include in each and every contract 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 Contractor's indemnity obligations hereunder shall, but not by way of limitation, 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.

§ 3.18.9 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 meeting all time limits for Substantial Completion or Final Completion. Labor or trade union disputes that effect production or delivery of materials or equipment, or their installation, shall be at no cost to the Owner. The Contractor shall notify the Architect and the



Owner in writing as 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 Owner, 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 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.

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

§ 4.1.3 If the employment of the Architect is terminated, the Owner shall employ a successor architect ~~as to whom the Contractor has no reasonable objection and~~ whose status under the Contract Documents shall be that of the Architect.

§ 4.1.4 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.

### § 4.2 ADMINISTRATION OF THE CONTRACT

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

§ 4.2.2 The Architect will visit the site at intervals ~~appropriate to the stage of construction, or as otherwise agreed with the Owner, as agreed to by Owner and Architect~~ to become generally familiar with the progress and quality of the ~~portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully Work to endeavor to determine that the Work, when completed, will be in~~ accordance with the Contract ~~Documents. 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, except as provided in Section 3.3.1. Documents.~~

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the ~~portion of the Work completed~~, and report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) 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 FACILITATING CONTRACT ADMINISTRATION

Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner. 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, (2) certified payroll statements and documentation as per the Indiana Common Construction 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 13.5.2 and 13.5.3, whether or not such 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, material and equipment 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, unless otherwise specifically stated by the Architect, 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 will give 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 authorize 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~~. 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. 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 they 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 duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

§ 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 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~~. faith and in the absence of negligence.

§ 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 subcontractors of a separate contractor.

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

### § 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

§ 5.2.1 ~~Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, Prior to executing the Contract, the Contractor~~ shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. ~~Failure of the Owner or Architect to reply 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 execution of the Contract, not later than twenty-one (21) days after Notice of Award of the Contract, 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 ~~reasonable and timely~~ objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection. All contracts 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~~. ~~If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be~~



~~issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required 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 previously selected if the Owner or Architect makes reasonable objection to such substitution without written approval of the Owner. The Contractor further acknowledges and agrees that after award of the Contract to the Contractor, any savings on changes to contracts with subcontractors or substitute subcontractors will be for the benefit of the Owner and 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 contract 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 agreement, written where legally required for validity, 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, which the Contractor, by these 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 any and all Subcontractors working under him and shall carry insurance for all Subcontractors or ensure that they are carrying it for themselves so as to relieve the Owner, Architect and Architect's Consultants of any and all liability.~~

~~§ 5.3.2 The Owner and Architect assume no responsibility for overlapping or omission of parts of the Work by various Subcontractors in their Contracts with the Contractor.~~

### § 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 in writing; and
- .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

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

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

§ 5.4.3 Upon such 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 Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of ~~subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15: subrogation, without altering the Owner's agreement with the Contractor.~~

§ 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 other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

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

### § 6.2 MUTUAL RESPONSIBILITY

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

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report 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, except as to defects not then reasonably discoverable.

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

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

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

### § 6.3 OWNER'S RIGHT TO CLEAN UP

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

## ARTICLE 7 CHANGES IN THE WORK

### § 7.1 GENERAL

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

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

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, 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 schedules 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.

§ 7.1.5 If a proposal for additional 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.
- .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.
- .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 Sub-Sections 7.3.6.1 through 7.3.6.5.
- .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 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 district or region 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.

## § 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 7.3.7.

§ 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 7.3.5 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.

§ 7.3.6 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order. Upon resolution of exact scope, Contract Sum change, and Contract Time change, a Change Order shall be prepared incorporating the Construction Change Directive.

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and 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 7.3.7 shall be limited to the following:

1. ~~Costs~~ Actual costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;
2. ~~Costs~~ Actual costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;
3. Rental actual costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
4. ~~Costs~~ Actual costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and
5. Additional 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.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be ~~actual net cost computed in accordance with Section 7.3.7~~ as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net ~~increase, 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 additions.

§ 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 has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor. The Owner and Architect shall be notified in writing by the Contractor of the minor change.



## § 7.5 SUBSTITUTIONS

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.

Substitution requests shall be written, timely, and accompanied by adequate technical and cost data. Requests shall include a complete description of the proposed substitution, name of the material or equipment for which it is to be substituted, drawings, cuts, performance and test data, and any other data or information necessary for a complete evaluation by the Architect.

## ARTICLE 8 TIME

### § 8.1 DEFINITIONS

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

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

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

§ 8.1.4 The term "day" as used in the Contract Documents shall mean ~~calendar day unless otherwise specifically defined~~ 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, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

§ 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 and for more than two (2) inspections for Substantial Completion or final inspection.

### § 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 an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner ~~pending mediation and arbitration; or by other causes that the Architect determines~~ or by other causes which the Architect and Owner determine, in their sole

discretion, may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect and Owner may determine.

§ 8.3.2 ~~Claims relating to time shall be made in accordance with applicable provisions of Article 15. 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 or~~ delay by ~~either party 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 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.~~

## ARTICLE 9 PAYMENTS AND COMPLETION

### § 9.1 CONTRACT SUM

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.

### § 9.2 SCHEDULE OF VALUES

~~Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, At the pre-construction meeting, the Contractor shall submit to the Architect, before the first Application for Payment, a schedule of values allocating the entire Contract Sum to the various portions of the Work and Owner and the Architect a detailed schedule of values allocated to various portions of the Work, prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.~~

### § 9.3 APPLICATIONS FOR PAYMENT

§ 9.3.1 At least ~~ten~~ twenty (20) days before the Owner's submission date ~~for the School Board's review and approval of such payment at the next School Board meeting or, if the Owner's School 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. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material 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 material 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 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. Contractor shall include the Contractor's waiver of lien for the full amount and partial subcontractor waivers of lien in the amounts of the previous payment request.

§ 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. 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, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

§ 9.3.4 The Contractor shall submit his application for payment as outlined in Section 9.3 on the first of the month, and the Owner will make payment accordingly promptly after receipt of the Architect's Certificate. 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. The Owner reserves the right to reduce retainage prior to substantial completion. Retainage shall not be reduced below 5% until all closeout documents as required in the Instruments of Service have been received and reviewed by the Architect.

§ 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. Each payment request shall include executed waivers of lien in conformity with information set forth on a properly completed Contractor's Affidavit. In the event that the Owner is satisfied with Contractor's payment procedures, the Owner may accept partial waivers of lien of Subcontractors and suppliers who were included in the immediate preceding payment. The Contractor shall submit waivers on a current basis, but the Owner may allow Subcontractors and suppliers to be not more than one payment late with their partial waivers.

§ 9.3.7 Upon giving ten (10) days notice in writing to the Contractor, the full contract retainage may be reinstated and the retention restored to the basis established in Section 9.3.4 if the manner of completion of the work and its progress do not remain satisfactory to the Owner, or if any surety of Contractor withholds its consent.

§ 9.3.8 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.

§ 9.3.9 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 issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part 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 comprising the Application for Payment, that, to the best of the Architect's knowledge, information and belief, the Work has progressed to the point indicated and that the quality of the Work is in accordance with the Contract Documents. 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. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. 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 material 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 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 the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.3 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 material or equipment suppliers 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 Architect will reflect such payment on the next Certificate for Payment.

§ 9.5.4 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 ~~and Owner~~ on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment 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 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, except as may otherwise be required by law.

~~§ 9.6.5 Contractor payments to material and equipment suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.~~

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors and 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, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

#### ~~§ 9.7 FAILURE OF PAYMENT~~

~~If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' written notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut down, delay and start up, plus interest as provided for in the Contract Documents.~~

#### § 9.8 SUBSTANTIAL COMPLETION

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. 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, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall 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 such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to such 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. The payment shall be sufficient to increase the total payments to 95 percent of the contract sum, less such amounts as the Architect shall determine for incomplete work and unsettled claims.

#### ~~§ 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 as required under Section 11.3.1.5 and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.~~

~~§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.~~

~~§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.~~

#### § 9.10 FINAL COMPLETION AND FINAL PAYMENT

§ 9.10.1 Upon receipt of the Contractor's written 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 and, 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 terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial 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 and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, 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. If such lien 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 such lien, including all costs and reasonable attorneys' fees.

~~§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.~~

~~§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from~~  
~~.1 — liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;~~  
~~.2 — failure of the Work to comply with the requirements of the Contract Documents; or~~  
~~.3 — terms of special warranties required by the Contract Documents.~~

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material 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

The Contractor is solely responsible for substantially completing the Work by the scheduled Substantial Completion Dates for each Phase of the Work. This responsibility includes all work including that of the Contractor's forces, 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 School District Community, 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 of Five Hundred Dollars (\$500) for each calendar day of delay per each School Campus, per Phase in Substantial Completion. Substantial Completion for this project refers to all scheduled work being a minimum 99% complete.

§ 9.11.2 Payments of Liquidated Damages are in addition to other 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.

### ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

#### § 10.1 SAFETY PRECAUTIONS AND PROGRAMS

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract.

#### § 10.2 SAFETY OF PERSONS AND PROPERTY

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to

- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; 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 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 owners and users of adjacent sites and utilities.

§ 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~~ 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, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

#### § 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.2.9 The Contractor, prior to commencing the work, shall submit to the Architect, in writing, a statement certifying that he is familiar with the Manual of Accident Prevention in Construction by the Associated General Contractors of America, current edition, and further that the Contractor will maintain at the project a copy of said publication and will strictly enforce the applicable requirements of same. Contractor will also state the name of the Contractor's Safety Engineer who will be responsible for enforcing all safety requirements.

§ 10.2.10 All Construction documents pertaining to this Work, and the joint and several phases of construction hereby contemplated, are to be governed, at all times, by applicable provisions of the Federal Law, including but not limited to the latest amendments of the following:

- .1 Williams Steiger Occupational Safety & Health Act of 1970 Public Law 91 596;
- .2 Part 1910 — Occupational Safety & Health Standards, Chapter XVII of Title 29, Code of Federal Regulations;
- .3 Part 1518 — Safety & Health Regulations for Construction, Chapter XIII of Title 29, Code of Federal Regulations.



### § 10.3 HAZARDOUS MATERIALS

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. 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 report the condition to the Owner and Architect in writing.

§ 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 written 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 such material or substance or who are to perform the task of removal or safe containment of such material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss or

~~expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss or expense is due to the fault or negligence of the party seeking indemnity.~~

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for materials or substances the Contractor brings to the ~~site unless such materials or substances are required by the Contract Documents.~~ site. The Owner shall be responsible for 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 indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

~~§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall indemnify the Contractor for all cost and expense thereby incurred.~~

#### § 10.4 EMERGENCIES

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

### ARTICLE 11 INSURANCE AND BONDS

#### § 11.1 CONTRACTOR'S LIABILITY INSURANCE

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- .1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be ~~performed;~~ performed including private entities performing work at the site and exempt from the coverage on account of number of employees or occupation, which entities shall maintain voluntary compensation coverage at the same limits specified for mandatory coverage for the duration of the project;
- .2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's ~~employees;~~ employees or persons or entities excluded by statute from the requirements of Section 11.1.1.1 but required by the contract documents to provide the insurance required by that Section;
- .3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- .4 Claims for damages insured by usual personal injury liability coverage;
- .5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- .6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor ~~vehicle;~~ vehicle and coverage should be written on a comprehensive automobile policy which will include coverage for owned, non-owned and hired motor vehicles;
- .7 Claims for bodily injury or property damage arising out of completed operations; and
- .8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.
- .9 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.
  - 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 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.
- .13 The General Liability coverages shall be provided by a commercial General Liability Policy on an occurrence basis.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from ~~the~~ date of commencement of the Work until ~~the date of final payment and termination of any coverage required to be maintained after final payment, and, with 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 ~~the~~ 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.

§ 11.1.2.1 The insurance required by Section 11.1.1 shall be written for not less than the following limits, or greater if required by law:

1. Workers' Compensation, Occupational Disease and Employer's Liability Insurance:
  - a. State: Statutory limits
  - b. Applicable Federal (e.g., Longshoremen's): Statutory limits
  - c. Employer's Liability
    - \$1,000,000 Per Accident
    - \$1,000,000 Disease, Policy Limit
    - \$1,000,000 Disease, Each Employee
- 2A. If written under Comprehensive General Liability Policy Form (including sub-lines specified in Section 11.1.1.9)
  - a. Bodily Injury:
    - \$1,000,000 Each Occurrence
    - \$2,000,000 Aggregate
  - b. Property Damage:
    - \$1,000,000 Each Occurrence
    - \$2,000,000 Aggregate
  - c. Bodily Injury and Property Damage combined:
    - \$1,000,000 Each Occurrence
    - \$2,000,000 Aggregate
  - d. Personal Injury:
    - \$1,000,000 Aggregate



- e. Products and Completed Operations to be maintained for one year after final payment:  
\$1,000,000 Aggregate
  - f. Property Damage Liability Insurance shall provide X, C and U coverages.
  - g. Broad Form Property Damage Coverage shall include Completed Operations.
- 2B. If written under Commercial General Liability Policy Form.
- a. \$2,000,000 General Aggregate
  - b. \$1,000,000 Products Completed Operations Aggregate
  - c. \$1,000,000 Personal and Advertising Injury
  - d. \$1,000,000 Each Occurrence
  - e. \$50,000 Fire Damage (any one fire)
  - f. \$5,000 Medical Expense (any one person)
3. Contractual Liability:
- a. Bodily Injury:  
\$1,000,000 each occurrence  
\$2,000,000 aggregate
  - b. Property Damage:  
\$1,000,000 each occurrence  
\$2,000,000 aggregate
4. Personal Injury, with Employment Exclusion deleted:
- a. \$1,000,000 aggregate
5. Business Automobile Liability (including owned, non-owned and hired vehicles):
- a. Automobile Liability:
    - i. Bodily injury:  
\$1,000,000 each person  
\$1,000,000 each occurrence
    - ii. Property Damage:  
\$1,000,000 Each Occurrence  
\$1,000,000 Combined Single Limit
6. Umbrella Excess Liability:  
\$2,000,000 Over Primary Insurance  
\$10,000 Retention for Self-Insured Hazards  
Each Occurrence

§ 11.1.3 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 by this Section 11.1 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 Section 11.1.2. 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.'

§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents 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 during the Contractor's completed operations.

§ 11.1.5 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.

§ 11.1.6 If the insurance is written on the Comprehensive General Liability policy form, the Certificates shall be AIA Document G705, Certificate of Insurance. If this insurance is written on a Commercial General Liability policy form, ACCORD form 25S will be acceptable. These certificates shall specifically state that the Owner, his representatives, and the Architect are protected by the Contractor's insurance against all liabilities as spelled out in Par. 3.18 of AIA Doc. A201, as modified hereinabove.

## **§ 11.2 OWNER'S LIABILITY INSURANCE**

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

§ 11.2.1. The Contractor shall purchase and maintain insurance covering the Owner's contingent liability for claims which may arise from operations under the contract and that will protect the Owner and the Architect and their 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.

§ 11.2.2 In any and all claims against the Owner or the Architect or any of their agents or employees by any employee of the 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 any subcontractor under Workmen's Compensation Acts, disability benefit acts or other employee benefit acts.

§ 11.2.3 The Contractor shall give the Owner the original policy and shall furnish the Architect memorandum copies of said policy. The Owner and Architect shall be the named insureds in this Protective Liability Policy. The Contractor shall protect the Owner and the Architect and their agents and employees from expenses, including attorney's fees, arising out of or resulting from the performance sickness, disease, or death, or injury to, or destruction of any tangible property (other than the Work itself) including the loss of use therefrom that is caused in whole or in part by any negligent act or omission of the Contractor, any subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, regardless of whether it is caused in whole or in part by a party to whom insurance is afforded pursuant to this Section.

## **§ 11.3 PROPERTY INSURANCE**

~~§ 11.3.1 Unless otherwise provided, the Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project. The Builder's Risk Insurance is required and shall be purchased and maintained by the Owner until Substantial Completion.~~

§ 11.3.1.1 Property insurance shall be on an "all risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss. The policy shall be a Completed Value All Risk Builder's Risk policy and shall cover all work (including that of all contractors) in the course of construction excluding temporary structures and materials used in the construction process stored on or within one hundred feet of the construction site and while awaiting installation. The policy shall be written in an amount equal to 100% of the total sum of all contracts. However, the policy is based on a \$5,000 deductible, applicable to all losses for each occurrence. Therefore,

the Contractor shall be solely responsible for any and all losses up to \$5,000. Losses are adjustable with and payable to the Owner for his own account.

§ 11.3.1.2 If the Owner does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Owner shall so inform the Contractor in writing prior to commencement of the Work. The Contractor may then effect insurance that will protect the interests of the Contractor, Subcontractors and Sub-subcontractors in the Work, and by appropriate Change Order the cost thereof shall be charged to the Owner. If the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain insurance as described above, without so notifying the Contractor in writing, then the Owner shall bear all reasonable costs properly attributable thereto. Coverage shall include, but not be limited to:

- A. All Risk of Direct Physical Loss, including Fire and Extended Coverage (Lightning, wind storm, hail, explosion, riot, civil commotion, aircraft, vehicle and smoke).
- B. Vandalism and Malicious Mischief.

§ 11.3.1.3 If the property insurance requires deductibles, the Owner shall pay costs not covered because of such deductibles. Coverage shall not extend to:

- A. The Contractors', Subcontractors', or the Architect's/Engineer's Tools, apparatus, machinery, scaffolding, hoists, forms, staging, shoring and other similar items commonly referred to as construction equipment, which may be on the site and the capital value of which is not included in the Work.
- B. Property owned by employees of any of the foregoing.
- C. Vehicles of any kind.
- D. Trees and shrubs.
- E. Drawings and specifications.

§ 11.3.1.4 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

§ 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance. The policy by its terms or endorsement shall specifically permit and allow for beneficial or partial occupancy prior to completion or acceptance of the project by the Owner.

§ 11.3.1.6 The prompt repair or reconstruction of the Work as a result of any insured loss or damage shall be the Contractor's responsibility and shall be accomplished at no additional cost to the Owner or Architect. The contractor shall furnish the proper assistance in the adjustment and settlement of any loss. Loss will be adjustable with and payable to the party purchasing the Builder's Risk Insurance who shall be responsible for apportioning the loss proceeds to each and every entity involved in the loss to the extent of his interest. The policy shall contain a provision that the policy will not be canceled, changed or altered until at least 30 calendar days prior written notice has been given to the named insured.

## **§ 11.3.2 BOILER AND MACHINERY INSURANCE**

The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

## **§ 11.3.3 LOSS OF USE INSURANCE**

The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner's property, including consequential losses due to fire or other hazards however caused.

§ 11.3.4 If the Contractor requests in writing that insurance for risks other than those described herein or other special causes of loss be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost thereof shall be charged to the Contractor by appropriate Change Order.

~~§ 11.3.5 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, the Owner shall waive all rights in accordance with the terms of Section 11.3.7 for damages caused by fire or other causes of loss covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.~~

~~§ 11.3.6 Before an exposure to loss may occur, the Owner shall file with the Contractor a copy of each policy that includes insurance coverages required by this Section 11.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least 30 days' prior written notice has been given to the Contractor.~~

#### ~~§ 11.3.7 WAIVERS OF SUBROGATION~~

~~The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.~~

§ 11.3.8 A loss insured under the Owner's property insurance 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 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

§ 11.3.9 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the Owner shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. reach. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

§ 11.3.10 The Owner as fiduciary shall have the power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Owner's exercise of this power; if such objection is made, the dispute shall be resolved in the manner selected by the Owner and Contractor as the method of binding dispute resolution in the Agreement. If the Owner and Contractor have selected arbitration as the method of binding dispute resolution, the Owner as fiduciary shall make settlement with insurers or, in the case of a dispute over distribution of insurance proceeds, in accordance with the directions of the arbitrators. insurers."

#### § 11.4 PERFORMANCE BOND AND PAYMENT BOND

§ 11.4.1 The ~~Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.~~ Contractor shall furnish a Performance Bond and

Labor and Material Payment Bond in the amount of one hundred percent (100%) of the Contract Sum. Owner requires that the bond surety must carry a BEST RATING of A and that the Owner has no objection to the bond surety.

§ 11.4.2 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. 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.

§ 11.4.3 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 Indiana and approved by the Owner.

§ 11.4.4 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.

§ 11.4.5 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.

§ 11.4.6 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.

§ 11.4.7 The Contractor must within ten (10) days after the execution of this Agreement furnish a Payment 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 Indiana, 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 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 Indiana. 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.

§ 11.4.8 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.

#### § 11.5 ADDITIONAL INSURANCE REQUIREMENTS

§ 11.5.1 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.

§ 11.5.2 The limits of liability as stated may be arrived at using a Split-Limit or a Combined Single Limit basis. However, the total limit of liability shall not be less than that stated in the requirements.



## 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, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

### § 12.2 CORRECTION OF WORK

#### § 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

#### § 12.2.2 ~~AFTER SUBSTANTIAL COMPLETION~~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 ~~Substantial~~ 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 an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly at the Contractor's sole expense after receipt of written 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 2.4.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after ~~Substantial-Final~~ Completion by the period of time between ~~Substantial-Final~~ Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 ~~The one year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2. In the case of any work performed in correcting defects pursuant to guarantees provided or referred to by this Article 12, the guarantee period shall begin anew from the date of the completion 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, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract ~~Documents~~ 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 place where the Project is located except that, if the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.~~ Laws of Indiana.

### § 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 such 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 such assignment.

### § 13.3 WRITTEN NOTICE

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

### § 13.4 RIGHTS AND REMEDIES

§ 13.4.1 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.

§ 13.4.2 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 there under, except as may be specifically agreed 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 or 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.

### § 13.5 TESTS AND INSPECTIONS

§ 13.5.1 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 (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.2 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 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, ~~except as provided in Section 13.5.3,~~ shall be at the ~~Owner's Contractor's~~ expense.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 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.

§ 13.5.4 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.

§ 13.5.5 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.

§ 13.5.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

#### § 13.6 INTEREST

~~Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located. Any references in this agreement to interest being assessed against the Owner are hereby deleted.~~

#### ~~§ 13.7 TIME LIMITS ON CLAIMS~~

~~The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time 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 13.7.~~

#### § 13.8 REGULATIONS

§ 13.8.1 The Contractor and/or Subcontractor warrant/s that s/he is familiar with and s/he shall comply with Federal, State and local laws, statutes, ordinances, rules and regulations, School 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, Contractor and subcontractor warrant that s/he 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 Contract. To the extent that there are any violations of any of the applicable laws, rules, regulations and/or court orders/decrees mentioned herein, 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 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.



§ 13.8.1.1 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.

§ 13.8.2 The Contractor and Subcontractors shall carefully examine the Occupational Safety and Health Act of 1970, published in May 1971, as issued by the Federal Register (OSHA), and the specific regulations governing procedures, techniques, safety precautions, equipment design, and the configuration of the same as required under this Act and the Contractor agrees as evidenced by his submission of a bid to comply with all terms of the Act and to perform and complete in a workmanlike manner all work required in full compliance with said Act. The Contractor is responsible to comply with OSHA and its regulations as amended in performing any work under the Contract Documents.

§ 13.8.3 The Contractor shall comply with all federal, state and local non-discrimination laws:

§ 13.8.3.2.1 Contractor 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.

§ 13.8.3.2.2 Contractor, 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.

§ 13.8.15 No Smoking. In accordance with the Owner's Policy, smoking is prohibited on all School Corporation property.

§ 13.8.16 Concurrent with the execution of this Contract, the Contractor has executed the Certificate of Eligibility.

§ 13.8.17 The Contractor understands and acknowledges that its work, in whole or in part, will be performed on public school property where there may be direct, daily contact with school students. The Contractor further understands and acknowledges that the State of Indiana requires that all employees of vendors, licensees, contractors or others having direct, daily contact with students are subject to a criminal background check and may not be listed on the State Sex Offender Registry. Prior to allowing any of its employees who will be performing the scope of work access to school property, the Contractor agrees to provide the Owner, at the sole cost of the Contractor with the following:

- (1) Evidence that each employee, agent, contractor or other person performing work on school property under this Agreement was subjected to a criminal background check in conformity with I.C. 20-26-5-10; that said persons are not listed on said Registry; and said persons have no criminal convictions for the offenses listed under I.C. 20-26-5-11(6);
- (2) The Contractor will provide the Owner, upon request, a copy of the criminal background check conducted on each such person.

In the event the Contractor plans to subcontract with or use the services of another person or firm that may have direct, daily contact with students on school property, in order to fulfill its obligations under its Agreement with the Owner then in that event the Contractor will require all such persons or firms to comply with the provisions of this paragraph and I.C. 20-26-5-10.

In the event the Contractor fails to comply with the provisions of this paragraph and I.C. 20-26-5-10, and as a result a suit or claim is instituted by a student for harm caused by an employee of the Contractor, or caused by an employee of a subcontractor to the Contractor, then in that event the Contractor agrees to fully defend and indemnify, including reimbursement of attorney's fees and costs, the Owner against any such claims.

## ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

## ~~§ 14.1 TERMINATION BY THE CONTRACTOR~~

~~§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:~~

- ~~.1 — Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;~~
- ~~.2 — An act of government, such as a declaration of national emergency that requires all Work to be stopped;~~
- ~~.3 — Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or~~
- ~~.4 — The Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by Section 2.2.1.~~

~~§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in Section 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365 day period, whichever is less.~~

~~§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.~~

~~§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.~~

## ~~§ 14.2 TERMINATION BY THE OWNER FOR CAUSE~~

~~§ 14.2.1 The Owner may terminate the Contract if the Contractor~~

- ~~.1 — repeatedly refuses or fails to supply enough properly skilled workers or proper materials;~~
- ~~.2 — fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;~~
- ~~.3 — repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or~~
- ~~.4 — otherwise is guilty of substantial breach of a provision of the Contract Documents.~~

~~§ 14.2.1 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 above reasons exist, the Owner, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, 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' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2 Accept assignment of subcontracts pursuant to Section 5.4; and
- .3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds ~~costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the 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. The amount~~ 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 subcontractors, any additional interest or fees which the Owner must pay by reason of a delay in 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 or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, 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 as described in 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 written 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 Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

### 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, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim.

##### § 15.1.2 NOTICE OF CLAIMS

Claims by either the Owner or Contractor must be initiated by written 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 must 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 CONTINUING CONTRACT PERFORMANCE

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. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Initial Decision Maker.

##### § 15.1.4 CLAIMS FOR ADDITIONAL COST

If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

##### § 15.1.5 CLAIMS FOR ADDITIONAL TIME

§ 15.1.5.1 If the Contractor wishes to make a Claim-claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim-given within seven (7) calendar days after the event giving rise to the claim. The Contractor's claim shall include an estimate of cost and of probable effect of the delay on the progress of the Work. In the case of a continuing delay, only one Claim-delay only one claim is necessary.

§ 15.1.5.2 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 CLAIMS FOR CONSEQUENTIAL DAMAGES

The Contractor ~~and Owner waive Claims against each other~~ waives Claims against the Owner and Architect for consequential damages arising out of or relating to this Contract. This ~~mutual~~-waiver includes

- ~~1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and~~
- ~~2~~ damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This ~~mutual~~-waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

#### § 15.2 INITIAL DECISION

§ 15.2.1 Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. ~~Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered.~~ Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. ~~The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.~~

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of such request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the ~~parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution parties, subject to litigation.~~

~~§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.~~

~~§ 15.2.6.1 Either party may, within 30 days from the date of an initial decision, demand in writing that the other party file for mediation within 60 days of the initial decision. If such a demand is made and the party receiving the demand~~



~~fails to file for mediation within the time required, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.~~

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

### ~~§ 15.3 MEDIATION~~

~~§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.6 shall be subject to mediation as a condition precedent to binding dispute resolution.~~

~~§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.~~

~~§ 15.3.3 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.~~

### ~~§ 15.4 ARBITRATION~~

~~§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.~~

~~§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.~~

~~§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.~~

~~§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement shall be specifically enforceable under applicable law in any court having jurisdiction thereof.~~

### ~~§ 15.4.4 CONSOLIDATION OR JOINDER~~

~~§ 15.4.4.1 Either party, at its sole discretion, may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).~~

~~§ 15.4.4.2 Either party, at its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.~~

#### 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 in this project.

~~§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as the Owner and Contractor under this Agreement.~~





RESPONSIBLE BIDDER FORM

## Duneland School Corporation

### Responsible Bidding Practices Submission Form

*\*Refer to the Duneland School Corporation "Policy to establish Responsible Bidding Practices"*

**Project:** Duneland School Corporation – 2017 Pool Renovations at Chesterton Middle School.

**Bid Opening Date:** March 23, 2017.

**Name of Contractor:**

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**Address:**

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**Telephone:**

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**Name of Primary Contact:**

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**Category of Work:**

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*Contractors proposing to submit bids on any Duneland School Corporation ("School") project estimated to be at least one hundred fifty thousand dollars (\$150,000) or more must, prior to the opening of bids, submit a statement made under oath and subject to perjury laws, the following:*

1. Attach to this Form a Certificate of Good Standing from the Indiana Secretary of State dated within the last 60 days. (This requirement shall not apply if the bidder is an individual, sole proprietor or partnership.)
2. List all names previously used by the bidder within the last five (5) years:  

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3. Within the last five (5) years, has the bidder been determined by a court or governmental agency to be in violation of any federal, state, or local laws, including violations of contracting or anti-trust laws, tax or licensing laws, the Occupational Safety and Health Act (OSHA) violations, federal Davis-Bacon Act violations or violations of the Indiana Common Construction Wage Act? If so, identify the date of the violation and identify the court or agency issuing the determination.  

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**SECTION 00820**

**RESPONSIBLE BIDDER FORM**

4. State whether the bidder intends to employ its own employees or whether the bidder intends to utilize subcontractors to be utilized by the bidder for the project. If the bidder intends to use subcontractors for the project, identify all subcontractors the bidder intends to utilize.

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5. Provide evidence of the bidder's participation in apprenticeship and training programs applicable to the work to be performed on the project which are approved by and registered with the United States Department of Labor's Office of Apprenticeship or any similar organization. Include copies of all applicable certificates or standards for such training programs.

6. Provide a copy of the bidder's workplace drug-testing policy that covers all employees of the bidder and meets or exceeds the requirements of Indiana Code 4-13-18.

7. Identify, by name and description of experience, each of the bidder's project managers and superintendents that bidder intends to assign to work on the project.

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8. If applicable, identify all professional or trade licenses required by law to be held, for any trade or specialty area for which the bidder seeks a contract award.

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9. If applicable, state whether any professional or trade license held by the bidder, or any directors, officer, or manager employed by the bidder, has been suspended or revoked within the last five (5) years.

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10. Provide evidence that the surety company utilized by the bidder is on the United States Department of Treasury's Listing of Approved Securities.

11. Identify any federal, state, or local tax liens or delinquencies owed by the bidder to any federal, state, or local taxing body within the last five (5) years.

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**SECTION 00820**

**RESPONSIBLE BIDDER FORM**

**VERIFICATION**

I swear or affirm, under the penalties for perjury, that the foregoing information is true and that I am duly authorized by the bidder to make the representations herein. I understand and acknowledge that any material changes to the bidder's status or as to any of the information provided on this Form must be reported to the School Corporation within ten (10) days from the date of the occurrence or the change of status and that the School Corporation reserves the right to request additional information and verification of any of the information submitted pursuant to this Form.

Bidder: \_\_\_\_\_

By: \_\_\_\_\_

Its: \_\_\_\_\_

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

**A Policy to Establish Responsible Bidding Practices and  
Submission Requirements for Submitting Bids to Perform Construction Work**

WHEREAS, the Duneland School Corporation is required by law to award capital improvement contracts to the "lowest responsive and responsible" bidder; and,

WHEREAS, the Duneland School Corporation, based upon its experience, has determined that quality workmanship, efficient operation, safety, and timely completion of projects requires all bidders meet certain minimum requirements in order to be a "responsive and responsible" bidder; and,

WHEREAS, applicable state law also requires that bidders meet certain minimum requirements in order to be a "responsive and responsible" bidder; and,

WHEREAS, the Duneland School Corporation seeks to enhance its ability to identify "responsive and responsible" bidders on all School construction projects by institution of more comprehensive submission requirements which are in compliance with Indiana State law; and,

WHEREAS, the "Responsible Bidding Practices and Submission Requirements" policy will preserve administrative resources by insuring that only qualified contractors and subcontractors are awarded contracts on public works construction projects; and,

WHEREAS, the "Responsible Bidding Practices and Submission Requirements" policy will assure efficient use of taxpayer dollars, will promote public safety and is in the public interest.

THEREFORE, this Policy, which is entitled "Responsible Bidding Practices and Submission Requirements for Submitting Bids to Perform Construction Work," is hereby adopted and reads as follows:

**I. Bid Submission Requirements**

Contractors proposing to submit bids on any Duneland School Corporation ("School") project estimated to be at least one-hundred fifty thousand dollars (\$150,000.00) or more must, prior to the opening of bids, submit a statement made under oath and subject to perjury laws, on a form designated by the School and must include:

- (A) A copy of a print-out of the Indiana Secretary of State's on-line records for the bidder dated within sixty (60) days of the submission of said document showing that the bidder is in existence, current with the Indiana Secretary of State's Business Entity Reports, and eligible for a certificate of good standing. If the bidder is an individual, sole proprietor or partnership, this subsection shall not apply;
- (B) A list identifying all previous names used by the bidder;
- (C) A list of all determinations by a court or governmental agency for violations of federal, state, or local laws including, but not limited to violations of contracting or antitrust laws, tax or licensing laws, environmental laws, the Occupational Safety and Health Act (OSHA), or federal Davis-Bacon and related Acts;

- (D) A statement on staffing capabilities, including labor sources;
- (E) Evidence of participation in apprenticeship and training programs, applicable to the work to be performed on the project, which are approved by and registered with the United States Department of Labor's Office of Apprenticeship, or its successor organization. The required evidence includes a copy of all applicable apprenticeship certificates or standards for these training programs;
- (F) A copy of a written plan for employee drug testing that: (i) covers all employees of the bidder who will perform work on the public work project; and (ii) meets, or exceeds, the requirements set forth in IC 4-13-18-5 or IC 4-13-18-6;
- (G) The name and description of the management experience of each of the bidder's project managers and superintendents that bidder intends to assign to work on the project;
- (H) Proof of any professional or trade license required by law for any trade or specialty area in which bidder is seeking a contract award; and disclosure of any suspension or revocation within the previous five years of any professional or trade license held by the company, or of any director, office or manager employed by the bidder;
- (I) Evidence that the contractor is utilizing a surety company which is on the United States Department of Treasury's Listing of Approved Sureties; and
- (J) A written statement of any federal, state or local tax liens or tax delinquencies owed by the bidder to any federal, state or local taxing body in the last five years.

The School reserves the right to demand supplemental information from the bidder, (additional) verification of any of the information provided by the bidder, and may also conduct random inquiries of the bidder's current and prior customers.

## **II. Post-Bid Submissions from Subcontractors**

All bidders shall provide a written list that discloses the name, address, and type of work for each first-tier subcontractor from whom the bidder has accepted a bid and/or intends to directly contract with or hire on any part of the public work project, including individuals performing work as independent contractors, within five (5) business days after the date the bids are due.

In addition, each such subcontractor contracting directly with the bidder shall be required to adhere to the requirements of Section I of this Ordinance as though it were bidding directly to the School, except that such subcontractors shall submit the required information (including the name, address, and type of work for each of their subcontractors) to the successful bidder no later than five (5) business days after the subcontractor's first day of work on the public work project and the bidder shall then forward said information to the School. Payment shall be withheld from any subcontractor contracting directly with the bidder who fails to timely submit said information until such information is submitted and approved by the School.

Upon request, the School may require any subcontractors to provide the required information (including name, address, type of work on the project and the name of the subcontractor with whom the subcontractor has a direct contract). Payments shall be withheld from any

subcontractor who fails to timely submit this information until this information is submitted and approved by the School. Additionally, the School may require the successful bidder and relevant subcontractor to remove the nonresponsive or non-responsible subcontractor from the project and replace it with a responsive and responsible subcontractor.

Failure of a subcontractor to submit the required information shall not disqualify the successful bidder from performing work on the project and shall not constitute a contractual default and/or breach by the successful bidder. However, the School may withhold all payments otherwise due for work performed by a subcontractor, until the subcontractor submits the required information and the School approves such information. The School may also require that successful bidder to remove the subcontractor from the project and replace it with a responsive and responsible subcontractor.

The disclosure of a subcontractor ("Disclosed Subcontractor") by a bidder or a subcontractor shall not create any rights in the Disclosed Subcontractor. Thus, a bidder and/or subcontractor may substitute another subcontractor ("Substitute Subcontractor") for a Disclosed Subcontractor by giving the School written notice of the name, address, and type of work of the Substitute Subcontractor. The Substitute Subcontractor is subject to all of the obligations of a subcontractor under this Ordinance.

### **III. Validity of Pre-Qualification Classification**

Upon designation by the School that a contractor's or subcontractor's submission in anticipation of a bid is complete and timely, and upon any further consideration deemed necessary by the School, the contractor or subcontractor may be pre-qualified for future School public works projects. A contractor's classification as "qualified" shall exempt the contractor or sub-contractor from the comprehensive submission requirements contained herein for a period of twelve (12) months. Thereafter, contractors or subcontractors who are pre-qualified must submit a complete application for continuation of "pre-qualified" standing, on a form provided by the School, (also referred to as the "short form") by December 31<sup>st</sup> for the upcoming calendar year. Failure by any pre-qualified contractor or subcontractor to timely submit its complete application for continuation of "pre-qualified" standing shall result in automatic removal of the designation, effective January 1 of the upcoming year. However, the "removed" contractor or subcontractor shall still be permitted to bid on School public works projects.

Any material changes to the contractor's status, at any time, must be reported in writing within ten (10) days of its occurrence to the School. The pre-qualification designation is solely within the discretion of the School and the School specifically reserves the right to change or revoke the designation for a stated written reason(s).

Denial of pre-qualification shall be in writing and shall be forwarded to the contractor within seven (7) working days of such decision. Any contractor denied or losing pre-qualification status may request reconsideration of the decision by submitting such request in writing to the School within five (5) business days of receipt of notice of denial.

### **IV. Incomplete Submissions by Bidders**

It is the sole responsibility of the potential bidder to comply with all submission requirements applicable to the bidder in section I above by no later than the public bid opening. Post-bid



submissions must be submitted in accordance with section II above. Submissions deemed inadequate, incomplete, or untimely by the School may result in the automatic disqualification of the bid.

**V. Responsive and Responsible Bidder Determination**

The School, after review of complete and timely submissions, shall, in its sole discretion, after taking into account all information in the submission requirements, determine whether a bidder is responsive and responsible. The School specifically reserves the right to utilize all information provided in the contractor or subcontractor's submission or any information obtained by the School through its own independent verification of the information provided by the contractor.

**VI. Certified Payroll**

For projects in which the cost is at least \$150,000, the successful bidder and all subcontractors working on a public work project shall submit a certified payroll report utilizing the federal form now known as a WH-347 which must be prepared on a weekly basis and submitted to the School within ten (10) calendar days after the end of each week in which the bidder or subcontractor performed its work on the public work project. These certified payroll reports shall identify the job title and craft of each employee on the project, e.g. journeyman electrician or apprentice electrician.

The School may withhold payment due for work performed by a bidder if the bidder fails to timely submit its certified payroll reports until such time as such certified payroll reports are submitted. The School may also withhold payment due for work performed by a subcontractor if the subcontractor fails to timely submit its certified payroll reports until such time as such certified payroll reports are submitted. The School shall not withhold payment to a bidder for work performed by the bidder or for work performed by subcontractors who have submitted their certified payroll reports, because one or more other subcontractors failed to timely submit their certified payroll reports.

**VII. Public Records**

All information submitted by a bidder or a subcontractor pursuant to this Policy, including certified payrolls, are public records subject to review pursuant to the Indiana Access to Public Records law (IC 5-14-3).

**VIII. Penalties for False, Deceptive, or Fraudulent Statements/Information**

Any bidder that willfully makes, or willfully causes to be made, a false, deceptive or fraudulent statement, or willfully submits false, deceptive or fraudulent information in connection with any submission made to the School shall be disqualified from bidding on all School projects for a period of three years.

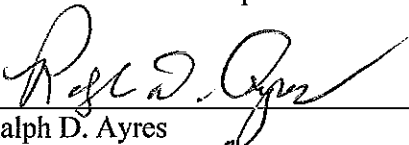
**IX. Conflicting Policies**

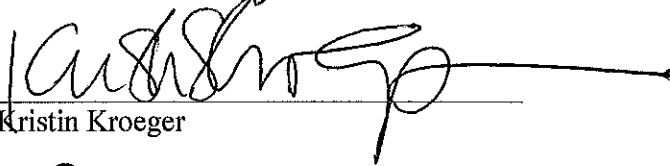
Any Policy or provision of any Policy in conflict with the provisions of this Policy is hereby repealed.

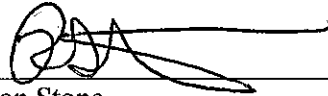
**X. Severability**

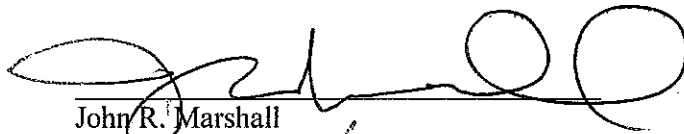
If any provision of this Policy is found to be invalid, the remaining provisions of this Policy shall not be affected by such a determination. These other provisions of this Policy shall remain in full force and effect without the invalid provision.

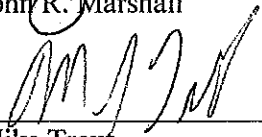
This Policy, which is entitled "Responsible Bidding Practices and Submission Requirements for Submitting Bids to Perform Construction Work," is hereby adopted by the Duneland School Corporation on the 12<sup>th</sup> day of January 2016.

  
\_\_\_\_\_  
Ralph D. Ayres

  
\_\_\_\_\_  
Kristin Kroeger

  
\_\_\_\_\_  
Ron Stone

  
\_\_\_\_\_  
John R. Marshall

  
\_\_\_\_\_  
Mike Trout

## SECTION 01100

### SUMMARY

#### PART 1 – GENERAL

##### 1.1 PROJECT

- A. Project Name: 2017 Pool Renovations at Chesterton Middle School.
- B. Owner's Name: Duneland School Corporation.
- C. The Project includes, but is not limited to: new acoustical ceilings, painting, mechanical renovation work with associated electrical, masonry and steel work, and new lighting in the existing school natatorium area. The new LED light fixtures will be furnished by the Owner, and installed by the Contractor.

##### 1.2 CONTRACT DESCRIPTION

- A. Work covered by Contract Documents: As defined in the Contract Documents.
- 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. Owner shall purchase and maintain Builder's Risk Insurance in accord with the General Conditions.
    - b. The Owner's insurance will be subject to a deductible of \$5,000.00 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 Architect will submit for the State of Indiana Design Release (ACDR) permit, and the Owner will pay the permit costs.
- C. The contractor shall be responsible for, and submit, for the local municipality main building permit, and the Owner will pay the permit costs.
- D. The contractor shall be responsible for paying and securing all other permits, governmental fees and licenses necessary for the proper execution and completion of the Project.
- E. 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.
- F. The contractor shall coordinate, and have completed, all inspections required by public authorities relating to the performance of the work under the Contract Documents.
- G. The contractor 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

## SECTION 01100

### SUMMARY

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 unfit person of those not skilled in the assigned task
- H. 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. The date of Substantial Completion shall be no later than August 9, 2017, 5:00 p.m. Note: Substantial Completion for this project refers to all scheduled work being a minimum 99% complete.
- B. The date of Final Completion shall be no later than September 29, 2017, 5:00 p.m. Note: Final Completion for this project refers to all scheduled work, punch list and closeout items being 100% complete.
- C. 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.
- D. 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. Beginning on May 26, 2017: all work will be restricted between 3:00 p.m. and 11:00 p.m. with the following exceptions (dates listed below are based on the current school calendar and are subject to change):
    - a. Exception - Summer Break 2017: No time restrictions between June 5, 2017 and August 6, 2017.
  2. Beginning on August 7, 2017: all work will be restricted between 3:00 p.m. and 11:00 p.m. with no exceptions.

#### 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.

## SECTION 01100

### SUMMARY

#### 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:
- M. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
- N. Arrange use of site and premises to allow:
  - 1. Work by Owner's mechanical test, and balance contractor. The renovated mechanical system shall be tested, and balanced by Others.

#### 1.8 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.

#### PART 2 – PRODUCTS – NOT USED

#### PART 3 – EXECUTION – NOT USED

END OF SECTION



## SECTION 01200

### 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 01210 - Allowances: Payment procedures relating to allowances.
- B. Section 01780 - 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 in duplicate within 15 days after of the Letter of Intent.
- 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. Revise schedule to list approved Change Orders, with each Application For Payment.
- F. Support values given with data to substantiate their correctness.
- G. Submit quantities of designated materials.
- H. List quantities of materials specified under unit prices.
- I. Include in the line items a total amount of Contractor's overhead and profit.
- J. Payment for materials stored on or off site will be limited to those materials listed separately in Schedule of Values.
- K. 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.
- L. 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.

## SECTION 01200

### PRICE AND PAYMENT PROCEDURES

6. Make sum of total costs of all items listed in Schedule equal to total contract sum.
- M. Review and Resubmittal
  1. After review by Architect, revise and resubmit Schedule as directed by Architect.
  2. Follow original submittal procedure.
- N. 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 pencil copy has been approved by Architect, send three 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 01300.
  2. Construction progress schedule, revised and current as specified in Section 01300.
  3. Current construction photographs specified in Section 01300.
  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



## SECTION 01200

### PRICE AND PAYMENT PROCEDURES

number and date, and line item by number and description.

#### 1.5 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%, 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% 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

## SECTION 01200

### PRICE AND PAYMENT PROCEDURES

- 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.

#### 1.6 APPLICATION FOR FINAL PAYMENT

- A. Submit all closeout documents and comply with all requirements as put forth in Section 01780 - Closeout Submittals.
- B. Once closeout submittal have been approved by Architect, prepare 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 01780.

**SECTION 01200**

**PRICE AND PAYMENT PROCEDURES**

**PART 2 – PRODUCTS – NOT USED**

**PART 3 – EXECUTION – NOT USED**

**END OF SECTION**



## **SECTION 01210**

### **ALLOWANCES**

#### **PART 1 – GENERAL**

##### **1.1 SECTION INCLUDES**

- A. Cash allowances.
- B. Payment and modification procedures relating to allowances.

##### **1.2 RELATED SECTIONS**

- A. Section 01200 - 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. Use the contingency allowance only as directed by Architect for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.
- B. Contractor's overhead, profit, and related costs for products and equipment ordered by Owner under the contingency allowance are included in the allowance and are not part of the Contract Sum. These costs include delivery, installation, taxes, insurance, equipment rental, and similar costs.
- C. Authorized use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit margins. Refer to Section 01200 for not to exceed amounts for Contractor's overhead and profit.

## **SECTION 01210**

### **ALLOWANCES**

#### **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: Cash Allowance: Include a contingency allowance of \$8,000.00 for use according to Owner's instructions.

**END OF SECTION**

## SECTION 01230

### 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 00100 – 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 (90) 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: Paint Existing Pool Walls

State the amount to be ADDED to the lump sum base bid if all walls in Pool C-127 are painted.  
Note the following:

- 1. Painting of any new CMU, including but not limited to any existing wall patching, shall be included in the Base Bid.
- 2. The existing glazed block portions of the wall, and glazed block wall base, shall Not be painted.

###### Alternate No. 2: Concrete Duct Sealing

State the amount to be ADDED to the lump sum base bid if the existing underground concrete duct is sealed using Carlisle HVAC Products, Hardcast RS-100 (or Architect Approved Equal), water based spray sealant, [www.carlislehvac.com](http://www.carlislehvac.com) .

Note the following:

- 1. Cleaning the inside of the ductwork of all debris shall be included in the Base Bid.

#### PART 2 – PRODUCTS – NOT USED

#### PART 3 – EXECUTION – NOT USED

END OF SECTION





## SECTION 01300

### 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 00700 - General Conditions: Dates for applications for payment.
- B. Section 01100 - Summary: Stages of the Work, Work covered by each contract, occupancy,.
- C. Section 01200 - Price and Payment Procedures:
- D. Section 01325 - Construction Progress Schedule: Form, content, and administration of schedules.
- E. Section 01700 - Execution Requirements: Additional coordination requirements.
- F. Section 01780 - 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.

## SECTION 01300

### ADMINISTRATIVE REQUIREMENTS

3. At completion of Project, assemble record documents from all subcontractors and deliver to the Architect in accordance with Section 01780.
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 01780.
- Q. Contractor to turn over to Architect for approval all items for closeout as put forth in Section 01780.

## 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, and further that the Contractor will maintain at the project a copy of said publication and will strictly enforce the applicable requirements of same.

## SECTION 01300

### ADMINISTRATIVE REQUIREMENTS

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 SITE MOBILIZATION MEETING

- A. Contractor will schedule a meeting at the Project site prior to Contractor occupancy.
- B. Attendance Required:
  1. Contractor.
  2. Owner.
  3. Architect.
  4. Special Consultants.
  5. Contractor's Superintendent.
  6. Major Subcontractors.
  7. Safety Representative.
- C. Agenda:
  1. Use of premises by Owner and Contractor.
  2. Owner's requirements and occupancy prior to completion.
  3. Construction facilities and controls provided by Owner.
  4. Temporary utilities provided by Owner.
  5. Survey and building layout.
  6. Security and housekeeping procedures.
  7. Schedules.
  8. Application for payment procedures.
  9. Procedures for testing.
  10. Procedures for maintaining record documents.
  11. Requirements for start-up of equipment.
  12. Inspection and acceptance of equipment put into service during construction period.
  13. Establish safety and first aid procedures.
  14. Procedures and reviews of mock-up panels.
- D. Contractor will record minutes and distribute copies within five (5) days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

## **SECTION 01300**

### **ADMINISTRATIVE REQUIREMENTS**

#### **3.3 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.

#### **3.4 CONSTRUCTION PROGRESS SCHEDULE - See Section 01325**

#### **3.5 PROGRESS PHOTOGRAPHS**

- A. Provide photographs of site and construction throughout progress of Work.
- B. Take photographs as evidence of existing project conditions.

#### **3.6 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.

#### **3.7 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 01780 - CLOSEOUT SUBMITTALS.

## SECTION 01300

### ADMINISTRATIVE REQUIREMENTS

#### 3.8 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.

#### 3.9 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.

#### 3.10 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.

#### 3.11 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

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### ADMINISTRATIVE REQUIREMENTS

documents, are not acceptable and will be returned, without review, to the contractor, for resubmittal.

- J. All shop drawings which are poorly prepared or hand written 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. Selected sheets will cost \$250.00 for all sheets within a single discipline.
  - 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 01700 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

## SECTION 01300

### ADMINISTRATIVE REQUIREMENTS

- 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.

## **SECTION 01300**

### **ADMINISTRATIVE REQUIREMENTS**

- 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 01325**

### **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 01100 - 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 01300.

##### **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.

## SECTION 01325

### CONSTRUCTION PROGRESS SCHEDULE

#### 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 01100.
- 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 01200.
- 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.

## **SECTION 01325**

### **CONSTRUCTION PROGRESS SCHEDULE**

#### **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 01400

### 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. Manufacturers' field services.

##### 1.2 RELATED SECTIONS

- A. Section 01210 - Allowances: Allowance for payment of testing services.
- B. Section 01300 - Administrative Requirements: Submittal procedures.
- C. Section 01600 - 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

## **SECTION 01400**

### **QUALITY REQUIREMENTS**

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 01425**

#### **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 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.

## **SECTION 01400**

### **QUALITY REQUIREMENTS**

- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturer's written instructions.

#### **3.5 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 01425**

### **REFERENCE STANDARDS**

#### **PART 1 – GENERAL**

##### **1.1 SECTION INCLUDES**

- A. Requirements relating to referenced standards.
- B. Reference standards full title and edition date.

##### **1.2 RELATED SECTIONS**

- A. Document 00700 - General Conditions: Reference standards.

##### **1.3 QUALITY ASSURANCE**

- A. For products or workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard of date of issue specified in this section, except where a specific date is established by applicable code.
- C. Obtain copies of standards when required by the Contract Documents.
- D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.
- E. Should specified reference standards conflict with Contract Documents, request clarification from the Architect before proceeding.
- F. Neither the contractual relationships, duties or responsibilities of the parties in Contract nor those of the Architect shall be altered by the Contract Documents by mention or inference otherwise in any reference document.

#### **PART 2 – CONSTRUCTION INDUSTRY ORGANIZATION DOCUMENTS**

##### **2.1 AA – ALUMINUM ASSOCIATION, INC.**

- A. AA ADM-1 - Aluminum Design Manual; 2000.
- B. AA DAF-45 - Designation System for Aluminum Finishes; 2003.
- C. AA SAAA-46 - Standards for Anodized Architectural Aluminum; 1978.
- D. AA BDAS-516161 - Behavior and Design of Aluminum Structures; 1992.

##### **2.2 AABC -- ASSOCIATED AIR BALANCE COUNCIL**

- A. AABC MN-1 - AABC National Standards for Total System Balance; 2002.

##### **2.3 AAMA -- AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION**

- A. AAMA/NWWDA 101/I.S.2 - Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors; 1997 with revisions contained in "reprinting" of 12/99.
- B. AAMA 303 - Voluntary Specification for Poly (Vinyl Chloride) (PVC) Exterior Profile Extrusions; 2000.
- C. AAMA 501 - Methods of Test for Exterior Walls; 1994.
- D. AAMA 501.1 - Standard Test Method for Exterior Windows, Curtain Walls and Doors for Water Penetration Using Dynamic Pressure; 1994 (part of AAMA 501).
- E. AAMA 501.2 - Field Check of Metal Storefronts, Curtain Walls, and Sloped Glazing Systems for Water Leakage; 1994 (part of AAMA 501).
- F. AAMA 501.3 - Field Check of Water Penetration Through Installed Exterior Windows, Curtain Walls, and Doors by Uniform Air Pressure Difference (part of AAMA 501); 1994.
- G. AAMA 603.8 - Voluntary Performance Requirements and Test Procedures for Pigmented Organic Coatings on Extruded Aluminum; 1998.
- H. AAMA 605.2 - Voluntary Specification for High Performance Organic Coatings on Architectural Aluminum Extrusions and Panels; 1998.
- I. AAMA 606.1 - Voluntary Guide Specifications and Inspection Methods for Integral Color Anodic Finishes for Architectural Aluminum; 1976.
- J. AAMA 607.1 - Voluntary Guide Specification and Inspection Methods for Clear Anodic Finishes

## **SECTION 01425**

### **REFERENCE STANDARDS**

For Architectural Aluminum; 1977.

- K. AAMA 608.1 - Voluntary Guide Specification and Inspection Methods for Electrolytically Deposited Color Anodic Finishes for Architectural Aluminum; 1977.
- L. AAMA 609 - Voluntary Guide Specification for Cleaning and Maintenance of Architectural Anodized Aluminum; 2002.
- M. AAMA 610.1 - Voluntary Guide Specification for Cleaning and Maintenance of Painted Aluminum Extrusions and Curtain Wall Panels; 1979.
- N. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 1998.
- O. AAMA 701/702 - Combined Voluntary Specifications for Pile Weatherstrip and Replaceable Fenestration Weatherseals; 2000.
- P. AAMA 800 - Voluntary Specifications and Test Methods for Sealants; 1992, Addendums 1994, 2000.
- Q. AAMA 802.3 - Compound (Part of AAMA 800); 1992.
- R. AAMA 803.3 - Voluntary Specifications and Test Methods for Narrow Joint Seam Sealer (Part of AAMA 800); 1992.
- S. AAMA 804.3 - Sealants: Back Bedding Mastic Type Glazing Tapes (Part of AAMA 800); 1992.
- T. AAMA 806.3 - Tape (Part of AAMA 800); 1992.
- U. AAMA 807.3 - Glazing Tape (Part of AAMA 800); 1992.
- V. AAMA 809.2 - Sealants: Non-Drying Sealant (Part of AAMA 800); 1992.

### **PART 3 – EXECUTION – NOT USED**

**END OF SECTION**

## SECTION 01500

### TEMPORARY FACILITIES AND CONTROLS

#### PART 1 – GENERAL

##### 1.1 SECTION INCLUDES

- A. Temporary sanitary facilities.
- B. Temporary Controls: Barriers, enclosures, and fencing.
- C. Waste removal facilities and services.

##### 1.2 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.
- B. Provide and maintain a temporary toilet for all workers on the project, in an enclosed, roofed structure housing adequate plumbing fixtures.
- C. Portable toilets shall be serviced twice weekly, including emptying tanks, recharging with a germicidal and deodorizing solution and scrubbing entire interior with germicidal solution.
- D. As soon as plumbing is installed in building, temporary fixtures may be provided for all workers and portable toilet facilities may be removed from the site.
- E. Use of existing facilities is permitted at the Owner's discretion.
- F. Maintain daily in clean and sanitary condition.
- G. At end of construction, return facilities to same or better condition as originally found.

##### 1.3 TEMPORARY ENVIRONMENTAL CONTROLS

- A. Provide controls over environmental conditions at the construction site and related areas under the Contractor's control.
- B. Equip internal combustion engines on compressors with mufflers to reduce noise to a minimum. Do not operate in enclosed areas without adequate ventilation.
- C. Do not use power actuated tools except where specified in individual specifications.
- D. Provide dust control materials to minimize dust from construction operations. Prevent air-borne dust from dispersing into the atmosphere.

##### 1.4 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.
- C. Provide protection for plants designated to remain. Replace damaged plants.
- D. Provide temporary barriers 4 foot high around each, or around each group of trees and plants at drip line.
- E. Carefully supervise excavating, grading, and filling and subsequent construction operations, to prevent damage.
- F. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.
- G. Materials may be new or used, suitable for purpose. Materials at Contractor's options, appropriate for purpose. Do not violate code requirements.

##### 1.5 CONSTRUCTION AIDS

- A. Provide and maintain all miscellaneous temporary facilities such as ladders, ramps, scaffolds, hoists, railings, chutes, barricades, enclosures, platforms, walks, etc., as required for the proper execution of the Work.
- B. Materials may be new or used, suitable for purpose. Comply with specified codes and standards.
- C. Consult with Owner's representative, review site conditions and factors which affect construction procedures and construction aids, including adjacent properties and public facilities which may be affected by execution of the work.
- D. Installation:
  - 1. Comply with respective Project Manual Specifications Sections.
  - 2. Relocate construction aids as construction progresses to expedite storage or work requirements and to accommodate legitimate requirements of Owners and other contractors

## **SECTION 01500**

### **TEMPORARY FACILITIES AND CONTROLS**

at the site.

#### **1.6 WASTE REMOVAL**

- A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition. Do not burn or bury rubbish on project site.
- B. Provide additional collections and disposal of debris whenever regular schedule is inadequate to prevent accumulation.
- C. Provide containers with lids. Remove trash from site periodically.
- D. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.
- E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.
- F. Prevent contamination of soil, water or atmosphere by the discharge of noxious substances from construction operations.
- G. Provide equipment and personnel; perform emergency measures to contain all spillages, and to remove contaminated soils or liquids.
- H. Take special measures to prevent harmful substances from entering public waters. Prevent disposal of wastes, effluents, chemicals, or other such substances adjacent to streams, or in sanitary or storm sewer.
- I. Provide systems for control of atmospheric pollutants.
- J. Cleaning
  - 1. Maintain areas under Contractor's control free of waste materials, debris and rubbish.
  - 2. Remove debris and rubbish from closed or remote spaces, prior to closing the space.
  - 3. Control cleaning operations so that dust and other particulates will not adhere to wet or newly-coated surfaces.

#### **1.7 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS**

- A. Remove temporary equipment, facilities, and materials prior to Substantial Completion.
- B. Clean and repair damage caused by installation or use of temporary work.
- C. Restore existing facilities used during construction to original condition.
- D. Restore new permanent facilities used during construction to specified condition.
- E. Completely remove fences and barriers, including foundations when construction has progressed to the point that they are no longer needed, and when approved by the Architect.

#### **PART 2 – PRODUCTS – NOT USED**

#### **PART 3 – EXECUTION – NOT USED**

**END OF SECTION**

## SECTION 01600

### 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 00100 - Instructions to Bidders: Product options and substitution procedures prior to bid date.
- B. Section 01400 - 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. Motors: Refer to Section 15065, NEMA MG 1 Type. Specific motor type is specified in individual specification sections.
- C. 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.

## SECTION 01600

### PRODUCT REQUIREMENTS

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

## SECTION 01600

### PRODUCT REQUIREMENTS

- 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 01100 - 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.

## SECTION 01600

### PRODUCT REQUIREMENTS

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



## **SECTION 01600**

### **PRODUCT REQUIREMENTS**

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 01700

### 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. Cleaning and protection.
- E. Starting of systems and equipment.
- F. Demonstration and instruction of Owner personnel.
- G. Closeout procedures, except payment procedures.

##### 1.2 RELATED SECTIONS

- A. Section 01300 - Administrative Requirements: Submittals procedures.
- B. Section 01400 - Quality Requirements: Testing and inspection procedures.
- C. Section 01500 - Temporary Facilities and Controls: Temporary exterior enclosures.
- D. Section 01780 - Closeout Submittals: Project record documents, operation and maintenance data, warranties and bonds.
- E. Section 07840 - Firestopping.
- F. Section 15980 - HVAC Systems: Testing, Adjusting and Balancing

##### 1.3 SUBMITTALS

- A. See Section 01300 - 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.

## SECTION 01700

### EXECUTION REQUIREMENTS

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 QUALIFICATIONS

- A. 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.

#### 1.5 PROJECT CONDITIONS

- A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- B. 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.
- C. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
- D. Pest Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.
- E. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.
- F. 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.

#### 1.6 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.

## SECTION 01700

### EXECUTION REQUIREMENTS

- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01600.

## 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 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.

### 3.5 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.

## SECTION 01700

### EXECUTION REQUIREMENTS

- 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 07840, 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.

#### 3.6 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.

#### 3.7 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.

#### 3.8 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.

## SECTION 01700

### EXECUTION REQUIREMENTS

- 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.

#### 3.9 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, trouble-shooting, 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. Perform instruction in a classroom environment located at the school.
- F. 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.
- G. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.
- H. The amount of time required for instruction on each item of equipment and system is that specified in individual sections.
- I. Air and Water Testing, Adjusting and Balancing
  - 1. Testing, and balancing will be done by Others.
  - 2. Adjusting the system will be part of the mechanical contract.
  - 3. The mechanical subcontractor will perform services specified in Division 15.
  - 4. Reports will be submitted by Others 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.

#### 3.10 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.
- B. Testing, adjusting, and balancing HVAC systems: See Section 15980 and 01400.

#### 3.11 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;

## SECTION 01700

### EXECUTION REQUIREMENTS

- dispose of in legal manner; do not burn or bury.
- I. Contractor 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.

#### 3.12 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.



## **SECTION 01700**

### **EXECUTION REQUIREMENTS**

- 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 01100.
- 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.
- J. Complete items of work determined by Architect's final inspection.

#### **3.13 MAINTENANCE SERVICE**

- A. Furnish service and maintenance of components indicated in specification sections for one year from date of Final Payment.
- B. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.
- C. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.
- D. Maintenance service shall not be assigned or transferred to any agent or Subcontractor without prior written consent of the Owner.

**END OF SECTION**



## SECTION 01780

### 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 01300 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- C. Section 01700 - 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 01700.
  - 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.

## SECTION 01780

### CLOSEOUT SUBMITTALS

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 Compact Disc 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 Compact Disc 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 School Corporation to the general contractor, all warranties should include the verbiage "...for a

## SECTION 01780

### CLOSEOUT SUBMITTALS

period of (X) year(s) after the date The School Corporation 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 Compact Disc.
- D. Compact Discs: High quality CD-R format Compact Disc formatted for use by Microsoft Windows based computers. Rewriteable Compact Discs will not be accepted. Provide labels on all Compact Discs listing the Owner's name, Project name, Contractor's name, Date of Submittal, and the title "Project Record Documents".
- E. 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.
- F. Ensure entries are complete and accurate, enabling future reference by Owner.
- G. Store record documents separate from documents used for construction.
- H. Record information concurrent with construction progress.
- I. File documents in format in accord with Project Manual Table of Contents.
- J. Do not use record documents for field construction purposes.
- K. Make documents available at all times for inspection by Architect and Owner.
- L. 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.
- M. Contractor shall develop layout drawings for all concealed work that is schematically indicated on contract drawings.
- N. Provide red colored pencils or felt marking pens for marking devices.
- O. Do not permanently conceal any work until specified information has been recorded.
- P. 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.
- Q. Label each record document "PROJECT RECORD DOCUMENTS" in large print. Keep record

## SECTION 01780

### CLOSEOUT SUBMITTALS

documents current.

- R. 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.
- S. Shop Drawings: Maintain as record documents; legibly annotate drawings to record changes made after review.
- T. Completed Work Survey: Requirements specified in Section 01700 - 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 Compact Discs 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 Compact Discs 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.

## SECTION 01780

### CLOSEOUT SUBMITTALS

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. Compact Discs: High quality CD-R format Compact Disc formatted for use by Microsoft Windows based computers. Rewriteable Compact Discs will not be accepted. Provide labels on all Compact Discs listing the Owner's name, Project name, Contractor's name, Date of Submittal, and the title "Operation and Maintenance Manuals".
- F. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- G. Provide tabbed dividers for each separate product and system, with typed description of product and major component parts of equipment.
- H. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.
- I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- J. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.
- K. 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.

## **SECTION 01780**

### **CLOSEOUT SUBMITTALS**

- 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.
- L. Provide a listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.
- M. 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 Compact Discs.
- F. Compact Discs: High quality CD-R format Compact Disc formatted for use by Microsoft Windows based computers. Rewriteable Compact Discs will not be accepted. Provide labels on all Compact Discs listing the Owner's name, Project name, Contractor's name, Date of Submittal, and the title "Warranties and Bonds".
- G. 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.
- H. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.
- I. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

**END OF SECTION**



## SECTION 03300

### CAST-IN-PLACE CONCRETE

#### PART 1 – GENERAL

##### 1.1 SECTION INCLUDES

- A. Joint devices associated with concrete work.
- B. Miscellaneous concrete elements, including equipment pads.
- C. Concrete curing.

##### 1.2 RELATED SECTIONS

- A. Section 07900 - Joint Sealers.
- B. Division 15: Mechanical items for casting into concrete.
- C. Division 16: Electrical items for casting into concrete.

##### 1.3 REFERENCES

- A. Unless otherwise noted, the most current issue of references shall be used.
- B. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; American Concrete Institute International.
- C. ACI 211.2 - Standard Practice for Selecting Proportions for Structural Lightweight Concrete; American Concrete Institute International.
- D. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International.
- E. ACI 302.1R - Guide for Concrete Floor and Slab Construction; American Concrete Institute International.
- F. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; American Concrete Institute International.
- G. ACI 305R - Hot Weather Concreting; American Concrete Institute International.
- H. ACI 306R - Cold Weather Concreting; American Concrete Institute International.
- I. ACI 309R - Guide for Consolidation of concrete.
- J. ACI 318 - Building Code Requirements for Reinforced Concrete and Commentary; American Concrete Institute International.
- K. ASTM C 39/C 39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- L. ASTM C 94/C 94M - Standard Specification for Ready-Mixed Concrete.
- M. ASTM C 143/C 143M - Standard Test Method for Slump of Hydraulic-Cement Concrete.
- N. ASTM C 173/C 173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
- O. ASTM C 260 - Standard Specification for Air-Entraining Admixtures for Concrete.
- P. ASTM C 309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
- Q. ASTM C 494/C 494M - Standard Specification for Chemical Admixtures for Concrete.
- R. ASTM C 1059 - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete.
- S. ASTM D 994 - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
- T. ASTM D 1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
- U. ASTM E 1643-98 Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs
- V. COE CRD-C 572 - Corps of Engineers Specifications for Polyvinylchloride Waterstop; Corps of Engineers.

##### 1.4 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturers' data on manufactured products.
- C. Samples: Submit two, 12 inch x12 inch samples of vapor barrier materials and all accessories.
- D. Samples: Submit two, 12 inch long samples of waterstops and construction joint devices.

## SECTION 03300

### CAST-IN-PLACE CONCRETE

- E. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent construction for concrete accessories.
- F. Project Record Documents: Contractor shall coordinate with all trades to accurately record the actual locations of all embedded utility lines, conduits, piping and other items that will be concealed from view upon completion of concrete work.
- G. Mix Design: Submit concrete mix design for each type and strength of concrete determined by either laboratory trial mix or field test data in accordance with ACI 211.1 and ACI 301. Submit mix design at least 15 days prior to first pour.

#### 1.5 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 301 and ACI 318.
  - 1. Maintain one copy of each document on site.
- B. Acquire cement from same source and aggregate from same source for entire project.
- C. Follow recommendations of ACI 305R when concreting during hot weather.
- D. Follow recommendations of ACI 306R when concreting during cold weather.
- E. Concrete design mix shall test 15% higher than specified requirements.
- F. All 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.

### PART 2 – PRODUCTS

#### 2.1 CONCRETE MATERIALS

- A. Cement: ASTM C 150, Type I - Normal Portland type.
- B. Fine and Coarse Aggregates: ASTM C 33.
- C. Lightweight Aggregate: ASTM C 330.
- D. Fly Ash: ASTM C 618, Class C or F.
- E. Water: Clean and not detrimental to concrete.

#### 2.2 ADMIXTURES

- A. Air Entrainment Admixture: ASTM C 260.
- B. Chemical Admixtures:
  - 1. ASTM C 494, Type A - Water Reducing.
  - 2. Other chemical admixtures may be used only when approved in writing by the Architect prior to use. Under certain conditions the Architect may consider the use of the following admixtures: ASTM C 494/C 494M, Type E - Water Reducing and Accelerating, Type F - Water Reducing, High Range, and Type G - Water Reducing, High Range and Retarding.
  - 3. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

#### 2.3 CONCRETE ACCESSORIES

- A. Bonding Agent: ASTM C 1059, Type II acrylic non-redispersable type.
- B. Epoxy Bonding System: ASTM C 881, type as required by project conditions.
- C. Non-Shrink Grout: ASTM C 1107; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
  - 1. Minimum Compressive Strength at 48 Hours: 2,400 psi.
  - 2. Minimum Compressive Strength at 28 Days: 7,000 psi.
- D. Liquid Curing Compound: ASTM C 309, Type 1, clear or translucent.

#### 2.4 JOINT DEVICES AND MATERIALS

- A. Joint Filler: Nonextruding, resilient asphalt impregnated fiberboard or felt, 1/2 inch thick and full depth of slab less 1/2 inch.
- B. Construction Joint Devices: Integral extruded plastic; 0.0239 inch thick, formed to tongue and groove profile, knockout holes spaced at 6 inches, ribbed steel spikes with tongue to fit top screed edge.

## SECTION 03300

### CAST-IN-PLACE CONCRETE

C. Sealant and Primer: As specified in Section 07900.

#### 2.5 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
- B. Proportioning Structural Lightweight Concrete: Comply with ACI 211.2 recommendations.
- C. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience, as specified in ACI 301.
- D. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.
- E. Concrete for elevated slabs greater than 2 inches in thickness:
  - 1. Compressive Strength, when tested in accordance with ASTM C 39/C 39M at 28 days: 3000 psi.
  - 2. Concrete weight: Normal (144 lbs. per cubic foot)
  - 3. Water-Cement Ratio: Maximum 44 percent by weight.
  - 4. Cement Content: Minimum 470 lb per cubic yard, maximum 517 lb. per cubic yard.
  - 5. Total Air Content: Maximum 3 percent naturally occurring, per ASTM C 173.
  - 6. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
  - 7. Maximum Slump: 3 inches plus or minus 1 inch.
  - 8. Maximum Aggregate Size: 1 inch.
  - 9. Water reducing agent required.

#### 2.6 MIXING

- A. Transit Mixers: Comply with ASTM C 94/C 94M.
- B. Admixtures:
  - 1. Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer. All admixtures must be approved prior to placing concrete.
  - 2. Use accelerating admixtures in cold weather only when approved by Architect. Use of admixtures will not relax cold weather placement requirements.
  - 3. Use of calcium chloride is not permitted.
  - 4. Use set of retarding admixtures during hot weather only when approved by Architect.
  - 5. Add air entraining agent to normal weight concrete mix for work exposed to exterior.

### PART 3 – EXECUTION

#### 3.1 EXAMINATION

- A. Verify lines, levels, and dimensions before proceeding with work of this section.
- B. Contractor shall coordinate with Division 15 and 16 trades and verify that all Mechanical, Electrical, Plumbing lines or other items placed are wholly within or below the CA-6 granular fill layer for slab on grade applications. Vapor Barrier may not be placed directly over any pipes, conduits or other items, but shall rest firmly on compacted granular fill.

#### 3.2 PREPARATION

- A. Formwork: Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.
- B. Verify that forms are clean and free of rust before applying release agent.
- C. Coordinate placement of joint devices with erection of concrete formwork and placement of form accessories.
- D. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.
- E. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

## SECTION 03300

### CAST-IN-PLACE CONCRETE

#### 3.3 PLACING CONCRETE

- A. Begin placing concrete within 60 minutes from the time truck leaves the concrete plant.
- B. Place concrete in accordance with ACI 304R.
- C. Do not add water to concrete during transport, delivery, at project site, or during placement unless approved by Architect.
- D. Place concrete in a continuous operation and without segregation.
- E. Placement of concrete requiring drops less than 10 feet may be by means of bottom discharge bucket, flexible drop chute, elephant-trunk, hopper or tremie, or free fall concrete may be used provided it is directed such that fall is vertical down the center of forms and reinforcing without hitting the sides, or reinforcement. Where a drop of more than 15 feet is required concrete must be pumped into place.
- F. Consolidate concrete prior to the point in which the mechanical vibrator will not sink into the concrete by its own weight.
- G. Consolidate concrete using a mechanical vibrator by inserting and withdrawing vertically at close uniform intervals, using a systematic pattern of vibration to ensure that all concrete has been adequately consolidated. When pouring multiple lifts, insert mechanical vibrator to a depth of penetrating the previous lift by minimum 6 inches. Use equipment and procedures as recommended by ACI 309R--Do not over consolidate. Do not allow vibrator to contact forms or reinforcing.
- H. On surfaces where air void holes are objectionable, use additional vibration. Do not over vibrate.
- I. Place concrete for floor slabs in accordance with ACI 302.1R unless exceeded herein.
- J. Cold Weather Placement: Comply with ACI 306.1
- K. Hot Weather Placement: Comply with ACI 305R.
- L. Notify Architect not less than 48 hours prior to commencement of placement operations.
- M. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.
- N. Separate slabs on grade from vertical surfaces with joint filler.
- O. Place joint filler in floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.
- P. Extend joint filler from bottom of slab to within 1/2 inch of finished slab surface. Conform to Section 07900 for finish joint sealer requirements.
- Q. Install joint devices in accordance with manufacturer's instructions.
- R. Install construction joint devices in coordination with floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.
- S. Slabs on grade shall be placed in continuous strips as per ACI recommendations. The maximum pour area shall not exceed 3600 square feet. Allow 24 hours to elapse between the placement of adjacent strips. Pour in alternating strip pattern so that no two adjoining slabs are poured the same day.
- T. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- U. Place concrete continuously between predetermined expansion, control, and construction joints.
- V. Do not interrupt successive placement; do not permit cold joints to occur. Provide construction joints at the termination of all pours.
- W. Saw cut joints within 24 hours after placing. Use 3/16 inch thick blade, cut into 1/4 depth of slab thickness. If no spacing of joints is indicated on drawings, place joints at a maximum spacing of 15 feet in each direction.
- X. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
- Y. Screed floors and slabs on grade level, maintaining surface flatness within maximum 1/8 inch from a level plane.

## SECTION 03300

### CAST-IN-PLACE CONCRETE

#### 3.4 PLACING GROUT

- A. Mix non-shrink grout in accordance with manufacturer's instructions.
  - 1. Do not mix more grout than can be placed in 20 minutes.
  - 2. Do not retemper grout.
- B. Soak concrete surfaces to receive grout and remove free water just before placing grout. Pack grout to form a full grout bed without air pockets or cavities. Trowel smooth and splay neatly to 45 degrees.

#### 3.5 CONCRETE FINISHING

- A. Repair surface defects, including tie holes, immediately after removing formwork.
- B. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height. Provide finish as follows:
  - 1. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal.
  - 2. Grout Cleaned Finish: Wet areas to be cleaned and apply grout mixture by brush or spray; scrub immediately to remove excess grout. After drying, rub vigorously with clean burlap, and keep moist for 36 hours.
- C. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
  - 1. Steel trowel all surfaces.
- D. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains at 1:50 nominal.
- E. Do not sprinkle dry cement on surfaces to absorb water.

#### 3.6 CURING AND PROTECTION

- A. Comply with requirements of ACI 308 unless exceeded herein. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Apply evaporation retarder after floating to prevent premature surface setting under dry or windy conditions.
- C. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
  - 1. Normal concrete: Not less than 7 days.
  - 2. High early strength concrete: Not less than 4 days.
- D. Formed Surfaces: Cure by moist curing with forms in place for full curing period of 7 days minimum. Where forms are removed prior to 7 day curing period, apply curing compound in two coats at right angles using application rate recommended by manufacturer.
- E. Surfaces Not in Contact with Forms:
  - 1. Start initial curing as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by saturated burlap.
  - 2. Begin final curing after initial curing but before surface is dry.
    - a. Moisture-retaining cover: Seal in place with waterproof tape or adhesive.
- F. Concrete slab curing:
  - 1. Wet cure all concrete slabs for a minimum of 7 days. Completely cover pour area with moisture retaining cover and protect against movement. Keep moisture retaining cover continuously moist for full 7 day period. Do not permit loading or partial loading caused by vehicle traffic or material placement during this curing period.
  - 2. In no case shall liquid curing compound be used where compound may be incompatible with floor finish materials. If the application of curing compound is questionable, the Contractor shall provide a review report by the finish materials manufacturer prior to the application of those materials to ensure that the proper moisture and other conditions exist and if any remedial work is required.

## **SECTION 03300**

### **CAST-IN-PLACE CONCRETE**

#### **3.7 DEFECTIVE CONCRETE**

- A. Requirements for repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.
- B. Provide sample area of patch, fill, touch-up, repair, or exposed concrete for approval of the Architect for each type of area requiring repair.
- C. Excessive honeycombing or embedded debris in concrete is not acceptable. Notify Architect upon discovery.
- D. Allow Architect to inspect concrete surfaces upon removal of forms and prior to backfilling or otherwise covering concrete.

**END OF SECTION**

## SECTION 04065

### 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 04810 - Unit Masonry Assemblies: Installation of mortar and grout.

##### 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 01300 - 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.

## SECTION 04065

### MORTAR AND MASONRY GROUT

- 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](http://www.solomoncolors.com)
    - b. Davis Colors: [www.concretestains.com](http://www.concretestains.com)
    - c. Color Solutions, Inc.: [www.dynamiccolorsolutions.com](http://www.dynamiccolorsolutions.com)
    - d. Prism Pigments: [www.prismpigments.com](http://www.prismpigments.com)
    - e. Western Lime and Cement Co.
  - 4. Substitutions: See Section 01600 - 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. Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio.



## SECTION 04065

### MORTAR AND MASONRY GROUT

#### 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. 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.
- B. 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 04810; 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.

## **SECTION 04065**

### **MORTAR AND MASONRY GROUT**

- 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.

**END OF SECTION**

## SECTION 04810

### UNIT MASONRY ASSEMBLIES

#### PART 1 – GENERAL

##### 1.1 SECTION INCLUDES

- A. Concrete Masonry Units.
- B. Reinforcement and Anchorage.
- C. Accessories.

##### 1.2 RELATED SECTIONS

- A. Section 04065 - Mortar and Masonry Grout.
- B. Section 05500 - Metal Fabrications: Loose steel lintels and fabricated steel items.
- C. Section 06100 - Rough Carpentry: Nailing strips built into masonry.
- D. Section 07900 - 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 A 615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- I. ASTM A 641/A 641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
- J. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- K. ASTM A 666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
- L. ASTM B 370 - Standard Specification for Copper Sheet and Strip for Building Construction.
- M. ASTM C 27 - Standard Classification of Fireclay and High-Alumina Refractory Brick.
- N. ASTM C 34 - Standard Specification for Structural Clay Load Bearing-Wall Tile.
- O. ASTM C 55 - Standard Specification for Concrete Brick; 2001a.
- P. ASTM C 56 - Standard Specification for Structural Clay Non-Load-Bearing Tile.
- Q. ASTM C 62 - Standard Specification for Building Brick (Solid Masonry Units Made From Clay or Shale).
- R. ASTM C 67 - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.
- S. ASTM C 91 - Standard Specification for Masonry Cement.
- T. ASTM C 126 - Standard Specification for Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units.
- U. ASTM C 129 - Standard Specification for Nonloadbearing Concrete Masonry Units.
- V. ASTM C 140 - Standard Test Methods of Sampling and Testing Concrete Masonry Units and Related Units.
- W. ASTM C 144 - Standard Specification for Aggregate for Masonry Mortar.
- X. ASTM C 150 - Standard Specification for Portland Cement.
- Y. ASTM C 207 - Standard Specification for Hydrated Lime for Masonry Purposes.
- Z. ASTM C 212 - Standard Specification for Structural Clay Facing Tile.
- AA. ASTM C 270 - Standard Specification for Mortar for Unit Masonry.
- BB. ASTM C 315 - Standard Specification for Clay Flue Linings.
- CC. ASTM C 404 - Standard Specification for Aggregates for Masonry Grout.

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### UNIT MASONRY ASSEMBLIES

- DD. ASTM C 476 - Standard Specification for Grout for Masonry.
- EE. ASTM C 530 - Standard Specification for Structural Clay Nonloadbearing Screen Tile.
- FF. ASTM C 652 - Standard Specification for Hollow Brick (Hollow Masonry Units Made From Clay or Shale).
- GG. ASTM C 744 - Standard Specification for Prefaced Concrete and Calcium Silicate Masonry Units.
- HH. ASTM C 780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
- II. ASTM D 226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
- JJ. ASTM E 514-90 - Standard Test Method for Water Penetration and Leakage Through Masonry

#### 1.4 SUBMITTALS

- A. See Section 01300 - 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. Sealant.
  - 2. Joint filler: full width x 6 inches long.
  - 3. Preformed Control Joints: 6 inches long.
  - 4. Anchors: submit each type of anchor required.
- D. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

#### 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. 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.

#### 1.7 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.

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### UNIT MASONRY ASSEMBLIES

#### PART 2 – PRODUCTS

##### 2.1 CONCRETE MASONRY UNITS

- A. Acceptable Manufacturers:
  - 1. Best Block Co.; [www.bestblock.net](http://www.bestblock.net).
  - 2. Chicago Block and Brick; [www.chicagoblock.com](http://www.chicagoblock.com)
  - 3. Northfield Block; [www.northfieldblock.com](http://www.northfieldblock.com)
  - 4. Trenwyth Industries; [www.trenwyth.com](http://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.
- 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, 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.
- D. Non-Loadbearing 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 MORTAR AND GROUT MATERIALS

- A. Mortar and grout: As specified in Section 04065.

##### 2.3 REINFORCEMENT AND ANCHORAGE

- A. Manufacturers of Joint Reinforcement and Anchors:
  - 1. Dur-O-Wal: [www.dur-o-wal.com](http://www.dur-o-wal.com).
  - 2. Heckmann Building Products, Inc: [www.heckmannbuildingprods.com](http://www.heckmannbuildingprods.com).
  - 3. Hohmann & Barnard, Inc: [www.h-b.com](http://www.h-b.com).
  - 4. Masonry Reinforcing Corporation of America: [www.wirebond.com](http://www.wirebond.com).
  - 5. Substitutions: See Section 01600 - 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 03200; size as indicated on drawings; uncoated finish.
- D. Interior Single Wythe Joint Reinforcement: Contractor option of Truss or ladder type; ASTM A 82 steel wire, mill galvanized to ASTM A 641/A 641M, Class 3; 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage on each exposure.
- E. Interior Multiple Wythe Joint Reinforcement: 3 Wire Ladder or truss type; spaced 16 inches on center vertically ASTM A 82 steel wire, mill galvanized to ASTM A 641/A 641M, Class 3; 0.1483 inch side rods minimum with 0.1483 inch cross rods and pintles; width as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage on each exposure.
- F. Flexible Anchors: 2-piece anchors that permit differential movement between masonry and

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### UNIT MASONRY ASSEMBLIES

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 inch 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.
- G. 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.
- H. 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.

#### 2.4 ACCESSORIES

- A. Rigid insulation adhesive: as specified in section 07212.
- 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](http://www.illinoisproducts.com).
    - b. Dur-O-Wal Inc.; [www.dur-o-wal.com](http://www.dur-o-wal.com).
    - c. Heckmann Building Products, Inc; [www.heckmannbuildingprods.com](http://www.heckmannbuildingprods.com).
    - d. Hohmann & Barnard, Inc; [www.h-b.com](http://www.h-b.com).
    - e. Substitutions: See Section 01600 - 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](http://www.illinoisproducts.com).
    - b. Dur-O-Wal Inc.; [www.dur-o-wal.com](http://www.dur-o-wal.com).
    - c. Heckmann Building Products, Inc; [www.heckmannbuildingprods.com](http://www.heckmannbuildingprods.com).
    - d. Hohmann & Barnard, Inc; [www.h-b.com](http://www.h-b.com).
    - e. Substitutions: See Section 01600 - Product Requirements.
- E. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.
- F. Beam and Column Isolation Wrap: Contractor choice of closed cell Expanded Polyethylene, closed cell Neoprene or closed cell PVC. Minimum of 1/2 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:

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- 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. 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.
- B. 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.
- C. Determine requirements for temporary bracing of walls which require bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.
- D. Consult and coordinate masonry work with other crafts to avoid future cutting and patching.
- E. 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.

### 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. Lay hollow masonry units with full face shell bedding on head and bed joints.
- C. Lay first course of all masonry above steel and concrete surfaces in full bed of mortar.
- D. Lay all concrete masonry units dry.
- E. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- F. Remove excess mortar as work progresses.
- G. Interlock intersections and external corners, except for units laid in stack bond.
- H. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- I. Do not use broken, chipped or cracked units where exposed to view.
- J. 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,

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- K. 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.
- L. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- M. Fill mortar joints flush where wall tile or resilient base is scheduled. All other joints shall be tooled as scheduled above in coursing.
- N. 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.
- O. Isolate masonry partitions from vertical structural framing members with a control joint.
- P. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible filler.
- Q. Extend and anchor all masonry walls to underside of floors, beams or roof structure, unless otherwise indicated.
- R. Brick up solid wherever beams bear on masonry, except where otherwise indicated.
- S. 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 07900 - Joint Sealers

#### 3.5 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. 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.

#### 3.6 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.

#### 3.7 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.



## SECTION 04810

### UNIT MASONRY ASSEMBLIES

#### 3.8 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.

#### 3.9 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.

#### 3.10 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 07900 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.

#### 3.11 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.

## **SECTION 04810**

### **UNIT MASONRY ASSEMBLIES**

#### **3.12 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.

#### **3.13 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.

#### **3.14 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.

#### **3.15 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 05500

### METAL FABRICATIONS

#### PART 1 – GENERAL

##### 1.1 SECTION INCLUDES

- A. Shop fabricated steel items.
- B. Fasteners

##### 1.2 RELATED SECTIONS

- A. Section 03300 - Cast-In-Place Concrete: Placement of metal fabrications in concrete.
- B. Section 04810 - Unit Masonry Assemblies: Placement of metal fabrications in masonry.
- C. Section 09900 - 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 01300 - 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

## SECTION 05500

### METAL FABRICATIONS

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 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.

#### 2.3 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.

#### 2.4 FINISHES - STEEL

- A. Prime paint all interior steel items. Galvanize and paint all steel exposed to the exterior.
  1. Exceptions: Galvanize items to be embedded in concrete or masonry.
  2. 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.

#### 2.5 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.

## **SECTION 05500**

### **METAL FABRICATIONS**

#### **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 06100

### ROUGH CARPENTRY

#### PART 1 – GENERAL

##### 1.1 SECTION INCLUDES

- A. Roof nailers and curbs.
- B. Blocking in wall and roof openings.
- C. Preservative treatment of wood.

##### 1.2 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.

##### 1.3 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide technical data on wood preservative materials.

##### 1.4 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.

##### 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.

##### 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.

## **SECTION 06100**

### **ROUGH CARPENTRY**

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: AWPAC 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 from 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.

**END OF SECTION**



## SECTION 07505

### ROOFING REPAIRS

#### PART 1 – GENERAL

##### 1.1 SECTION INCLUDES

- A. To provide EPDM flashing tie-ins and repairs on existing buildings, as required for the installation of new roof top mechanical equipment and roof penetrations, as shown on the drawings and as specified herein.
- B. To provide all accessories/appurtenances for a complete repair as shown and specified.
- C. To schedule the re-inspection of all existing warranted roof systems in which repair or modification work by the warranty holder to verify compliance with the manufacturers' requirements and continuance of the existing roof system warranty. Cost of same to be borne by the Roofing Contractor.

##### 1.2 RELATED SECTIONS

- A. Section 06100 – Wood Blocking and Curbing.
- B. Section 07900 – Joint Sealers.
- C. Division 15 – Supports and Anchors.

##### 1.3 DEFINITIONS

- A. Roofing System Manufacturer: Any of the manufacturers whose systems are specified under "Acceptable Systems" in this section and who hereinafter are called "manufacturer."

##### 1.4 SUBMITTALS

- A. Make all submittals in accordance with Section 01300.
- B. Roofing Firm Endorsement: At least 3 business days prior to first project coordination meeting, submit roofing firm's name, address, telephone number and manufacturer's endorsement of roofing firm to Architect.
- C. Submit written certification that the Roofing Contractor has been as approved applicator of specified roofing system for a period of 5 years or more.
- D. Submit Contractor's written certification of licensing under the Illinois Roofing Industry Licensing Act.
- E. Shop Drawings: Shop drawings shall represent standards and detailing as specified herein or as indicated in drawings. Manufacturer's standard shop drawings are not acceptable.
  - 1. Minimum scale: 3" = 1'-0" unless otherwise specified.
  - 2. Required details: New roof curb tie-in for each roofing system.
- F. Product Data: Material safety and technical information sheets for all products being utilized.
  - 1. Insulation:
    - a. Polyisocyanurate.
    - b. Perlite.
    - c. Perlite Cants.
- G. Mechanical Fasteners:
  - 1. FM approved insulation fasteners and stress plates for each roof deck type.
  - 2. Screw fasteners.
- H. On existing warranted roof systems:
  - 1. Copy of shop drawings sent manufacturer for review.
  - 2. Written certification from holder of warranty that modification will not impinge the integrity of the existing warranty.
- I. Roofing Cement.
- J. Roof Membrane:
  - 1. EPDM.
- K. Samples:
  - 1. Insulation: (3) pieces of manufacturer's sample.
  - 2. Roof membrane and flashing: (3) pieces of manufacturer's sample.

## SECTION 07505

### ROOFING REPAIRS

#### 1.5 QUALITY ASSURANCE

- A. Qualifications/Requirements of Roofing Contractor.
  - 1. Contractor shall have a minimum of 5 years experience in successfully applying the specified products and shall be certified by the specified products manufacturer to apply their roofing systems.
  - 2. On warranted roof systems, be an approved applicator of the system in question for 5 years minimum.
- B. Application Qualifications: The application method shall be approved by the manufacturer of the roofing materials which are selected.
- C. Roofing contractor is responsible for reviewing the MEP drawings and verifying the number and location of new roof curbs and penetrations to be installed through existing roof systems as well as roof curbs and penetrations being eliminated and removed requiring patching of the existing roof system.

#### 1.6 PRE-INSTALLATION MEETING

- A. Convene one week before starting work of this section.

#### 1.7 DELIVERY, STORAGE, AND PROTECTION

- A. Deliver all materials in manufacturer's original, unopened containers and rolls with all labels intact and legible. All products shall bear Underwriters' Laboratories (UL) label.
- B. Deliver materials requiring fire resistance classification packaged with labels attached as required by label service.
- C. Deliver materials in sufficient time and quantity to allow continuity of work and compliance with approved construction schedule.
- D. Handle rolled goods so as to prevent damage to edges/ends.
- E. Store all materials on clean raised platforms with weather-protective covering when stored outdoors.
- F. Store rolled goods on end or as required by manufacturer.
- G. Provide continuous protection of materials against damage or deterioration with breathable coverings. Coverings such as canvas, visqueen or other non-breathable coverings will not be acceptable.
- H. Remove damaged or defective materials from site.
- I. Roof Insulation:
  - 1. Store insulation on clean, raised platforms with weather-protective covering when stored outdoors.
  - 2. Provide continuous protection of insulation materials against wetting and moisture absorption.
  - 3. Once insulation has become wet, it shall be removed from the site and not be used in the work. Insulation which has become wet and has dried shall be removed from the site in the same manner as any wet insulation.
- J. Comply with all fire and safety regulations.
- K. Follow manufacturer's recommendations.
- L. All materials shall be new.
- M. All unprotected, moist, or otherwise damaged materials or products with evidence of moisture damage such as staining shall be removed permanently from the job.

#### 1.8 PROJECT CONDITIONS

- A. Environmental Requirements: (Except as otherwise authorized by Architect following the manufacturer's written request for variance):
  - 1. It shall be the Contractor's responsibility to verify existing and forecasted weather conditions. If inclement weather is anticipated during the work period, the Contractor shall take adequate precautions to ensure products applied to roofing and building interiors are protected from possible moisture damage/contamination.
  - 2. Wind velocity limitations will be based on ability to remove existing roofing and apply products in specific manner. Special precautions may be necessary at times, due to

## SECTION 07505

### ROOFING REPAIRS

excessive winds experienced by this region.

3. Special precautions will be required during application of new roofing products when ambient and/or wind chill temperatures are below 40 degrees F.
  4. The roofing work shall be coordinated with the work of the Mechanical Contractor, including the Mechanical Contractor's anticipated schedule.
  5. Roofing Contractor's project foreman shall attend the roofing repair pre-installation meeting.
  6. Subcontractors shall integrate their schedules for the "on-roof" operations.
- B. Protection:
1. Avoid heavy traffic on completed work.
  2. Restore to original condition or replace work or materials damaged by any roofing operations.
  3. Protect paving, grass, and building walls adjacent to hoists and kettles prior to starting work.
    - a. Lap suitable protective materials at least 6 inches.
    - b. Secure protective coverings against the wind.
    - c. Leave protective covering in place for duration of the roofing work.
    - d. Repair any damage to existing conditions caused by work of this Section.
  4. Provide protection of neighboring and adjacent existing roof areas during new construction. Repair and render watertight any damage to the existing roof systems and flashing during demolition and new construction.
  5. Protect the existing roof systems flashing and roofing projections to remain during construction.
    - a. Flashing that was damaged during removal shall not be reinstalled.
    - b. Replace flashing of the same material for damaged flashing at no additional cost to the Owner.
  6. Remove protection upon completion of the roofing work.
  7. Do not walk across membrane immediately after installation.
  8. Remove debris daily from the roof and minimize dust, dirt, and noise with proper equipment.
  9. Provide a minimum of (2) 15 pound minimum size fire extinguishers, utilizing ammonium phosphate agent at site of new roof application on the roof or wherever heating elements are utilized to raise temperature of roof materials.
  10. The Contractor must take every precaution to prevent interior leakage, products from falling into interior, or other such occurrences. Installation of the roofing materials shall be accomplished in such a manner that bitumen drippage does not occur.
  11. Contractor shall prevent access by the public to any materials, tools, or equipment during the course of the work. The Owner assumes no liability or responsibility whatsoever for any damage, theft, or other acts which occur to Contractor's material, products or equipment.
  12. Contractor shall return all improvements on or about the property which are shown to have been altered, removed, or otherwise changed to conditions which have existed previous to starting work or better.
  13. The Contractor shall notify the Owner if any seriously deteriorated structural member or roof deck is uncovered prior to placement of new roofing materials.
  14. Existing Conditions: May not be shown on drawings. Some modification of details may be required to accomplish intent of documents. All modifications or adjustments are to be approved in advance by Architect. Prior to work, the Contractor shall:
    - a. Ascertain to his satisfaction that all aspects of the specifications are workable as specified.
    - b. Become completely familiar with all requirements and stipulations contained throughout all Contract Documents and specifications.
    - c. Verify the existing site conditions with respect to, but not necessarily limited to, the building accessibility, traffic/pedestrian flow, special safety considerations, all parked vehicles, attachment of the existing roofing/accessories, the building dimensions and roofing replacement impediment.

## SECTION 07505

### ROOFING REPAIRS

- C. Sequencing/Scheduling: At First Project Coordination Meeting:
  - 1. Roofing Contractor:
    - a. Shall provide detailed schedule of all roofing operations.
    - b. Ensure that the Project Foreman attends meeting.
  - 2. Subcontractors shall integrate their schedules for the "on-roof" operations.

#### 1.9 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply EPDM roofing membrane during inclement weather and/or ambient temperatures below 20 degrees F or above 95 degrees F.
- B. Do not apply roofing membrane to damp or frozen deck surface.
- C. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.
- D. All SPM sealants and adhesives must be kept at 60 degrees F when the ambient temperature falls below 40 degrees.

#### 1.10 WARRANTY

- A. Contractor Guarantee:
  - 1. Contractor shall guarantee the installation of roofing and flashing under this contract to be watertight for a period of 2 years from the date of substantial completion of the roofing replacement project.
  - 2. Contractor shall make all repairs during this 2 year period to maintain a watertight roof in conformance with these specifications without additional cost to the Owner.
  - 3. Contractor shall repair, at his own expense, all the blisters, bubbles, bare spots, slippage of membrane, roofing and flashings and any other defects which are manifested as part of the Contractor's work within 2 years.
  - 4. Contractor shall respond within 48 hours after notification of leakage to the roof site. If he does not, the Owner shall have the right, without invalidating this guarantee, to make any temporary repairs required, in order to protect the building and its contents from any damage due to the roof leakage. The cost of same will be billed to the contractor.
  - 5. Conversely, upon diligent response of the Contractor to repair a reported roof leak, it is discovered that the leaks are due to faulty maintenance and/or operation of the building's equipment or accessories unrelated to the roof performance, then the Owner shall reimburse the Contractor for the fair value of the Contractor's time and expenses incurred to respond to a false leak report, not to exceed \$100.00 for each occurrence.
- B. Guarantee Period:
  - 1. This period shall be established as commencing from the date that the Architect inspects the repairs and finds them to be in compliance with the contract documents and written approval of same is obtained from holder of the warranty.
  - 2. The Roofing Contractor shall notify the Architect in writing when the roof is complete for a final inspection.
- C. See Section 01780 - Closeout Submittals, for additional warranty requirements.

## PART 2 – PRODUCTS

### 2.1 SINGLE PLY EPDM MEMBRANE SYSTEMS

- A. Single Ply EPDM, Fully Adhered systems utilizing 60 mil EPDM. Use one of the following:
  - 1. Tremco Roofing & Building Maintenance, 3735 Green Road, Beachwood, Ohio 44122 Phone: 216.292.5000.
  - 2. Firestone Building Products Company, 525 Congressional Blvd., Carmel, IN 46032 Phone: (317) 575-7000.
  - 3. Manville Roofing Systems, P.O. Box 5108, Denver, CO 80217-5108
  - 4. Carlisle Syntec Incorporated, P.O. Box 7000, Carlisle, PA 1701 Phone: 800-4-SYNTEC.
  - 5. Genflex Roofing Systems, 1722 Indian Wood Circle, Suite A, Maumee, OH 43537

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### ROOFING REPAIRS

6. Jersico Roofing Systems Total System Warranty, 3485 Fortuna Drive, Akron, OH. 44312. Phone: 800-992-7663.
7. Section 01600 - Materials and Equipment: Product options. Substitutions: Not permitted.

#### 2.2 MATERIALS

- A. Bituminous Materials:
  1. Asphalt primer shall conform to ASTM D41-78 or an approved equal.
  2. Asphaltic plastic roof cement shall conform to ASTM D2822-75.
  3. Elastomeric polymer asphalt sealant, two component, cold-applied conforming to ASTM D1850.
  4. Cold process asphalt adhesive shall conform to ASTM D2823.
  5. Hot applied, extra steep roofing asphalt shall conform to ASTM D312-78, Type IV.
- B. Insulation: Shall comply with "Standard Specifications" as outlined by Thermal Insulation Manufacturers' Association (TIMA), and with Technical Bulletin No. 281-1 from the Roof Insulation Committee (RIC/TIMA).
  1. Tapered Polyisocyanurate: 1/8 inch per foot, 1/4 inch per foot, and 1/2 inch per foot taper; field verify thickness; facing compatible with roof system.
  2. Flat Rigid Board/Polyisocyanurate: Field verify to match existing facings compatible with roof system.
  3. Flat Rigid Board/Perlite: Facings compatible with roof system; thickness as indicated; preformed rigid mineral aggregate board composed of expanded perlite, cellulose binders and waterproofing agents that meet requirements of ASTM C728-82.
  4. Tapered Edge Strips/Cants:
    - a. Cants, tapered edge strips, saddles/crickets, and the above required tapered insulation board system shall be preformed and rigid mineral aggregate board composed of expanded perlite, cellulose binders and waterproofing agents meeting the requirements of ASTM C-728-82.
    - b. Cant Strips shall have a nominal 4 inches face or as required by the job conditions:
      - 1) Cant Strip Corp. of America.
      - 2) DeSoto Strip Supply Co.
      - 3) Approved equal.
    - c. Tapered edge strips shall be a minimum of 1-1/2 inches thick, tapered to 0 inches on 18 inches wide panels or as is required by the job conditions.
      - 1) Cant Strip Corp. of America.
      - 2) DeSoto Strip Supply Co.
      - 3) Approved equal.
    - d. All layers of insulation shall be classified UL Class "A" and FM approved Class "1". In addition, the total insulation system shall be installed per FM's "I-60/I-90" wind uplift criteria and "Loss Prevention Data Sheet".
- C. Adhesive Materials:
  1. Surface Conditioner: Compatible with membrane, as recommended by membrane manufacturer.
  2. Membrane Adhesives: As recommended by membrane manufacturer.
  3. Insulation Adhesive: As recommended by insulation manufacturer.
  4. Thinner and Cleaner: As recommended by adhesive manufacturer, compatible with sheet membrane.
- D. Accessories:
  1. Prefabricated Roof Specialties: Refer Division 15.
  2. Insulation Fasteners: Appropriate for purpose intended and approved by Factory Mutual and system manufacturer; length required for thickness of material with metal washers.
  3. Sealants: As recommended by membrane manufacturer.
  4. Stack Boots: Flexible boot and collar for pipe stacks through membrane by membrane manufacturer.
  5. SPM Manufacturers Water Cut-Off Mastic: Provide as needed to sheet metal manufacturer.

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### ROOFING REPAIRS

#### PART 3 – EXECUTION

##### 3.1 EXISTING ROOFING

- A. At work areas indicated, remove all existing roofing system materials including the roof membrane, and base flashing. Remove insulation and vapor barrier to the existing roof deck where necessary to provide the work indicated.
- B. Properly dispose of all roof debris to off-site location.
- C. Protect surrounding areas from damage during construction.
- D. At tie-in, do not remove more roofing than can be covered with new roofing at end of each day's work or prior to rain. Properly waterproof all areas prior to leaving the job site each day.
- E. Do not leave any roof deck open overnight or during rain. Water damage caused by this work shall be borne by this contractor.
- F. Coordinate with the General and Mechanical Contractors the cutting of existing roof membranes to install new curbs so as to render the same watertight, prior to leaving the job site each day. Mechanical Contractor to provide the Roofing Contractor with a schedule of new roof curb installation 5 days in advance of start of the work.
- G. At tie-ins to the existing roof system with guarantees still in effect, Roofing Contractor shall:
  1. Prepare tie-in shop drawing.
  2. Contact holder of guarantee and verify the required information to be submitted.
  3. Submit shop drawings to the holder of guarantee for review.
  4. Submit to Architect the manufacturer's approved shop drawings and letter of certification from the guarantee holder verifying that the tie-in, if properly installed, will in no way affect or modify the existing guarantee.
  5. Contractor to pay for all inspections to maintain the guarantee.

##### 3.2 EXISTING ROOF PREPARATION

- A. Prior to installing new roofing tie-in, the Contractor shall inspect all existing rooftop conditions, including but not limited to, roof deck, accessories, units, drainage, penetrations, etc. Contractor shall verify the roof repair may be installed in strict accordance with the original design, manufacturer's current recommendations, and other pertinent codes and regulations.
- B. The Contractor shall protect surrounding areas from damage during the roof removal. Provide 1/2 inch plywood walk boards on 1 inch expanded polystyrene insulation in traffic areas and surrounding all work areas of any trade. In addition take any other measures to prevent damage to roofing system by any trade.
- C. 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.
- D. Contractor shall not leave any roof deck open overnight or during rain. Water damage caused by this work shall be borne by this Contractor.
- E. EPDM Roofing:
  1. Carefully remove debris and dirt from area in which curb is to be installed. Sweep off build-up of residual debris. Sweep up debris, dirt, dust and deposit into garbage bag or suitable container to prevent it from blowing back onto the roof.
  2. Wash the existing EPDM membrane 18 inches out from the vertical plane to remove all accumulated debris. Scrub power washed membrane with a mixture of water and soap using a scrub brush. Thoroughly rinse.
  3. Splice wash the existing membrane.

##### 3.3 INSPECTION

- A. Roofing Contractor to receive from General Contractor a schedule of roof demolition five days prior to work. Roofing Contractor to coordinate demolition and installation with the General Contractor.
- B. Verify that all work of subcontractors which penetrates the roof deck or requires traffic on roof deck has been completed.

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### ROOFING REPAIRS

- C. Examine surfaces for inadequate anchorage, foreign material, moisture, unevenness or other conditions which would prevent execution and quality of installation of a specified roofing and flashing system and accessory items.
- D. All surfaces shall be dry, smooth, and free of projections and holes that might rupture the membrane.
  - 1. Immediately before application of roofing, thoroughly clean the surface of dust and loose material.
- E. Do not proceed with any work until all defects are corrected to the satisfaction of and with written approval of the roofing system manufacturer.
- F. Inspect roof deck and roof edge conditions for defects or conditions that will affect the progress of roofing system manufacturer.

#### 3.4 INSTALLATION

- A. Manufacturer's Instructions:
  - 1. Install roofing repairs with flashing systems and all accessory items in strict accordance with the system manufacturer's printed instructions current at date of bidding documents and the manufacturer-approved shop drawings.
  - 2. When items of conflict arise between the manufacturer's recommendations and the contract documents, the more stringent will govern, unless it violates the manufacturer's warranty requirements.
- B. Insulation:
  - 1. Install the new insulation to the height of existing insulation.
  - 2. Set insulation in solid mopping of hot steep asphalt.
  - 3. All insulation joints greater than 1/4 inch to be filled with insulation strips.
- C. EPDM Base Flashing:
  - 1. Install bonding adhesive to the roof curb and splice adhesive to the existing EPDM.
  - 2. New 60 mil EPDM base flashing should be cut to fit, providing a 6 inch horizontal edge beyond the end of the cut edge of the existing membrane. Thoroughly clean on the side to receive adhesive with splice wash before applying adhesive.
  - 3. Apply bonding adhesive to that portion of the flashing coming in contact with the curb. Apply the splice adhesive to areas coming in contact with EPDM and the securement strip.
  - 4. Allow the adhesive to "flash-off". Perform finger-push test to verify readiness of adhesive to be bonded.
  - 5. Two crew members (minimum) are to handle the new base flashing, folding in half vertically. Position on the top of the new base flashing horizontally, hand press into position. Slowly lower and roll the new membrane into position. Press into position with an open hand.
  - 6. Position new base flashing so that it is tight to the substrate. Wrinkles are unacceptable.
  - 7. Following installation of new 60 mil EPDM base flashing, roll all flashing with a rubber roller. For roof curbs, nail off new base flashing 4 inches on center with 1 inch cap head nails.
  - 8. Thoroughly clean horizontal edge of the base flashing with splice wash.
  - 9. Apply splice adhesive over edge of base flashing edge. Install SPM lap sealant into and over the edge of the base flashing.
  - 10. Using an SPM lap sealant screed, tool lap sealant into and over the edge of the cover strip.
  - 11. At base flashing laps, intersections with field seams are to be covered with uncured EPDM patches and/or cover strips to be cut to extend 3 inches beyond condition.
  - 12. Following the Architect's inspection and approval and for a period of 48 hours for the SPM lap sealant to cure, re-install tongue and groove.

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### **ROOFING REPAIRS**

#### **3.5 ADJUST AND CLEAN**

- A. Carefully inspect all completed work. Correct all defects.
- B. Clean up mastic spills and splatterings. Remove all surplus materials.
- C. Provide adequate protection of all completed work until the Substantial Completion. Prevent traffic, storage or movement of any materials/equipment on the completed roofing systems.
- D. Clean up all rubbish, debris, surplus materials, tools, and equipment, and remove from site.
- E. Provide 1/2 inch plywood walk boards on 1 inch expanded polystyrene insulation in areas of heavy traffic and take any other measures to prevent damage to roofing system by any trade.

**END OF SECTION**



## **SECTION 07840**

### **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 01300 - 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:.
  - 2. With minimum 3 years documented experience installing work of this type.
  - 3. Able to show at least 5 satisfactorily completed projects of comparable size and type.
  - 4. Licensed by authority having jurisdiction.
  - 5. 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.

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### FIRESTOPPING

- 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;

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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.

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- 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.

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### FIRESTOPPING

- 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. Firestopping between Edge of Floor Slab and Curtain Wall (without Penetrations): Glass fiber or mineral fiber safing insulation; UL Design No. F-C-7001, F Rating 1 hour.
- M. 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 01600 - 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.

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### **FIRESTOPPING**

- 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 07900**

### **JOINT SEALERS**

#### **PART 1 – GENERAL**

##### **1.1 SECTION INCLUDES**

- A. Sealants and joint backing.

##### **1.2 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.

##### **1.3 SUBMITTALS**

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, and color availability.

##### **1.4 QUALITY ASSURANCE**

- A. Applicator Qualifications: Company specializing in performing the work of this section with minimum 3 years experience and approved by manufacturer.

##### **1.5 ENVIRONMENTAL REQUIREMENTS**

- A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

##### **1.6 WARRANTY**

- A. See section 01780 – 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 MANUFACTURERS**

- A. Silicone Sealants:
  - 1. Bostik Findley; [www.bostikfindley-us.com](http://www.bostikfindley-us.com).
  - 2. GE Plastics; [www.geplastics.com](http://www.geplastics.com).
  - 3. Pecora Corporation; [www.pecora.com](http://www.pecora.com).
  - 4. Sonneborn, ChemRex, Inc; [www.chemrex.com](http://www.chemrex.com).
  - 5. Dow Corning; [www.dowcorning.com](http://www.dowcorning.com)
  - 6. Tremco, Inc; [www.tremcosealants.com](http://www.tremcosealants.com).
  - 7. Substitutions: See Section 01600 - Product Requirements.
- B. Polyurethane Sealants:
  - 1. Bostik Findley; [www.bostikfindley-us.com](http://www.bostikfindley-us.com).
  - 2. Pecora Corporation; [www.pecora.com](http://www.pecora.com).
  - 3. Sonneborn, ChemRex, Inc; [www.chemrex.com](http://www.chemrex.com).
  - 4. Tremco, Inc; [www.tremcosealants.com](http://www.tremcosealants.com).
  - 5. Substitutions: See Section 01600 - Product Requirements.
- C. Butyl Sealants:
  - 1. Bostik Findley; [www.bostikfindley-us.com](http://www.bostikfindley-us.com).
  - 2. Pecora Corporation; [www.pecora.com](http://www.pecora.com).
  - 3. TEC Specialty Products Inc.
  - 4. Tremco, Inc; [www.tremcosealants.com](http://www.tremcosealants.com).

## SECTION 07900

### JOINT SEALERS

5. Substitutions: See Section 01600 - Product Requirements.
- D. Preformed Compressible Foam Sealers:
  1. Emseal Joint Systems, Ltd: [www.emseal.com](http://www.emseal.com).
  2. Sandell Manufacturing Company, Inc: [www.sandellmfg.com](http://www.sandellmfg.com).
  3. Polytite Manufacturing Corporation: [www.polytite.com](http://www.polytite.com).
  4. Substitutions: See Section 01600 - 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 - Acoustical Sealant: Butyl or acrylic sealant; ASTM C 920, Grade NS, Class 12-1/2, Uses M and A; single component, solvent release curing, non-skinning.
  1. Color: N/A.
  2. Applications:
    - a. For concealed locations only.
    - b. Sealant bead between top stud runner and structure; and between bottom stud track and floor.
- D. Type S4 - 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.
- E. Type S5 - 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.



## **SECTION 07900**

### **JOINT SEALERS**

#### **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 S5.
- 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 S4.
- G. In STC-Rated Walls, Between Metal Stud Track/Runner and Adjacent Construction: Type S3.
- H. Joints Between Plumbing Fixtures and Walls and Floors, and Between Countertops and Walls: Type S2.

**END OF SECTION**



## SECTION 09511

### SUSPENDED ACOUSTICAL 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 15940 – Air Outlets and Inlets.
- B. Section 16510 – Interior Luminaires.

##### 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 01300 - 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.

## SECTION 09511

### SUSPENDED ACOUSTICAL CEILINGS

#### 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.

## SECTION 09511

### SUSPENDED ACOUSTICAL CEILINGS

#### 1.10 EXTRA MATERIALS

- A. See Section 01600 - 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. Basis of Design: CertainTeed Ceilings: [www.certainteed.com](http://www.certainteed.com)
  - 2. Other acceptable manufacturer: Armstrong World Industries, Inc.: [www.armstrong.com](http://www.armstrong.com)
  - 3. Substitutions: See Section 01600 - 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 – Vinyl faced acoustical ceiling tile, with the following characteristics:
  - 1. Basis of Design: CertainTeed: Performa Aquarock (1180-CRF-1SV).
  - 2. Size: 24 x 48 inches.
  - 3. Thickness: 1/2 inches.
  - 4. Composition: Paperless, exterior sheathing this is mold and abuse resistant embedded reinforced gypsum (EGRG).
  - 5. Light Reflectance: .78
  - 6. CAC Rating: 42
  - 7. Edge: Trim (Square).
  - 8. Surface Color: White.
  - 9. Other characteristics:
    - a. Sag Resistant
    - b. Mold Resistant
    - c. Washable
    - d. Washable with Sanitizing Chemicals
    - e. Fire Class A, ASTM E1264
  - 10. Other acceptable products:
    - a. Armstrong: Cermaguard (605).
      - 1) Unperforated, 5/8" thickness.
      - 2) Aluminum grid system as specified below.
  - 11. Suspension System: Exposed aluminum grid system as specified below.

##### 2.2 SUSPENSION SYSTEMS

- A. Manufacturers:
  - 1. Armstrong World Industries, Inc.: [www.armstrong.com](http://www.armstrong.com)
  - 2. USG Interiors, Inc.: [www.usg.com](http://www.usg.com)
  - 3. Chicago Metallic Corp.; [www.chicagometallic.com](http://www.chicagometallic.com)
  - 4. Substitutions: See Section 01600 - 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 Aluminum Suspension System: Narrow-Face, Double-Web, Extruded-Aluminum Suspension System: Main and cross runners formed from extruded aluminum to produce structural members; intermediate-duty.
  - 1. Body Construction: Aluminum
  - 2. Cap Construction: Aluminum
  - 3. Basis of Design: Armstrong-Prelude ALXL
    - a. Profile: Tee, **15/16 inch wide face.**
    - b. Face Finish: Painted white.
- D. Single-Source: As stated above in Article 1.5, acoustical panel and grid components shall be single-sourced from one manufacturer. However, if an acoustical panel manufacturer does not

## SECTION 09511

### SUSPENDED ACOUSTICAL CEILINGS

offer an all-aluminum grid product as specified, it is acceptable to provide grid products from one of the manufacturers listed in Part A. above. The grid product must be 100% compatible and warrantable with the acoustical panel product being used.

#### 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.

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### **SUSPENDED ACOUSTICAL CEILINGS**

- 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 09900

### PAINTS AND COATINGS

#### PART 1 – GENERAL

##### 1.1 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints and other coatings.
- C. See Schedule - Surfaces to be Finished, at end of Section.

##### 1.2 RELATED SECTIONS

- A. Section 01230 – Bid Alternates
- B. Section 05500 - Metal Fabrications: Shop-primed items.

##### 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 01300 - 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 01400 - 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.

## SECTION 09900

### PAINTS AND COATINGS

- E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

#### 1.11 EXTRA MATERIALS

- A. See Section 01600 - 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](http://www.gliddenprofessional.com)
  - 2. Benjamin Moore & Co.; [www.benjaminmoore.com](http://www.benjaminmoore.com)
  - 3. PPG Pittsburgh Paints; [www.ppg.com](http://www.ppg.com)
  - 4. Sherwin-Williams Co; [www.sherwin-williams.com](http://www.sherwin-williams.com)
- B. Primer Sealers:
  - 1. Glidden Professional; [www.gliddenprofessional.com](http://www.gliddenprofessional.com)
  - 2. Benjamin Moore & Co.; [www.benjaminmoore.com](http://www.benjaminmoore.com)
  - 3. PPG Pittsburgh Paints; [www.ppg.com](http://www.ppg.com)
  - 4. Sherwin-Williams Co; [www.sherwin-williams.com](http://www.sherwin-williams.com)
- C. Block Fillers:
  - 1. Glidden Professional; [www.gliddenprofessional.com](http://www.gliddenprofessional.com)
  - 2. Benjamin Moore & Co.; [www.benjaminmoore.com](http://www.benjaminmoore.com)
  - 3. PPG Pittsburgh Paints; [www.ppg.com](http://www.ppg.com)
  - 4. Sherwin-Williams Co; [www.sherwin-williams.com](http://www.sherwin-williams.com)
- D. Substitutions: See Section 01600 - 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 – INTERIOR

- A. New and Existing Concrete Masonry Walls, Opaque, High Performance Interior Paint Epoxy System (Water Base), 3 Coat, Semi-Gloss-High Luster Finish:
  - 1. First Coat: Benjamin Moore: Corotech Acrylic Block Filler V114, or equal.
  - 2. Second Coat: Benjamin Moore: Corotech Waterborne Amine Epoxy V440, or equal.
  - 3. Third Coat: Benjamin Moore: Corotech Waterborne Amine Epoxy V440, or equal.
  - 4. Do NOT paint the existing glazed block walls or glazed block wall base.
- B. Existing Aluminum Ceiling tiles, Opaque, High Performance Interior Paint System, 3 Coat, Low Sheen Finish:
  - 1. First Coat: Benjamin Moore: Super Spec HP Acrylic Metal Primer P04, or equal.
  - 2. Second Coat: Benjamin Moore: Ultra Spec HP D.T.M. Acrylic Low Luster Enamel HP25, or equal.
  - 3. Third Coat: Benjamin Moore: Ultra Spec HP D.T.M. Acrylic Low Luster Enamel HP25, or equal.
- C. New Exposed Metal Ductwork, Opaque, High Performance Interior Paint System, 3 Coat, Semi-Gloss Finish:
  - 1. First Coat: Benjamin Moore: Ultra Spec D.T.M. Acrylic Gloss Enamel HP 28, or equal.
  - 2. Second Coat: Benjamin Moore: Ultra Spec HP D.T.M. Semi-Gloss Enamel HP29, or equal.
  - 3. Third Coat: Benjamin Moore: Ultra Spec HP D.T.M. Semi-Gloss Enamel HP29, or equal.

## SECTION 09900

### PAINTS AND COATINGS

#### 2.4 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 are 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.

## SECTION 09900

### PAINTS AND COATINGS

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. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. 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. 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.
- C. 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.

#### 3.7 SCHEDULE - PAINT COLOR

- A. P-1: Existing Aluminum Ceiling, color to be selected by the Architect from the manufacturer's full range.
- B. P-2: New Exposed metal ductwork, color to be selected by the Architect from the manufacturer's full range.
- C. P-3: New and Existing CMU walls, color to be selected by the Architect from the manufacturer's full range.
  - 1. NOTE: Do not paint the existing glazed block or glazed block wall base.
  - 2. Refer to Section 01230 for further information on Bid Alternates that affect this work.

**END OF SECTION**

## **SECTION 15010**

### **BASIC MECHANICAL REQUIREMENTS**

#### **PART 1 GENERAL**

##### **1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this and the other sections of Division 15 and Division 17.

##### **1.2 SUMMARY**

- A. This Section includes general administrative and procedural requirements for mechanical installations. The following administrative and procedural requirements are included in this Section to expand the requirements specified in Division 1:
  - 1. Item
  - 2. Submittals.
  - 3. Coordination drawings.
  - 4. Record documents.
  - 5. Maintenance manuals.
  - 6. Rough-ins.
  - 7. Mechanical installations.
  - 8. Cutting and patching.

##### **1.3 DEFINITIONS**

- A. Furnish: To purchase; fabricate, as applicable; and deliver to designated location on job site.
- B. Install: To locate and make all necessary connections for complete and operating system. Installing contractor shall provide all necessary labor and miscellaneous piping, fittings, connectors, ductwork, etc. as required for installation and startup. Installing contractor shall also be responsible for all warranties, including the coordination and implementation of all factory warranties, regardless of whether or not the installing contractor has furnished the equipment.
- C. Provide: To furnish and install.

##### **1.4 CODES AND STANDARDS**

- A. Code Compliance: Comply with all applicable codes pertaining to product materials and installations.
- B. All product materials and work shall comply to all local codes, including but not limited to the following codes and standards as applicable, in addition to any codes and standards referenced within individual specification sections. These codes and standards shall apply to all Division 15 Sections as applicable.
  - 1. Americans with Disabilities Act (ADA)
  - 2. American Gas Association (AGA)
  - 3. American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE)
  - 4. American Society of Mechanical Engineers (ASME)
  - 5. Air Moving and Conditioning Associates (AMCA)
  - 6. American Society for Testing and Materials (ASTM)
  - 7. American Society of Plumbing Engineers (ASPE)
  - 8. American National Standard Institute (ANSI)
  - 9. Air Conditioning and Refrigeration Institute (ARI)
  - 10. International Building Code
  - 11. International Mechanical Code
  - 12. Factory Mutual
  - 13. National Electric Code (NEC)
  - 14. National Electric Manufacturers' Association (NEMA)
  - 15. All applicable sections of National Fire Protection Association (NFPA)
  - 16. Underwriters' Laboratories (UL)
  - 17. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)

## **SECTION 15010**

### **BASIC MECHANICAL REQUIREMENTS**

#### **1.5 SUBMITTALS**

- A. General: Follow the procedures specified in Division 1 Sections, and additional defined below.
- B. Increase by one copy the number of mechanical related shop drawings, product data, and samples submitted, as required and defined in Division 2, to allow for required distribution. This copy will be retained by the Consulting Engineer.
- C. Additional copies may be required by individual sections of these Specifications.
- D. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Deviations included within shop drawings shall not be acceptable unless they are clearly identified as deviations. Deviations from the Contract Documents shall only be acceptable subsequent to the deviation being specifically submitted in writing, and responded to by the architect and engineer.

#### **1.6 RECORD DOCUMENTS**

- A. Prepare record documents in accordance with the requirements in Division 1 Sections and other Division 15 Sections. In addition to the requirements specified in Division 1, indicate the following installed conditions:
  - 1. Provide one (1) digital copy (CD) and one (1) full size paper copy of "as-built" drawings with all information and meeting the requirements as described under "Coordination Drawings" in this sections. MARKED UP COPIES OF THE DESIGN DOCUMENTS ARE NOT ACCEPTABLE.
  - 2. Approved substitutions, Contract Modifications, and actual equipment and materials installed.
  - 3. The as-built drawings shall indicate the electrical installations as "installed" and required as described under "Coordination Drawings" and "Record Drawings".
  - 4. As-Built drawings shall be complete on contractors own "Title Block".

#### **1.7 MAINTENANCE MANUALS**

- A. Prepare maintenance manuals in accordance with Division 1 Sections. In addition to the requirements specified in Division 1, include the following information for equipment items:
  - 1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
  - 2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
  - 3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
  - 4. Servicing instructions and lubrication charts and schedules.

#### **1.8 WARRANTIES**

- A. The Contractor shall warrant all Mechanical Work to be free of faults and defects in accordance with the General Conditions and Supplementary Conditions for a minimum period of one (1) year from final acceptance of the work. This shall include all materials and labor. Extended warranties shall be provided as indicated in other sections of these Specifications.
- B. The Contractor shall submit signed warranties for installations, equipment and fixtures required by this section and other sections of these Specifications.

#### **1.9 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.
- B. Store and protect products under provisions of Division 1 General Requirements.
- C. Deliver and store material in shipping containers with labeling in place.

## SECTION 15010

### BASIC MECHANICAL REQUIREMENTS

- D. Contractor shall store all materials shipped to this site in a protected area. If material is stored outside of the building, it must be stored off the ground a minimum of six inches set on 6 x 6 planks and/or wood pallets. All material must be completely covered with waterproof tarps or visquin. All piping will have the ends closed to keep out dirt and other debris. No equipment will be allowed to be stored on the site unless it is sitting on wood planks and is completely protected with weatherproof covers.

### PART 2 PRODUCTS

(Not Applicable)

### PART 3 EXECUTION

#### 3.1 ROUGH-IN

- A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.
- B. Refer to equipment specifications in Divisions 2 through 17 for additional rough-in requirements.

#### 3.2 MECHANICAL INSTALLATIONS

- A. General: Sequence, coordinate, and integrate the various elements of mechanical systems, materials, and equipment. Comply with the following requirements:
1. Coordinate mechanical systems, equipment, and materials installation with other building components.
  2. Verify all dimensions by field measurements.
  3. Confirm and arrange for chases, slots, and openings in other building components during progress of construction, to allow for mechanical installations.
  4. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
  5. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
  6. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
  7. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
  8. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Architect.
  9. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components.
  10. Install mechanical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location and purge all extended hoses with grease. Use extreme pressure grease to match District standards.
  11. Install access panel or doors where units are concealed behind finished surfaces. Access panels and doors are specified in Division 15 Section - Ductwork Accessories.
  12. Indicate locations and sizes for all access panels or doors where required for service of mechanical devices. Provide this information to the mason and/or drywall contractor before construction of corresponding partition.

## SECTION 15010

### BASIC MECHANICAL REQUIREMENTS

13. Access doors shall be required for service of any concealed device such as fire dampers, valves, fans, controls, and coils. As much as practical, locate these devices in readily accessible locations.
14. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.
15. General Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of the systems in a diagrammatic form only. Location and arrangement of pipe, duct, and equipment lay-out shall take into consideration pipe/duct sizing and pressure loss, expansion, pump/fan sizing, and other design considerations. So far as practical, install system as indicated. Refer to individual system specifications for requirements for coordination drawing submittals. Adjust routing and provide all offsets, fittings, etc., as required for coordination with building and all other systems at no additional cost to the owner. All deviations from the design drawings shall be reflected on the shop drawings for review by the architect and engineer before proceeding with fabrication or installation.
16. Where drawings, specifications or notes conflict one another the contractor shall immediately advise the architect of such conflicts. For purposes of bidding and pending written receipt of any direction to the contrary, the contractor shall include in his proposal the more expensive alternate described.

#### 3.3 CUTTING AND PATCHING

- A. General: Perform cutting and patching in accordance with Division 1 Sections. In addition to the requirements specified in Division 1, the following requirements apply:
  1. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.
- B. Perform cutting, fitting, and patching of mechanical equipment and materials required to:
  1. Uncover Work to provide for installation of ill-timed Work.
  2. Remove and replace defective Work.
  3. Remove and replace Work not conforming to requirements of the Contract Documents.
  4. Remove samples of installed Work as specified for testing.
  5. Upon written instructions from the Architect, uncover and restore Work to provide for Architect/Engineer observation of concealed Work.
- C. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.
  1. Patch finished surfaces and building components using new materials specified for the original installation and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.
- D. All piping penetrations to be by contractor including sleeves and patching. Use coring whenever possible through concrete and masonry.
- E. Contractor to fire safe and seal all wall penetrations for ductwork, piping, conduits, etc. in new and existing walls or floors.

END OF SECTION



## SECTION 15020

### MECHANICAL DEMOLITION

#### PART 1 GENERAL

##### 1.1 REQUIREMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

##### 1.2 DESCRIPTION OF WORK

- A. Contractor shall provide all labor, materials, tools, equipment and services for the complete demolition, removal, and legal disposal of existing abandoned equipment; chillers, cooling towers, air cooled condensing units, refrigerant, piping, boilers, tanks, concrete pads, pumps, ductwork, associated controls, associated structural supports, hangers, rods, supports, anchors, miscellaneous hardware, miscellaneous equipment, removal of appurtenant equipment and materials, and lawfully dispose of all equipment, and materials rendered obsolete off the premises.
  - 1. Recover and dispose of legally, all refrigerants in equipment being demolished, removed or modified. Prior to the disposal of any refrigerant, give the owner the option of salvaging. Reclaim of refrigerant shall be performed by personnel certified in refrigerant reclaim by the State of Illinois.
  - 2. Drain down entire piping system, flush and fill.
  - 3. Disconnect, remove, transport, properly and lawfully dispose of all incidental and miscellaneous materials, hardware, equipment associated with the above items.
  - 4. Maintain temporary warning signage, barricades, yellow protection tape, warning lights, and other similar items around any areas that create a hazard during the demolition process.
  - 5. Remove indicated piping including all associated hangers, rods, supports, channels, trapeze and anchors, and patching of existing walls, floors, slabs and ceilings to match existing conditions in all respects.
  - 6. Remove concrete housekeeping pads for existing, pumps, strainers and miscellaneous equipment scheduled for demolition. Repair floors to match existing conditions, in all respects.
  - 7. Where disturbed by demolition of mechanical equipment, patch existing walls, ceilings, floor surfaces with materials and workmanship to match existing conditions. Where surfaces are painted and components are removed, walls shall be painted to match existing conditions by this contractor.
  - 8. Coordinate all demolition with Division 16 contractor for shut down of electrical power. Do not proceed with mechanical demolition until all electrical power has been safely disconnected from equipment to be demolished.
  - 9. Coordinate with Owner any existing equipment/devices that the Owner wants to salvage.

##### 1.3 REQUIREMENTS

- A. Contractor shall provide caution and warning signs at all hazardous areas and at all door entries to construction rooms and areas during the entire construction period per IEPA law and regulations.

##### 1.4 MAINTAIN CONTINUITY OF SERVICE

- A. Any downtime time periods shall be at the convenience of the Owner and approved by the Architect. Contractor shall give a minimum of 30 days prior written notice to the Architect in advance of any desired shutdown. Prior written notice shall include a schedule for downtime, work to be performed, complete with detailed drawings indicating all temporary wiring and equipment. All downtime periods shall be on weekends or off hours with exact time period approved in advance in writing by the Architect. Coordinate an overall schedule that is to be submitted and approved by the Architect.
- B. An electrician shall be on the premises when any trade is working in close proximity to live equipment or within electric rooms during renovations by any trade.
- C. All premium time, overtime, labor, material and equipment costs required to accomplish the above shall be included in the Contractor's bid proposal.

## SECTION 15020

### MECHANICAL DEMOLITION

#### 1.5 PROTECTION

- A. Perform removal of equipment and related components, in such manner as to eliminate hazards to persons and property; to minimize interference with use of adjacent areas, utilities and structures or interruption of use of such utilities; and to provide free passage to and from such adjacent areas of structures.
- B. Provide safeguards, including warning signs, barricades, temporary fences, warning lights, and other similar items that are required for protection of all personnel during demolition and removal operations.
  - 1. Wherever a cutting torch or other equipment that might cause a fire is used, provide and maintain fire extinguishers nearby ready for immediate use. All possible users shall be instructed in use of fire extinguishers. For each area in which a cutting torch or welding apparatus is used, a designated fire watchman shall be appointed.
  - 2. Contractor shall notify the Architect in writing of the time and location that cutting torches or welding equipment is used. The notice shall be turned in to the Architect prior to commencing work. Due to this being an occupied building, protect adjacent areas from cutting torch flame.

#### PART 2 PRODUCTS

Not Used

#### PART 3 EXECUTION

##### 3.1 DEMOLITION

- A. Verify existing conditions and locations in field prior to submitting proposal. Failure to do so shall not relieve this contractor from performing the work required under this contract.
- B. Remove all piping indicated to be demolished back to associated main, terminating with branch capped as short as possible.
- C. All equipment and materials shall be removed from the premises. Materials and equipment becomes the property of the contractor and shall be legally disposed of.
- D. Provide all cutting, coring and patching and fire sealing as required for demolition work.
- E. The demolition drawings may be helpful in determining existing conditions, however they are based on original contract drawings and not "AS-BUILT". They do not show modifications made after the original construction.
- F. Maintain continuity of all existing systems for all buildings at all times.
- G. All demolition of the HVAC system as called for on the demolition drawings shall be under the mechanical (HVAC) contractors work.
- H. Mechanical contractor shall visit the building, before submitting his bid, to verify the existing conditions which will affect his work.
- I. Before starting any demolition on HVAC equipment which has an electrical connection. The mechanical contractor shall meet with the electrical contractor to identify all such equipment. The electrical contractor will disconnect the power to each unit, remove conduit, wiring, disconnect switches, and starters under his contract. Mechanical contractor will remove all equipment, electrical temperature control wiring, disconnect switches and starters under his contract. Mechanical contractor will remove all equipment, electrical temperature control wiring and conduit under this contract.
- J. Mechanical contractor shall verify size of all existing openings, doors, etc. for getting equipment and material out of building. Mechanical contractor shall provide any new or enlarged openings in existing building construction required to facilitate exiting of his equipment/material and restore such openings to their original state after completion.
- K. Mechanical contractor shall be responsible for his own clean-up throughout the course of the demolition work.

## **SECTION 15020**

### **MECHANICAL DEMOLITION**

- L. All equipment, material, etc. that is being demolished will become the property of the mechanical contractor. All such items will be removed from the building site by the mechanical contractor. No item which is being removed under the demolition contract may be reused under the new work contract.
- M. Sequence of all demolition work shall be in strict accordance with the specifications, drawings and/or as directed by Engineer.
- N. The contractor performing the demolition work shall remove no more than 8" of building material around each device being demolished.
- O. Remove all abandoned ductwork not being reused under the new construction. Field verify all conditions.

#### **3.2 FLOOR AND WALL OPENINGS**

- A. Openings through floors and walls where piping, ductwork or equipment has been removed shall be sealed to maintain any fire ratings and to seal off cold, smoke and toxic fumes.

#### **3.3 DAMAGE TO OTHER WORK**

- A. The Contractor shall be held responsible for any damage caused to existing installations not pertinent to the Contract. The cost of repairs to such damaged work shall be charged against the Contractor.

#### **3.4 CLEAN-UP**

- A. On completion of work of this section and after removal of all debris, site shall be left in clean condition satisfactory to the Architect. Clean up shall include off the premises disposal of all items and materials not required to remain the property of the Contractor as well as all debris and rubbish resulting from demolition operations.
- B. Debris, including brick, asphalt, concrete, stone, and similar materials shall become property of Contractor and shall be disposed of by the Contractor, off the property. Remove concrete foundations, conduits, anchor bolts, and all appurtenances.

**END OF SECTION**



## SECTION 15140

### SUPPORTS AND ANCHORS

#### PART 1 GENERAL

##### 1.1 WORK INCLUDED

- A. Pipe and equipment hangers and supports.
- B. Sleeves and seals.
- C. Flashing and sealing equipment and pipe stacks.

##### 1.2 RELATED SECTIONS

- A. Section 15242 - Vibration Isolation.
- B. Section 15870 - Power Ventilators.

##### 1.3 REFERENCES

- A. ASTM International:
  - 1. ASTM E119 – Standard Test Methods for Fire Tests of Building Construction and Materials.
  - 2. ASTM E814 – Standard Test Method for Fire Tests of Through Penetration Fire Stops.
  - 3. ASTM F708 – Standard Practice for Design and Installation of Rigid Pipe Hangers.
  - 4. ASTM E1966 – Standard Test Method for Fire-Resistive Joint Systems.
- B. American Welding Society:
  - 1. AWS D1.1 – Structural Welding Code – Steel.
- C. FM Global:
  - 1. FM – Approved Guide, A Guide to Equipment, Materials & Services Approved by Factory Mutual Research for Property Conservation.
- D. Underwriters Laboratories, Inc.
  - 1. UL 263 – Fire Tests of Building Construction and Materials.
  - 2. UL 723 – Tests for Surface Building Characteristics of Building Materials.
  - 3. UL 1479 – Fire Tests of Through-Penetration Firestops.
  - 4. UL 2079 – Tests for Fire Resistance of Building Joint Systems.
  - 5. UL – Fire Resistance Directory.

##### 1.4 DEFINITIONS

- A. Firestopping (Through-Penetration Protection System): Sealing or stuffing material or assembly placed in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat, and hot gases through fire rated construction.

##### 1.5 SUBMITTALS

- A. Submit under provisions of Division 1 General Requirements.
- B. Shop Drawings: Indicate system layout with location and detail of trapeze hangers.
- C. Product Data: Provide manufacturers catalog data including load capacity.
- D. Design Data: Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers.
- E. Manufacturer's Installation Instructions: Indicate special procedures and assembly of components.

##### 1.6 REGULATORY REQUIREMENTS

- A. Conform to 2012 International Mechanical Code.

#### PART 2 PRODUCTS

##### 2.1 ACCESSORIES

- A. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.

##### 2.2 FLASHING

- A. Metal Flashing: 26 gage stainless steel.
- B. Metal Counterflashing: 22 gage stainless steel.

## SECTION 15140

### SUPPORTS AND ANCHORS

- C. Lead Flashing:
  - 1. Waterproofing: 5 lb/sq ft sheet lead.
  - 2. Soundproofing: 1 lb/sq ft sheet lead.
- D. Flexible Flashing: 47 mil thick sheet compatible with roofing.
- E. Caps: Stainless steel, 22 gage minimum; 16 gage at fire resistant elements.

#### 2.3 EQUIPMENT CURBS

- A. Manufacturers:
  - 1. Thycurb.
  - 2. Pate.
  - 3. Approved Equal.
- B. Fabrication: Welded 18 gage stainless steel or aluminum shell and base, mitered 3 inch cant, 1- 1/2 inch thick insulation, factory installed wood nailer, 18 inches high, see architectural drawings for additional information.

#### 2.4 SLEEVES

- A. Sleeves for Pipes through Non-fire Rated Floors: 18 gage galvanized steel.
- B. Sleeves for Pipes through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage galvanized steel.
- C. Sleeves for Pipes through Fire Rated and Fire Resistive Floors and Walls, and Fire Proofing: Prefabricated fire rated sleeves including seals, UL listed.
- D. Sleeves for Round Ductwork: Galvanized steel.
- E. Sleeves for Rectangular Ductwork: Galvanized steel.
- F. Firestopping Insulation: Glass fiber type, non-combustible.
- G. Sealant: Acrylic.

#### 2.5 MECHANICAL SLEEVE SEALS

- A. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

#### 2.6 FORMED STEEL CHANNEL

- A. Product Description: Galvanized 12-gauge thick steel. With holes 1-1/2 inches on center.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

#### 3.2 PIPE HANGERS AND SUPPORTS

- A. Support horizontal piping as scheduled.
- B. Install hangers to provide minimum 2 inch space between finished covering and adjacent work.
- C. Place hangers within 12 inches of each horizontal elbow.
- D. Use hangers with 1- 1/2 inch minimum vertical adjustment.
- E. Support horizontal cast iron pipe adjacent to each hub, with 5 feet maximum spacing between hangers.
- F. Support vertical piping at every floor. Support vertical cast iron pipe at each floor at hub.
- G. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- H. Support riser piping independently of connected horizontal piping.
- I. Provide copper plated hangers and supports for copper piping.
- J. Design hangers for pipe movement without disengagement of supported pipe.

## SECTION 15140

### SUPPORTS AND ANCHORS

#### 3.3 EQUIPMENT BASES AND SUPPORTS

- A. Provide housekeeping pads of concrete, minimum 6 inches thick and extending 6 inches beyond supported equipment.
- B. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.
- C. Construct supports of steel members. Brace and fasten with flanges bolted to structure.
- D. Provide rigid anchors for pipes after vibration isolation components are installed.

#### 3.4 FLASHING

- A. Provide flexible flashing and metal counterflashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.
- B. Flash vent and soil pipes projecting 3 inches minimum above finished roof surface with lead worked one inch minimum into hub, 8 inches minimum clear on sides with 24 x 24 inches sheet size. For pipes through outside walls, turn flanges back into wall and caulk, metal counterflash, and seal.
- C. Flash floor drains in floors with topping over finished areas with lead, 10 inches clear on sides with minimum 36 x 36 inch sheet size. Fasten flashing to drain clamp device.
- D. Seal floor, shower and mop sink drains watertight to adjacent materials.
- E. Provide curbs for mechanical roof installations 18 inches minimum high above roofing surface. Flash and counterflash with sheet metal; seal watertight. Attach counterflashing mechanical equipment and lap base flashing on roof curbs. Flatten and solder joints. Roof curbs shall match roof pitch.
- F. Adjust storm collars tight to pipe with bolts; caulk around top edge. Use storm collars above roof jacks. Screw vertical flange section to face of curb.

#### 3.5 SLEEVES

- A. Set sleeves in position in wall.
- B. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- C. Where piping or ductwork penetrates floor, ceiling, or wall, close off space between pipe or duct and adjacent work with fire stopping insulation and caulk air tight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
- D. Install chrome plated steel escutcheons at finished surfaces.

## SECTION 15140

### SUPPORTS AND ANCHORS

#### 3.6 SCHEDULES

##### A. Copper and Steel Pipe Hanger Spacing:

| PIPE SIZE<br>Inches | COPPER TUBING<br>MAXIMUM<br>HANGER SPACING<br>Feet | STEEL PIPE<br>MAXIMUM<br>HANGER SPACING<br>Feet | COPPER<br>TUBING<br>HANGER ROD<br>DIAMETER<br>Inches | STEEL PIPE<br>HANGER ROD<br>DIAMETER<br>Inches |
|---------------------|----------------------------------------------------|-------------------------------------------------|------------------------------------------------------|------------------------------------------------|
| 1/2                 | 5                                                  | 7                                               | 3/8                                                  | 3/8                                            |
| 3/4                 | 5                                                  | 7                                               | 3/8                                                  | 3/8                                            |
| 1                   | 6                                                  | 7                                               | 3/8                                                  | 3/8                                            |
| 1-1/4               | 7                                                  | 7                                               | 3/8                                                  | 3/8                                            |
| 1-1/2               | 8                                                  | 9                                               | 3/8                                                  | 3/8                                            |
| 2                   | 8                                                  | 10                                              | 3/8                                                  | 3/8                                            |
| 2-1/2 (Note 2)      | 9                                                  | 11                                              | 1/2                                                  | 1/2                                            |
| 3                   | 10                                                 | 12                                              | 1/2                                                  | 1/2                                            |
| 4                   | 12                                                 | 14                                              | 1/2                                                  | 5/8                                            |
| 5                   | 13                                                 | 16                                              | 1/2                                                  | 5/8                                            |
| 6                   | 14                                                 | 17                                              | 5/8                                                  | 3/4                                            |
| 8                   | 16                                                 | 19                                              | 3/4                                                  | 3/4                                            |

##### B. Plastic and Ductile Iron Pipe Hanger Spacing:

| PIPE MATERIAL         | MAXIMUM HANGER SPACING<br>Feet | HANGER ROD DIAMETER<br>Inches |
|-----------------------|--------------------------------|-------------------------------|
| ABS (All sizes)       | 4                              | 3/8                           |
| FRP (All Sizes)       | 4                              | 3/8                           |
| Ductile Iron (Note 2) |                                |                               |
| PVC (All Sizes)       | 4                              | 3/8                           |

C. Note 1: Refer to manufacturer's recommendations for grooved end piping systems.

D. Note 2: 20 feet maximum spacing, minimum of one hanger for each pipe section close to joint behind bell. Provide hanger at each change of direction and each branch connection. For pipe sizes 6 inches and smaller, subjected to loadings other than weight of pipe and contents, limit span to maximum spacing for water service steel pipe.

**END OF SECTION**



## SECTION 15170

### MOTORS

#### PART 1 GENERAL

##### 1.1 WORK INCLUDED

- A. Three phase electric motors.

##### 1.2 REFERENCES

- A. AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
- B. AFBMA 11 - Load Ratings and Fatigue Life for Roller Bearings.
- C. IEEE 112 - Test Procedure for Polyphase Induction Motors and Generators.
- D. NEMA MG 1 - Motors and Generators.
- E. NFPA 70 - National Electrical Code.

##### 1.3 SUBMITTALS

- A. Submit under provisions of Division 1 General Requirements.
- B. Product Data: Provide wiring diagrams with electrical characteristics and connection requirements.
- C. Manufacturer's Installation Instructions: Indicate setting, mechanical connections, lubrication, and wiring instructions.

##### 1.4 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Division 1 General Requirements.
- B. Operation Data: Include instructions for safe operating procedures.
- C. Maintenance Data: Include assembly drawings, bearing data including replacement sizes, and lubrication instructions.

##### 1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacture of electric motors for commercial use, and their accessories, with minimum three (3) years documented product development, testing, and manufacturing experience.

##### 1.6 REGULATORY REQUIREMENTS

- A. Conform to NFPA 70 and ANSI.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., as suitable for the purpose specified and indicated.

##### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Division 1 General Requirements.
- B. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering.

##### 1.8 WARRANTY

- A. Provide five (5) year warranty under provisions of Division 1 General Requirements.
- B. Warranty: Include coverage for motors larger than 5 horsepower.

#### PART 2 PRODUCTS

##### 2.1 MANUFACTURERS

- A. Century E + 3 High Efficiency.
- B. Lincoln.
- C. Reliance.
- D. Dayton.
- E. General Electric.
- F. No substitutions.

## SECTION 15170

### MOTORS

#### 2.2 GENERAL CONSTRUCTION AND REQUIREMENTS

- A. Electrical Service:
  - 1. Motors 1/2 HP and Smaller: 208 or 120 volts, single phase, 60 Hz.
  - 2. Motors Larger than 3/4 Horsepower: 460 volts, three phase, 60 Hz.
- B. Type:
  - 1. Open drip-proof except where specifically noted otherwise.
  - 2. Motors: Design for continuous operation in 40 degrees C environment.
  - 3. Design for temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.
  - 4. Motors with frame sizes 184T and larger: Energy Efficient Type equal to Century E + 3.
- C. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, efficiency.
- D. Wiring Terminations:
  - 1. Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70, threaded for conduit.
  - 2. For fractional horsepower motors where connection is made directly, provide threaded conduit connection in end frame.

#### 2.3 THREE PHASE POWER - SQUIRREL CAGE MOTORS

- A. Starting Torque: Between 1 and 1- 1/2 times full load torque.
- B. Starting Current: Six times full load current.
- C. Power Output, Locked Rotor Torque, Breakdown or Pull Out Torque: NEMA Design B characteristics.
- D. Design, Construction, Testing, and Performance: Conform to NEMA MG 1 for Design B motors.
- E. Insulation System: NEMA Class B or better.
- F. Testing Procedure: In accordance with IEEE 112. Load test motors to determine free from electrical or mechanical defects in compliance with performance data.
- G. Motor Frames: NEMA Standard T-Frames of steel, aluminum, or cast iron with end brackets of cast iron or aluminum with steel inserts.
- H. Thermistor System Motor Frame Sizes 254T and Larger: Three PTC thermistors imbedded in motor windings and epoxy encapsulated solid state control relay for wiring into motor starter.
- I. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum AFBMA 9, L- 10 life of 20,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt center line at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate. Replace plugs at completion of project and provide grease fittings.
- J. Sound Power Levels: To NEMA MG 1.
- K. Part Winding Start Above 254T Frame Size: Use part of winding to reduce locked rotor starting current to approximately 60 percent of full winding locked rotor current while providing approximately 50 percent of full winding locked rotor torque.
- L. Weatherproof Epoxy Sealed Motors: Epoxy seal windings using vacuum and pressure with rotor and starter surfaces protected with epoxy enamel; bearings double shielded with waterproof non-washing grease.
- M. Nominal Efficiency: As scheduled at full load and rated voltage when tested in accordance with IEEE 112.
- N. Nominal Power Factor: As scheduled at full load and rated voltage when tested in accordance with IEEE 112.

## SECTION 15170

### MOTORS

#### PART 3 EXECUTION

##### 3.1 APPLICATION

- A. Single phase motors for shaft mounted fans: Split phase type.
- B. Single phase motors for shaft mounted fans or blowers: Permanent split capacitor type.
- C. Motors located in exterior locations, air cooled condensers explosion proof environments and dust collection systems shall be: Totally enclosed type.

##### 3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install securely on firm foundation. Mount ball bearing motors with shaft in any position.
- C. Check line voltage and phase and ensure agreement with nameplate.
- D. Replace bearing plugs with grease fittings at project completion.

##### 3.3 NEMA OPEN MOTOR SERVICE FACTOR SCHEDULE

| HP       | 1800 RPM |
|----------|----------|
| 1/6- 1/3 | 1.35     |
| 2        | 1.25     |
| 3/4      | 1.25     |
| 1        | 1.15     |
| 1.5- 75  | 1.15     |

##### 3.4 PERFORMANCE SCHEDULE: THREE PHASE - ENERGY EFFICIENT, OPEN DRIP-PROOF

| HP    | RPM (Syn) | NEMA Frame | Minimum Percent Efficiency | Minimum Percent Power Factor |
|-------|-----------|------------|----------------------------|------------------------------|
| 1     | 1800      | 143T       | 82                         | 84                           |
| 1-1/2 | 1800      | 145T       | 84                         | 85                           |
| 2     | 1800      | 145T       | 84                         | 85                           |
| 3     | 1800      | 182T       | 86                         | 86                           |
| 5     | 1800      | 184T       | 87                         | 87                           |
| 7-1/2 | 1800      | 213T       | 88                         | 86                           |
| 10    | 1800      | 215T       | 89                         | 85                           |
| 15    | 1800      | 256T       | 91                         | 85                           |
| 20    | 1800      | 256T       | 91                         | 86                           |
| 25    | 1800      | 284T       | 91                         | 85                           |
| 30    | 1800      | 286T       | 92                         | 88                           |

## SECTION 15170

### MOTORS

#### 3.5 PERFORMANCE SCHEDULE: THREE PHASE-ENERGY EFFICIENT (E+3) TOTALLY ENCLOSED, FAN COOLED

| HP    | RPM (Syn) | NEMA Frame | Minimum Percent<br>Efficiency | Minimum Percent<br>Power Factor |
|-------|-----------|------------|-------------------------------|---------------------------------|
| 1     | 1800      | 143T       | 82                            | 84                              |
| 1-1/2 | 1800      | 145T       | 84                            | 85                              |
| 2     | 1800      | 145T       | 84                            | 85                              |
| 3     | 1800      | 182T       | 87                            | 83                              |
| 5     | 1800      | 184T       | 88                            | 83                              |
| 7-1/2 | 1800      | 213T       | 89                            | 85                              |
| 10    | 1800      | 215T       | 90                            | 84                              |
| 15    | 1800      | 254T       | 91                            | 86                              |
| 20    | 1800      | 256T       | 91                            | 85                              |
| 25    | 1800      | 284T       | 92                            | 84                              |
| 30    | 1800      | 286T       | 93                            | 86                              |

END OF SECTION

## SECTION 15190

### MECHANICAL IDENTIFICATION

#### PART 1 GENERAL

##### 1.1 WORK INCLUDED

- A. Nameplates.
- B. Tags.
- C. Stencils.
- D. Pipe Markers.

##### 1.2 RELATED SECTIONS

- A. Section 15890 - Ductwork.

##### 1.3 SUBMITTALS

- A. Submit under provisions of Division 1 General Requirements.
- B. Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- D. Product Data: Provide manufacturers catalog literature for each product required.

##### 1.4 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Division 1 General Requirements.
- B. Record actual locations of tagged valves.

#### PART 2 PRODUCTS

##### 2.1 NAMEPLATES

- A. Manufacturers:
  - 1. Laco.
  - 2. Seton.
  - 3. Brady.
- B. Description: Laminated three-layer plastic with engraved black letters on light contrasting background color.

##### 2.2 TAGS

- A. Manufacturers:
  - 1. Laco.
  - 2. Seton.
  - 3. Brady
- B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1- 1/2 inch diameter.
- C. Chart: Typewritten letter size list in anodized aluminum frame.

##### 2.3 STENCILS

- A. Stencil: Paint for labeling will not be accepted. All labeling will be with manufacturers labels and letters.

##### 2.4 PIPE MARKERS

- A. Color: Conform to ASME A13.1.
- B. 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.
- C. Plastic Tape Duct Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- D. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

## **SECTION 15190**

### **MECHANICAL IDENTIFICATION**

#### **PART 3 EXECUTION**

##### **3.1 PREPARATION**

- A. Degrease and clean surfaces to receive adhesive for identification materials.

##### **3.2 INSTALLATION**

- A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant stainless steel chain.
- C. Identify air handling units, pumps, heat transfer equipment, tanks, and water treatment devices with plastic nameplates. Small devices, such as in-line pumps, may be identified with tags. Do not identify cabinet/suspended unit heaters, unit ventilators, etc.
- D. Identify control panels and major control components outside panels with plastic nameplates.
- E. Identify air terminal units with numbered tags.
- F. Tag automatic controls, instruments, and relays. Key to control schematic.
- G. Identify piping, concealed or exposed, with plastic pipe markers. Use tags on piping 3/4 inch
- H. Identify ductwork with plastic tape markers. Identify type of service i.e. supply, return, fresh air, exhaust relief and direction of flow. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.

**END OF SECTION**

## SECTION 15242

### VIBRATION ISOLATION

#### PART 1 GENERAL

##### 1.1 WORK INCLUDED

- A. Vibration isolation for equipment.
- B. Flexible connections.

##### 1.2 RELATED EQUIPMENT SECTIONS

- A. Section 15870 – Power Ventilators.
- B. Section 15890 – Ductwork.

##### 1.3 REFERENCES

- A. ASHRAE – Guide to Average Noise Criteria Curves.

##### 1.4 QUALITY ASSURANCE

- A. Maintain ASHRAE criteria for average noise criteria curves for all equipment at full load condition.
- B. Provide all vibration isolators and equipment bases for Division 15 work from the product line of a single manufacturer, unless otherwise accepted by the Acoustics Consultant.
- C. Select isolators to provide uniform deflections within acceptable tolerances when supporting the equipment approved for this project. Coordinate as required with the equipment manufacturers to accomplish this.
- D. Provide engineering, isolator selection, site supervision, and inspection by manufacturer's personnel who shall perform these services directly. Alert the Engineer of isolator selections that may result in resonances with the equipment and structural systems they are intended to isolate. Replace isolators that upon installation are found to resonate with the supported equipment.
- E. Provide complete isolation systems that include all elements recommended by the manufacturer for compliance with project requirements and applicable codes, ordinances, and regulations. Include all incidental products and materials required for a complete installation even if not explicitly described in the Construction Documents.
- F. Install vibration isolation systems using skilled workers trained and licensed, as applicable, by the manufacturer for installations of the types used on this project. Upon completion of the Work, provide final inspection by the manufacturer's representative and submit to the Architect and Engineer a written report authored by the manufacturer's representative certifying the correctness of installation and compliance with the approved submittal data. Include tabulation of the static deflection expected under design and operating loads in comparison with the actual static deflection measured in the completed installations.

##### 1.5 UNACCEPTABLE TYPES

- A. Do not use housed spring mounts on this project. Mason models C, CI, and CS; Amber-Booth models XI and XK; Kinetics SL and SM; and similar mounts are not acceptable.
- B. Do not use captive spring mounts on this project. Provide seismic restraint by means of resilient snubbers at the perimeter of the equipment or equipment base and not by mounts that combine isolation and snubbing functions. Mason model SSLFH, Amber-Booth model SWPQ, and similar mounts are not acceptable.
- C. Do not use cork as an isolation material.
- D. Do not use braided metallic hose for vibration isolation in piping unless fluid temperatures and pressures are beyond the service range of spherical elastomeric isolators.

## SECTION 15242

### VIBRATION ISOLATION

#### 1.6 SUBMITTALS

- A. Submit manufacturer's data, shop drawings, and product performance certifications in accordance with Division 1.
- B. Manufacturer's Data: Submit technical product data confirming that products comply with specified requirements:
  - 1. Illustrations and descriptions of components including, but not limited to isolators, equipment bases, thrust and seismic restraints, anchors, and accessories.
  - 2. Operation and maintenance instructions.
- C. Shop Drawings
  - 1. Full-size details of isolation systems, including plan and section drawings indicating isolator and flexible connection locations and types, isolator and connector schedules, and installation details.
  - 2. Indicate substrate construction required of other subcontractors.
- D. Color code legend for spring and elastomer capacities.
- E. Samples: provide a sample of each type of isolator assembly used in the project. It is not necessary to submit samples of each spring capacity and pad hardness.
- F. Calculations: submit manufacturer's engineer's calculations of loads, deflections, and natural frequencies for record only.
- G. General Requirements for Vibration Isolation Mounts and Hangers: Provide catalog cut sheets, shop drawings, and other documents as necessary to describe the installation and its components.
  - 1. Springs:
    - a. Equipment name and number
    - b. Operating Weight of Equipment
    - c. Lowest reciprocating or rotating speed
    - d. Isolator type
    - e. Weight supported by isolator
    - f. Scheduled deflection
    - g. Proposed deflection under operating load
    - h. Natural Frequency
    - i. Spring free height
    - j. Spring operating height
    - k. Spring solid height at coil bind
    - l. Spring diameter
  - 2. Elastomeric Pads:
    - a. Equipment name and number
    - b. Operating Weight of Equipment
    - c. Isolator type
    - d. Weight supported by isolator
    - e. Pad bearing area
    - f. Pad free height
    - g. Pad operating height
    - h. Scheduled deflection
    - i. Proposed deflection under operating load
    - j. Percent deflection
    - k. Natural Frequency
    - l. Hardness and compliance with AASHTO Bridge Bearing Neoprene quality standard

#### 1.7 REGULATORY REQUIREMENTS

- A. Conform to 2012 International Mechanical Code.



## SECTION 15242

### VIBRATION ISOLATION

#### 1.8 MANUFACTURER RESPONSIBILITIES

- A. Manufacturer of vibration isolation equipment shall have the following responsibilities:
  - 1. Determine vibration isolation sizes and locations.
  - 2. Provide piping and equipment isolation systems as scheduled or specified.
  - 3. Guarantee specified isolation system deflection.
  - 4. Provide installation instruction, drawings and field supervision to assure proper installation and performance.

### PART 2 PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers listed below have demonstrated an ability to comply with specifications for vibration isolation products similar to those required for this project. However, specific products made by the listed manufacturers do not all comply with the requirements of this specification. Subject to the requirement for a single manufacturer and the restrictions regarding unacceptable types of isolators, the products of the following manufacturers are acceptable sources for this project:
  - 1. Mason Industries, Inc.
  - 2. Kinetics Noise Control.
  - 3. Amber-Booth Company, Inc.
  - 4. E.A.R.
  - 5. PSI-Thunderline/Link-Seal.
  - 6. Ductmate Industries, Inc.
  - 7. Unger Technologies.

#### 2.2 SPRING REQUIREMENTS

- A. Provide steel springs with static deflections equal to or greater than those shown on the Construction Documents. Submittals based on rated deflections will be rejected.
- B. Unless otherwise noted, size springs to provide a natural frequency of not more than 3 Hertz. Where spring deflections called out in the Construction Documents exceed those required to achieve a natural frequency of 3 Hz or less, the greater deflection will govern.
- C. Size springs to provide not less than 50 percent additional travel to solid, coil-bind condition beyond the deflection under operating load.
- D. Size springs so that diameter is not less than 80 percent of the height of the spring at operating load.
- E. Provide springs that do not permanently deflect after loading to a solid, coil-bind condition.
- F. Do not weld springs to other components of the isolator assembly unless specifically noted in the Submittals and accepted by the Acoustics Consultant.
- G. Color code springs to allow positive identification after installation. Match color coding to the color code legend provided with the submittals.

#### 2.3 ELASTOMER REQUIREMENTS

- A. Provide elastomeric elements with static deflections equal to or greater than those shown on the Construction Documents. Submittals based on rated deflections will be rejected.
- B. Provide neoprene elements with a maximum hardness of 40 durometer, Shore A rating, where possible, but in no case exceeding 50 durometer. Where deflections called out in the construction documents exceed those required to achieve the specified natural frequencies, the greater deflection will govern.
- C. Meet AASHTO Highway Bridge Specifications for all neoprene products installed in irretrievable locations and as required elsewhere in the Construction Documents.

## SECTION 15242

### VIBRATION ISOLATION

#### 2.4 ACCEPTABLE PRODUCTS

- A. (Type F) Spring Hangers: Provide spring of the general characteristics specified in Paragraph 2.2, above in a rigid steel hanger box. Seat spring in a molded neoprene cup with steel washer reinforcing. Mold neoprene element with a rod isolation bushing that prevents rigid contact between hanger rod and housing from vertical through an angular deflection of not less than 15 degrees in any direction. For ductwork hung by straps, provide hangers with eyes on the top and bottom to allow for bolting to the straps. Acceptable products include:
  - 1. Spring hangers:
    - a. Mason types 30 and W30
- B. (Type G) Spring/Elastomer-in-Series Hangers: Provide neoprene-in-shear element of 1¼-inch minimum thickness and a spring of the general characteristics specified in Paragraph 2.2, above. Seat spring in a molded neoprene cup with steel washer reinforcing. Mold neoprene element with a rod isolation bushing that prevents rigid contact between hanger rod and housing from vertical through an angular deflection of not less than 15 degrees in any direction. Design neoprene for .25 to .35 inch minimum static deflection at rated load. Do not directly stack the spring and neoprene isolator elements. For ductwork hung by straps, provide hangers with eyes on the top and bottom to allow for bolting to the straps. Acceptable products include:
  - 1. Spring/Elastomer-in-Series Hangers:
    - m. Mason 30N
    - n. Kinetics SRH
    - o. Amber-Booth BSRA
- C. (Type H) Pre-compressed Spring/Elastomer-in-Series Hangers: Provide built-in adjustable spring restraints for equipment with operating weight greater than weight upon installation to prevent equipment from deflecting (or rising) when the additional weight is applied (or removed in the future). Provide isolators as specified in Subparagraph G but pre-compressed with restraint mechanisms that can be released to free the spring when subjected to its operational load. Provide an integral scale to indicate amount of deflection. For ductwork hung by straps, provide hangers with eyes on the top and bottom to allow for bolting to the straps. Acceptable products include:
  - 1. Pre-compressed Spring/Elastomer-in-Series Hangers:
    - a. Mason PC30N
    - b. Amber-Booth PBSRA
- D. (Type Q) Flexible Duct Connections: Provide Hypalon-coated, woven fiberglass, flameproof fabric (24 oz per square yard), serviceable from -40°F to 250°F. Acceptable products include:
  - 1. Ductmate Pro-Flex

### PART 3 EXECUTION

#### 3.1 INSTALLATION

- A. General:
  - 1. Install in accordance with manufacturer's written instructions. Vibration isolators must not cause any change of position of equipment or piping resulting in piping stresses or misalignment.
  - 2. Mechanical equipment shall be isolated from the building structure by means of noise and vibration isolators as scheduled on the drawings.
  - 3. All piping and ductwork to be isolated shall freely pass through walls and floors without rigid connections. Penetration points shall be sleeved or otherwise formed to allow passage of piping or ductwork, and maintain 3/4" to 1 1/4" clearance around the outside surfaces. This clearance space shall be tightly packed with fiberglass, and caulked airtight after installation of piping or ductwork.
  - 4. No rigid connections between equipment and building structure shall be made that degrades the noise and vibration isolation system herein specified.
  - 5. Electrical circuit connections to isolated equipment shall be looped to allow free motion of isolated equipment.

## SECTION 15242

### VIBRATION ISOLATION

6. The Contractor shall not install any equipment, piping or conduit which makes rigid contact with the "building" unless permitted in the Specification. Building includes, but is not limited to slabs, beams, columns, studs and walls.
7. Coordinate work with other trades to avoid rigid contact with the building. Inform other trades following work, such as plastering or electrical, to avoid any contact which would reduce the vibration isolation.
8. Bring to the Architect's attention prior to installation any conflicts with other trades which will result in unavoidable rigid contact with equipment or piping as described herein, due to inadequate space or other unforeseen conditions. Corrective work necessitated by conflicts after installation shall be at the responsible contractor's expense.
9. Bring to the Architect's attention any discrepancies between the specifications and field conditions or changes required due to specific equipment selection, prior to installation. Corrective work necessitated by discrepancies after installation shall be at the contractor's expense.
10. Obtain inspection and approval of any installation to be covered or enclosed, prior to such closure.
11. Correct, at additional cost, all installation which are deemed defective in workmanship or materials.
12. For all isolated equipment, make connections of piping, ductwork, and conduit using flexible connections specified in this section. Make no connections to isolated equipment in a manner that would compromise the performance of the isolation systems.

#### 3.2 MOUNTS AND HANGERS

- A. Align mounts and hangers squarely above or below the equipment mounting holes to avoid introducing lateral loads and deflection.
- B. Deflection requirements:
  1. Verify installed isolators have deflections equal to or greater than deflections specified on the submittals.
  2. Where multiple deflections apply to a single isolator (where a single isolator supports multiple isolated elements), the largest deflection governs.
  3. Vary the size and/or hardness of isolators as required to yield equal deflection for all isolators supporting a single piece of equipment or length of pipe or ductwork. Consult manufacturer for direction when specified isolators do not yield required deflection and correct non-compliant isolators at no cost to the Owner.
- C. Support equipment, ductwork, conduit and piping independently. Do not hang equipment, ductwork, piping, or conduit from other isolated equipment, ductwork, piping, or conduit.
- D. Maintain 2 inches of clearance between isolated elements and walls, ceilings, and other non-isolated building components.
- E. Limit stops must be inactive and out of contact with the isolator during equipment operation.
- F. Adjust leveling bolts and hanger rod lengths so that equipment is level and in alignment with connecting ductwork and piping.
- G. Restrained isolators may be substituted for unrestrained isolators at installer's option to simplify installation.

#### 3.3 SUSPENDED EQUIPMENT

- A. Fans, Cabinet/Suspended Unit Heater, and Fan Coil Units.
  1. Resiliently hang fans and fan coil units with Type G spring/elastomer-in-series isolators.
  2. Connect ductwork with Type Q flexible duct connections at inlet and discharge. Connect fan coil piping with Type P flexible piping connectors.
  3. Provide flexible electrical connections.

## SECTION 15242

### VIBRATION ISOLATION

#### 3.4 DUCTWORK

- A. Connect ductwork to equipment using Type Q flexible duct connections. Crimp fabric into duct flanges and seal airtight. Provide minimum separation of 6 inches between duct and equipment. Provide 1½ inch minimum slack or as required to accommodate full range of equipment and duct movement when subjected to maximum operating and lateral loads simultaneously without becoming taut. Utilize Type I thrust restraints to limit horizontal movement so that flexible connections do not become taut under any combination of operational loads. Mount flexible duct connections as close to equipment housings as practical but in no case beyond the first duct hanger.
- B. Duct Connections at Rigidly-Mounted Fire Dampers: Provide Type Q flexible duct connections at each side of all fire dampers rigidly connected to the associated partition construction.
- C. Isolator Types:
  - 1. Provide Type G spring/elastomer-in-series hangers for the first 3 duct hangers from the equipment. Provide hangers with minimum static deflection equal to that of the isolators supporting the equipment.
  - 2. Beyond the first 3 hangers, support all ductwork with short-side dimension less than 24 inches in the following manner:
    - a. Support with Type F elastomeric hangers, Type B neoprene-in-shear base mounts, or Type A elastomeric pads at all points of support within 50 feet of the equipment to which the ductwork connects.
    - b. Beyond 50 feet from the equipment, no isolation is required unless the ductwork is supported from construction enclosing Acoustically Sensitive or Critical Rooms, in which case provide the isolators described in (a).
  - 3. Beyond the first 3 hangers, support ductwork with short-side dimension of 24 inches or greater in the following manner:
    - a. Support with Type H pre-compressed spring/elastomer-in-series hangers or Type E restrained open spring base mount isolators for a minimum of 50 feet from the equipment.
    - b. If air velocities exceed 800 feet per minute, continue the isolators for an additional 50 feet.
    - c. In addition to the requirements of (a) and (b), provide isolators for all ductwork with velocities exceeding 800 feet per minute that is supported from Acoustically Sensitive or Acoustically Critical Rooms or that is otherwise indicated on the Drawings to receive isolation.
  - 4. Vertical Ductwork:
    - a. Support vertical ductwork for the 3 supports nearest the equipment with Type D open mount spring isolators with minimum deflections equal to or greater than the isolators supporting the equipment.
    - b. Thereafter, support all vertical ductwork with short-side dimension less than 24 inches with Type B neoprene-in-shear isolators for not less than 50 feet from the equipment.
    - c. Support all vertical ductwork with short-side dimension equal to or greater than 24 inches and all other ductwork indicated on the Drawings to receive isolation on Type D open spring base mount isolators.

#### 3.5 EQUIPMENT SCHEDULE

- A. Equipment to be installed on isolators:
  - 1. Inline Exhaust fans.

## **SECTION 15242**

### **VIBRATION ISOLATION**

#### **3.6 TESTING, EVALUATION AND ACCEPTANCE PROCEDURES**

- A. If it is found that the construction fails the acoustic test measurements or performance requirements identified in the Contract Documents, make changes necessary to meet the requirements identified in the Contract Documents and be responsible for the costs associated with performing all additional acoustical tests to verify the acoustic performance of the construction. Costs for additional acoustical testing shall include consulting fees at per hour rates in effect at the time of testing along with related expenses including, but not limited to, travel expenses and test equipment use charges.

**END OF SECTION**



## SECTION 15290

### DUCTWORK INSULATION

#### PART 1 GENERAL

##### 1.1 WORK INCLUDED

- A. Ductwork insulation.
- B. Insulation jackets.

##### 1.2 RELATED WORK

- A. Section 15190 - Mechanical Identification.
- B. Section 15890 - Ductwork.

##### 1.3 REFERENCES

- A. ASTM C518 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- B. ASTM C553 - Mineral Fiber Blanket and Felt Insulation.
- C. ASTM C612 - Mineral Fiber Block and Board Thermal Insulation.
- D. ASTM E84 - Surface Burning Characteristics of Building Materials.
- E. ASTM E96 - Water Vapor Transmission of Materials.
- F. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.

##### 1.4 SUBMITTALS

- A. Submit under provisions of Division 1 General Requirements.
- B. Product Data: Provide product description, list of materials and thickness for each service and locations.
- C. Contractor shall review all shop drawings prior to submitting them for Architect/Engineer's review. Contractor shall stamp each shop drawing to certify that he has reviewed it. Engineer will not check any shop drawings that contractor has not stamped with his review certification.

##### 1.5 REGULATORY REQUIREMENTS

- A. Conform to 2012 International Mechanical Code and 2012 International Energy Code with all Indiana amendments.

##### 1.6 QUALITY ASSURANCE

- A. Materials: Flame spread/smoke developed rating of 25/50 in accordance with ASTM E84.

##### 1.7 QUALIFICATIONS

- A. Applicator: Company specializing in performing the work of this Section with minimum three years experience.

##### 1.8 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Division 1 General Requirements.
- B. Deliver materials to site in original factory packaging, labeled with manufacturer's density and thickness.
- C. Contractor shall store all materials shipped to the site in a protected area. If material is stored outside of the building it must be stored off the ground a minimum of 6 inches set on 6 x 6 planks and/or wood pallets. All material must be completely covered with waterproof tarps or visquin. All ductwork will have the ends closed to keep out dirt and other debris. No equipment will be allowed to be stored on the site unless it is sitting on wood planks and completely protected with weatherproof covers.

##### 1.9 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics and insulation cements.

## SECTION 15290

### DUCTWORK INSULATION

#### PART 2 PRODUCTS

##### 2.1 GLASS FIBER, FLEXIBLE DUCT WRAP (TYPE A)

- A. Acceptable Manufacturers:
  - 1. Owens Corning Corp.
  - 2. CertainTeed Corp.
  - 3. Knauf Fiberglass.
  - 4. Manville.
- B. Insulation: ASTM C553; flexible, noncombustible blanket.
  - 1. R Value: ASTM C518, 5.7 at 75 degrees F.
  - 2. Maximum Service Temperature: 250 degrees F.
  - 3. Maximum Moisture Absorption: 0.20 percent by volume.
  - 4. Density: 1.0 lb/cu.ft.
  - 5. Thickness: 1-1/2 inch.
- C. Vapor Barrier Jacket:
  - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
  - 2. Moisture Vapor Transmission: ASTM E96; 0.04 perm.
  - 3. Secure with pressure sensitive tape.
- D. Vapor Barrier Tape:
  - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.
- E. Tie Wire: Annealed steel, 16 gauge.

##### 2.2 GLASS FIBER, RIGID DUCT WRAP (TYPE B)

- A. Acceptable Manufacturers:
  - 1. Owens Corning Corp.
  - 2. CertainTeed Corp.
  - 3. Knauf Fiberglass.
  - 4. Manville.
- B. Insulation: ASTM C612; rigid, noncombustible board with ASJ facing and ASJ tape.
  - 1. K Value: ASTM C518, 0.23 at 75 degrees F.
  - 2. Maximum Service Temperature: 250 degrees F.
  - 3. Maximum Moisture Absorption: 0.20 percent by volume.
  - 4. Density: 3.0 lb/cu.ft.
  - 5. Thickness: 2 inch.
- C. Vapor Barrier Jacket:
  - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
  - 2. Moisture Vapor Transmission: ASTM E96; 0.04 perm.
  - 3. Secure with pressure sensitive tape.
- D. Vapor Barrier Tape:
  - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

#### PART 3 EXECUTION

##### 3.1 EXAMINATION

- A. Verify that ductwork has been tested before applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed and dry.

##### 3.2 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Insulated ductwork conveying air below ambient temperature:
  - 1. Provide insulation with vapor barrier jackets.
  - 2. Finish with tape and vapor barrier jacket.
  - 3. Continue insulation through walls, sleeves, hangers and other duct penetrations.



## SECTION 15290

### DUCTWORK INSULATION

4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections and expansion joints.
- C. Insulated ductwork conveying air above ambient temperature:
  1. Provide with standard vapor barrier jacket.
  2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.
- 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; vapor tight.
  2. Install without sag on underside of ductwork. Use adhesive and mechanical fasteners where necessary to prevent sagging. Lift ductwork off trapeze hangers and insert spacers.
  3. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
  4. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.
  5. Supply and return air ductwork routed on exterior roof of building shall be internally and externally insulated. Provide exterior jacket over exterior insulation as indicated above. Provide roof curb at roof penetration.
  6. Exterior Applications: Provide vapor barrier jacket. Insulate fittings and joints with insulation of like materials and thickness as adjoining ductwork and finish with glass mesh reinforced vapor barrier cement. Cover with jacket with seams located on bottom side of horizontal ductwork.
- E. All insulation shall be installed neatly in a workman like manner in strict accordance with manufacturer's instructions.

### 3.3 TOLERANCE

- A. Substituted insulation materials shall provide thermal resistance within 10 percent at normal conditions, as materials indicated.

### 3.4 GLASS FIBER DUCTWORK INSULATION SCHEDULE

| <u>TYPE DUCTWORK</u>                                                            | <u>THICKNESS INCHES</u> | <u>TYPE</u> |
|---------------------------------------------------------------------------------|-------------------------|-------------|
| All low and medium pressure rectangular supply and return ductwork              | 2"                      | B           |
| Relief and transfer ducts                                                       | 1"                      | B           |
| Exhaust ducts                                                                   | 2"                      | B           |
| Outdoor air intake ductwork/plenums                                             | 2"                      | A or B      |
| All concealed round low and medium pressure rectangular supply and return ducts | 1-1/2"                  | A           |

**END OF SECTION**



## SECTION 15870

### POWER VENTILATORS

#### PART 1 GENERAL

##### 1.1 WORK INCLUDED

- A. Power roof exhaust fans.

##### 1.2 RELATED WORK

- A. Section 15140 - Supports and Anchors.
- B. Section 15890 - Ductwork.
- C. Section 15910 - Ductwork Accessories.

##### 1.3 REFERENCES

- A. AMCA 99 - Standards Handbook.
- B. AMCA 210 - Laboratory Methods of Testing Fans for Rating Purposes.
- C. AMCA 300 - Test Code for Sound Rating Air Moving Devices.
- D. NFPA 70 - National Electrical Code.

##### 1.4 SUBMITTALS

- A. Submit under provisions of the General Requirements.
- B. Product Data: Provide data on fans and accessories including fan curves with specified operating point clearly plotted, sound power levels at rated capacity and electrical characteristics and connection requirements.
- C. Manufacturer's installation instruction.
- D. Contractor shall review all shop drawings prior to submitting them for Architect/Engineer's review. Contractor shall stamp each shop drawing to certify that he has reviewed it. Engineer will not check any shop drawings that Contractor has not stamped with his review certification.

##### 1.5 OPERATION AND MAINTENANCE DATA

- A. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list and wiring diagrams.

##### 1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of the General Requirements.
- B. Contractor shall store all materials shipped to the site in a protected area. If material is stored outside of the building it must be stored off the ground a minimum of 6 inches set on 6 x 6 planks and/or wood pallets. All material must be completely covered with waterproof tarps or visquin. All duct openings will have the ends closed to keep out dirt and other debris. No equipment will be allowed to be stored on the site unless it is sitting on wood planks and completely protected with weatherproof covers.

##### 1.7 WARRANTY

- A. Equipment manufacturer shall provide a one (1) year warranty (parts and labor) on their equipment. Installing Contractor will provide one (1) year warranty on all parts and labor associated with the installation of the equipment. See the General Requirement Sections for other requirements.

##### 1.8 EXTRA MATERIALS

- A. Provide two sets of belts for each fan.

## SECTION 15870

### POWER VENTILATORS

#### PART 2 PRODUCTS

##### 2.1 UTILITY SET FANS

- A. Acceptable Manufacturers:
  - 1. Cook.
  - 2. Carnes.
  - 3. Acme.
  - 4. Penn.
- B. Product Requirements:
  - 1. Performance Ratings: Conform to AMCA 210 and bear the AMCA Certified Rating Seal.
  - 2. Sound Ratings: AMCA 301, tested to AMCA 300 and bear AMCA Certified Sound Rating Seal.
  - 3. Fabrication: Conform to AMCA 99.
  - 4. UL Compliance: UL listed and labeled, designed, manufactured and tested in accordance with UL 705.
- C. Description: Fan shall be a single width, single inlet, backward inclined flat blade, belt driven centrifugal vent set.
- D. Certifications: Fan shall be manufactured at an ISO 9001 certified facility. Fan shall be listed by Underwriters Laboratories (UL/cUL 705) for US and Canada. For restaurant applications, fan shall be listed by Underwriters Laboratories (UL/cUL 762) for US and Canada. Fan shall bear the AMCA certified ratings seal for sound and air performance.
- E. Construction:
  - 1. The fan shall be of bolted and welded construction utilizing corrosion resistant fasteners. The scroll wrapper shall be minimum 14 gauge steel and the scroll side panels shall be minimum 12 gauge steel. The entire fan housing shall have continuously welded seams for leakproof operation. A performance cut-off shall be furnished to prevent the recirculation of air in the fan housing. The fan housing shall be field rotatable to any one of eight discharge positions and shall have a minimum 1-1/2 inch outlet discharge flange. Bearing support shall be minimum 10 gauge welded steel. Side access inspection ports shall be provided with quick release latches for access to the motor compartment without removing the weather cover. Lifting lugs shall be provided for ease of installation. Unit shall bear an engraved aluminum nameplate. Nameplate shall indicate design CFM, static pressure, and maximum fan RPM. Unit shall be shipped in ISTA certified transit tested packaging.
  - 2. Exterior Coating: Steel fan components shall be Lorenized™ with an electrostatically applied, baked polyester powder coating. Each component shall be subject to a five stage environmentally friendly wash system, followed by a minimum 2 mil thick baked powder finish. Paint must exceed 1,000 hour salt spray under ASTM B117 test method.
  - 3. Interior Coating: All internal parts of fan housing, fan wheel, etc. shall be coated with an Epoxy Powder coating equal to Cook Epoxy Powder coating system.
  - 4. Wheel: Wheel shall be centrifugal backward inclined, constructed of 100% aluminum, including a precision machined cast aluminum hub. Wheel hub shall be keyed and securely attached to the fan shaft. Wheel inlet shall overlap an aerodynamic aluminum inlet cone to provide maximum performance and efficiency. Wheel shall be balanced in accordance with AMCA Standard 204-05, *Balance Quality and Vibration Levels for Fans*.
  - 5. Motor: Motor shall be Nema design B with class B insulation rated for continuous duty and furnished at the specified voltage, phase and enclosure.
- F. Blower Shaft:
  - 1. Blower shall be AISI C-1045 hot rolled and accurately turned, ground and polished. Shafting shall be sized for a critical speed of at least 125% of maximum RPM.
  - 2. Bearings: Bearings shall be designed and tested specifically for use in air handling applications. Construction shall be heavy duty regreasable ball or roller type in a cast iron pillow block housing selected for a minimum L50 life in excess of 200,000 hours at maximum cataloged operating speed.

## SECTION 15870

### POWER VENTILATORS

3. Belts & Drives: Belts shall be oil and heat resistant, static conducting. Drives shall be precision machined cast iron type, keyed and securely attached to the wheel and motor shafts. Drives shall be sized for 150% of the installed motor horsepower. The variable pitch motor drive must be factory set to the specified fan RPM.
- G. The following accessories shall be provided by the fan manufacturer: UL safety disconnect switch; wiring between motor and disconnect switch; electrical motorized dampers; inlet and outlet guards; motors, vibration isolators and belt guards.
- H. Electrical Characteristics and Components:
  1. Electrical Characteristics:
    - a. See Schedules.
  2. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70.
  3. Disconnect Switch: Factory wired, non-fusible, in housing for thermal overload protected motor.
  4. Motor: Inverter duty high efficiency type.
- I. Sheaves: Browning cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheaves selected so required RPM is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install flexible connections specified in Section 23 33 00 between fan inlet and ductwork (not applicable for roof mounted fans). Ensure metal bands of connectors are parallel with minimum three (3) inch flex between ductwork and fan while running.
- C. Provide sheaves required for final air balance.
- D. Do not operate fans for any purpose until ductwork is clean, bearings lubricated and fan has been test run under observation.

#### 3.2 OWNER TRAINING BY INSTALLING CONTRACTOR

- A. At the completion of the project, the Installing Contractor shall provide training of Owner's staff. Training shall consist of on-site (hands on) training, which will show the location of all devices and the operation of all controls, devices, motors, etc. and maintenance and repair requirements. Prior to commencement of training.

### END OF SECTION



## SECTION 15890

### DUCTWORK

#### PART 1 GENERAL

##### 1.01 WORK INCLUDED

- A. Sheet metal ductwork.
- B. Fabric ductwork.
- C. Installation of all dampers in ductwork.
- D. Coordination of building automation system installation.
- E. Installation of BAS components.

##### 1.02 RELATED SECTIONS

- A. Section 15140 - Supports and Anchors: Sleeves.
- B. Section 15190 - Mechanical Identification
- C. Section 15290 - Duct Insulation.
- D. Section 15910 - Ductwork Accessories.
- E. Section 15940 - Air Inlets and Outlets.

##### 1.03 REFERENCES

- A. ASTM A 36 - Structural Steel.
- B. ASTM A 90 - Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles.
- C. ASTM A 366 - Steel, Sheet, Carbon, Cold Rolled, Commercial Quality.
- D. ASTM A 525 - General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
- E. ASTM A 527 - Steel Sheet, Zinc-Coated (Galvanized) by Hot-Dip Process, Lock Forming Quality.
- F. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.
- G. AWS D9.1 - Welding of Sheet Metal.
- H. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.
- I. NFPA 91 - Installation of Blower and Exhaust Systems for Dust, Stock and Vapor Removal or Conveying.
- J. SMACNA - HVAC Air Duct Leakage Test Manual.
- K. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
- L. UL 181 - Factory-Made Air Ducts and Connectors.

##### 1.04 PERFORMANCE REQUIREMENTS

- A. No variation of duct configuration or sizes permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.

##### 1.05 REGULATORY REQUIREMENTS

- A. Construct ductwork to N.F.P.A. 90A standards.
- B. Conform to International Mechanical Code 2012.

##### 1.06 SUBMITTALS

- A. Submit under provisions of the General Requirements.
- B. Shop Drawings: Submit one-quarter inch shop drawing layouts of all ductwork systems prior to fabrication. Drawings are to be coordinated with other trades.
- C. Test Reports: Indicate pressure tests performed. Include date, section tested, test pressure, and leakage rate, following SMACNA HVAC Air Duct Leakage Test Manual.
- D. Provide detailed drawings confirming configuration of Fabric Tensioning System (components, support locations, segment lengths) and Textile Dispersion System (diameter, lengths, airflow, pressure, and textile permeability).
- E. Provide detailed installation instructions for components to be installed.
- F. Provide warranty and maintenance documentation.

## **SECTION 15890**

### **DUCTWORK**

#### **1.07 WARRANTY**

- A. Manufacturer must provide a 20 Year Product Warranty for products supplied for the fabric portion of this system as well as a Design and Performance Warranty.

#### **1.08 PROJECT RECORD DOCUMENTS**

- A. Submit under provisions of the General Requirements.
- B. Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

#### **1.09 QUALITY ASSURANCE**

- A. Perform Work in accordance with SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
- B. Maintain one copy of document on site.
- C. Building Codes and Standards:
  - 1. Product must be Classified by Underwriter's Laboratories in accordance with the 25/50 flame spread / smoke developed requirements of NFPA 90-A and UL 2518.
  - 2. All product sections must be labeled with the logo and classification marking of Underwriter's Laboratories.
- D. Design & Quality Control
  - 1. Manufacturer must have documented design support information including duct sizing; vent, orifice, and/or nozzle location; vent, orifice, and/or nozzle sizing; length; and suspension. Parameters for design, including maximum air temperature, velocity, pressure and textile permeability, shall be considered and documented.

#### **1.10 REGULATORY REQUIREMENTS**

- A. Construct ductwork to NFPA 90A standards.

#### **1.11 ENVIRONMENTAL REQUIREMENTS**

- A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
- B. Maintain temperatures during and after installation of duct sealants.

### **PART 2 PRODUCTS**

#### **2.01 MATERIALS**

- A. General: Non-combustible or conforming to requirements for Class 1 air duct materials or UL 181.
- B. All exposed ductwork that is to be painted shall be paint grip galvanized steel ductwork. ASTM A527 galvanized steel sheet. Lock forming quality G90 zinc coating in conformance with ASTM A90.
- C. Steel Ducts: ASTM A525 or ASTM A527 galvanized steel sheet, lock-forming quality, having zinc coating of 1.25 oz. per sq.ft. for each side in conformance with ASTM A90.
- D. Stainless Steel Ducts: 316 stainless steel of all welded construction with bolted flanged joints.
- E. Aluminum Ducts: ANSI/ASTM B209; aluminum sheet, alloy 3003-H14. Aluminum Connectors and Bar Stock: Alloy 6061-T6 or of equivalent strength.
- F. Fasteners: Rivets, bolts, duct mate (TM) or sheet metal screws.
- G. Sealant: Non-hardening, water resistant, fire resistive, compatible with mating materials; liquid used alone or with tape or heavy mastic.
- H. Hanger Rod: Steel, galvanized; threaded both ends, threaded one end or continuously threaded.



## SECTION 15890

### DUCTWORK

#### 2.06 MEDIUM PRESSURE SINGLE WALL (ROUND SPIRAL) DUCTWORK

- A. Acceptable Manufacturers:
  - 1. United McGill Corporation.
  - 2. Semco Mfg. Inc.
  - 3. E.H. Gustafson and Co.
  - 4. Approved Equal.
- B. Product:
  - 1. Fabricate and support in accordance with SMACNA High Pressure Duct Construction Standards and ASHRAE handbooks, except as indicated. Provide duct material, gauges, reinforcing and sealing for operating pressures indicated.
  - 2. Materials:
    - a. Duct will be spiral lock seam construction, provided in standard length, fabricated from galvanized steel meeting ASTM A527 Standards.
    - b. One inch thick fiberglass insulation (for double wall duct only).
    - c. Perforated galvanized steel inner wall (for double wall duct only).
  - 3. All joints and connections shall be sealed with United McGill Corp. duct sealed. Sealer shall be UL listed, suitable for installation from -20 degrees F. to +150 degrees F. temperature range.
- C. Construct T's, 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 are used, provide air foil turning vanes.
- D. Transform duct sizes gradually, not exceeding 15 degrees divergence and 30 degrees convergence.
- E. Fabricate continuously welded duct fittings two gauges heavier than duct gauges indicated in SMACNA Standard. Joints shall be minimum 2 inch cemented slip joint, brazed or electric welded. Prime coat welded joints.
- F. Provide standard 45 degree lateral wye takeoffs unless otherwise indicated where 90 degree conical tee locations may be used.
- G. All fittings are to be of stamped two piece welded seam construction. All welded joints prime coated both sides.

#### 2.08 FABRIC DUCTWORK

- A. Description of Work::
  - 1. Extent of non-metal ductwork is indicated on drawings and by requirements of this section.
  - 2. Types of non-metal ductwork required for this project include the following:
    - a. Textile Air Dispersion Products.
- B. Quality Assurance::
  - 1. Building Codes and Standards:
    - a. Product must be Classified by Underwriter's Laboratories in accordance with the 25/50 flame spread / smoke developed requirements of NFPA 90-A and UL 2518.
    - b. All product sections must be labeled with the logo and classification marking of Underwriter's Laboratories.
  - 2. Design & Quality Control
    - a. Manufacturer must have documented design support information including duct sizing; vent, orifice, and/or nozzle location; vent, orifice, and/or nozzle sizing; length; and suspension. Parameters for design, including maximum air temperature, velocity, pressure and textile permeability, shall be considered and documented.
- C. Submittals:
  - 1. Product Data: Submit manufacturer's specifications on materials and manufactured products used for work of this section.
  - 2. Building Code Data: Submit UL file number under which product is Classified by Underwriter's Laboratories for both NFPA 90-A and UL 2518.
  - 3. Provide detailed drawings confirming configuration of Textile Dispersion System (diameter, lengths, airflow, pressure, and textile permeability).

## SECTION 15890

### DUCTWORK

4. Provide detailed installation instructions for components to be installed.
5. Provide warranty and maintenance documentation.
- D. Warranty:
  1. Manufacturer must provide a 10 Year Product Warranty for products supplied for the fabric portion of this system as well as a Design and Performance Warranty.
- E. Delivery, Storage and Handling:
  1. Protect textile air dispersion system and hanger components from damage during shipping, storage, and handling.
  2. Where possible, store products inside and protect from weather. Where necessary to store outside, store above grade and enclose with a vented waterproof wrapping.
- F. Manufacturer:
  1. DuctSox® Corporation
  2. KE Fibertec
  3. FabricAir
  4. Equal
- G. Textile Air Dispersion System:
  1. Hanger Suspension: Air diffusers shall be constructed with multipoint suspension system.(Select only those options that apply)
    - a. 3x1 Hanger Suspension
      - i. System shall include a three row connection to fabric system at 10, 12, and 2 o'clock locations.
      - ii. The fabric system will also have intermediate Gliders located at 12 o'clock and between the hangers to attach directly to the one row suspension system located 3"(cable) or 4.5"(U-Track) above top-dead-center location of the fabric system.
      - iii. Available for diameters from 8" – 48".
    - b. Cable suspension hardware to include cable, eye bolts, thimbles, cable clamps, and turnbuckle(s) as required.
      - i. Cable suspension options(must specify if multiple on same project)
        - a.) Impregnated steel cable(required for natatorium applications)
      - ii. Support lengths available in 5'(standard), 10', 15', & 30'.
- H. Textile:
  1. Sedona-Xm
    - a. Textile Construction: Filament/filament twill polyester treated with a machine washable anti-microbial agent by the fabric manufacturer, fire retardant in accordance with UL 2518. Non-linting filament yarn to meet the requirements of ISO Class 3 environment.
    - b. Air Permeability: 2 (+2/-1) CFM/ft2 per ASTM D737, Frazier
    - c. Weight: 6.8 oz. /yd2 per ASTM D3776
    - d. Warranty: 10 years
  2. Textile Color
    - a. Custom - School Colors and minimum four (4) School Emblems.
- I. Textile System Fabrication Requirements:
  1. Textile system to be constructed in modular lengths (zippered).
  2. Integrated air dispersion shall be specified and approved by manufacturer. (select only those that apply)
    - a. Linear Vents
      - i. Air dispersion accomplished by linear vent and permeable fabric. Linear vents must be sized in 1 CFM per linear foot increments (based on .5" SP), starting a 1 CFM through 90 CFM per linear foot. Linear vent is to consist of an array of open orifices rather than a mesh style vent to reduce maintenance requirements of mesh style vents. Linear vents should also be designed to minimize dusting on fabric surface.
      - ii. Size of vent openings and location of linear vents to be specified and approved by manufacturer.

## SECTION 15890

### DUCTWORK

- b. Orifices – 2" & 3" SG's (Sewn-in Grommets)
  - i. Air dispersion and extended throws are accomplished by reinforced orifices and permeable fabric. Reinforced orifices are to be installed to keep the integrity of opening and withstand laundry processes.
  - ii. Diameter, quantity, and location of reinforced orifices to be specified and approved by manufacturer.
- c. Fixed Nozzles
  - i. Air dispersion accomplished by using conical aerodynamic nozzles and permeable fabric. Diameter of nozzles height to be minimum ½". Due to exact requirements of throw and maximum level of noise alternative flow models are not acceptable.
  - ii. Color of nozzles must match color of fabric. Unless otherwise specifically mentioned on drawings or otherwise in this specification, suppliers standard table is used for selection of color.
  - iii. Location and number of nozzles to be specified and approved by manufacturer.
- d. Adjustable Nozzles
  - i. Air dispersion accomplished by adjustable ball nozzles and permeable fabric. Adjustable ball nozzles to have multi-axial rotation to redirect airflow to desired area. Adjustable ball nozzles are able to completely close off airflow without adding caps or plugs. Adjustable ball nozzles should lock into place once set, preventing constant adjustment. Adjustable ball nozzle should have inset design to be a condensation resistant product.
  - ii. Colors of adjustable nozzles available are white and black. With white material receiving white adjustable nozzles and all other material colors receiving black adjustable nozzles unless otherwise specifically mentioned on drawings or otherwise in the specification.
  - iii. Quantity and location of adjustable ball nozzles to be specified and approved by manufacturer.
  - iv. Inlet connection to metal duct via fabric draw band with anchor patches as supplied by manufacturer. Anchor patches to be secured to metal duct via zip screw fastener – supplied by contractor.
  - v. Inlet connection includes zipper for easy removal / maintenance.
  - vi. Lengths to include required intermediate zippers as specified by manufacturer.
  - vii. System to include Adjustable Flow Devices to balance turbulence, airflow and distribution as needed. Flow restriction device shall include ability to adjust the airflow resistance from 0.06 – 0.60 in w.g. static pressure.
  - viii. End cap includes zipper for easy maintenance.
  - ix. Each section of the textile shall include identification labels documenting order number, section diameter, section length, piece number, code certifications and other pertinent information.
- J. Design Parameters:
  - 1. Textile air diffusers shall be designed from 0.25" water gage minimum to 3.1" maximum, with 0.5" as the standard.
  - 2. Textile air diffusers shall be limited to design temperatures between 0 degrees F and 180 degrees F (-17.8 degrees C and 82 degrees C).
  - 3. System overall design; diameter, length, airflow, operating static pressure and dispersion shall be designed or approved by the manufacturer.
  - 4. Do not use textile diffusers in concealed locations.
  - 5. Use textile air dispersion systems only for positive pressure air distribution components of the mechanical ventilation system.
- K. Installation of Textile Air Dispersion System:
  - 1. Install chosen suspension system in accordance with the requirements of the manufacturer. Instructions for installation shall be provided by the manufacturer with product.

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### DUCTWORK

- L. Cleaning and Protection:
  - 1. Clean air handling unit and ductwork prior to the DuctSox system unit-by-unit as it is installed. Clean external surfaces of foreign substance which may cause corrosive deterioration of facing.
  - 2. Temporary Closure: At ends of ducts which are not connected to equipment or distribution devices at time of ductwork installation, cover with polyethylene film or other covering which will keep the system clean until installation is completed.
  - 3. If DuctSox systems become soiled during installation, they should be removed and cleaned following the manufacturers standard terms of laundry.

## PART 3 EXECUTION

### 3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install and seal ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- C. Duct Sizes are inside clear dimensions for lined ducts, maintain sizes inside lining.
- D. Provide openings in ductwork where required to accommodate controllers. Provide pitot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.
- E. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- F. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.
- G. Use double nuts and lock washers on threaded rod supports.
- H. Seal all joints in medium pressure ductwork with United duct sealer.
- I. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- J. Connect diffusers to low pressure ducts with 3 feet maximum length of flexible duct held in place with strap or clamp.
- K. Connect flexible ducts to metal ducts with adhesive plus draw bands. Flexible duct allowed for final connection to diffuser only (3'-0" max. length).
- L. Connect terminal units to medium pressure main with spiral duct and welding fittings.
- M. Spiral flat oval and round duct is acceptable in equivalent sizes for rectangular medium pressure duct shown on plans.
- N. Provide residual traps in kitchen hood exhaust ducts at base of vertical risers with provisions for clean out. Use stainless steel for ductwork exposed to view and also stainless steel for ducts where concealed.
- O. Install manufacturer recommended suspension system in accordance with the requirements of the manufacturer.

### 3.02 INSTALLATION OF CONTROL PRODUCTS

- A. Install gauges, temperature and pressure sensors and other instrumentation in the locations directed by the BAS contractor.
- B. Failure of this contractor to adequately coordinate his work with the BAS contractor shall not be justification for any request for additional payment.
- C. This contractor shall include the cost of coordinating and installing related BAS components in his bid.
- D. Install duct smoke detectors provided by electrical contractor.

## SECTION 15890

### DUCTWORK

#### 3.03 SCHEDULES

##### A. DUCTWORK MATERIAL AND PRESSURE CLASS SCHEDULE

| <u>SMACNA Air System</u> | <u>Class</u>                       | <u>Material Pressure</u> |
|--------------------------|------------------------------------|--------------------------|
| Medium Pressure Supply   | Steel, Spiral with Welded Fittings | 10"                      |
| Return and Relief        | Aluminum                           | 4" (Negative)            |
| Outside Air              | Steel                              | 4"                       |
| Fabric Duct              | Fabric / Textile                   | 3"                       |

END OF SECTION



## SECTION 15910

### DUCTWORK ACCESSORIES

#### PART 1 GENERAL

##### 1.1 WORK INCLUDED

- A. Air turning devices/extractors.
- B. Duct access doors.
- C. Duct test holes.
- D. Fire dampers.
- E. Flexible duct connections.
- F. Volume control dampers.
- G.

##### 1.2 RELATED SECTIONS

- A. Section 15242 - Vibration Isolation.
- B. Section 15870 - Power Ventilators.
- C. Section 15890 - Ductwork.
- D. Division 17 - Building Automation System.

##### 1.3 REFERENCES

- A. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.
- B. NFPA 70 - National Electrical Code.
- C. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
- D. UL 33 - Heat Responsive Links for Fire-Protection Service.
- E. UL 555 - Fire Dampers and Ceiling Dampers.

##### 1.4 SUBMITTALS

- A. Submit under provisions of Division 1 General Requirements.

##### 1.5 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Division 1 General Requirements.

##### 1.6 REGULATORY REQUIREMENTS

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories Inc., as suitable for the purpose specified and indicated.

##### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Division 1 General Requirements.
- B. Protect dampers from damage to operating linkages and blades.

##### 1.8 EXTRA MATERIALS

- A. Provide two of each size and type of fusible link.

#### PART 2 PRODUCTS

##### 2.1 AIR TURNING DEVICES/EXTRACTORS

- A. Multi-blade device with blades aligned in short dimension; steel construction; with individually adjustable blades, mounting straps.

##### 2.2 DUCT ACCESS DOORS

- A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.

## SECTION 15910

### DUCTWORK ACCESSORIES

- B. Fabrication: Rigid and close-fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ductwork, install minimum one inch thick insulation with sheet metal cover.
  - 1. Less Than 12 Inches Square: Secure with sash locks.
  - 2. Up to 18 Inches Square: Provide two hinges and two sash locks.
  - 3. Up to 24 x 48 Inches: Three hinges and two compression latches with outside and inside handles.
  - 4. Larger Sizes: Provide an additional hinge.
- C. Access doors with sheet metal screw fasteners are not acceptable.

#### 2.3 DUCT TEST HOLES

- A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.
- B. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

#### 2.4 FIRE DAMPERS

- A. Manufacturers:
  - 1. Ruskin.
  - 2. Vent Products.
  - 3. Air Balance.
  - 4. Nailor.
- B. Fabricate in accordance with NFPA 90A, and UL 555S and as indicated.
- C. Ceiling Dampers: Galvanized steel, 22 gage frame and 16 gage flap, two layers 0.125 inch ceramic fiber on top side, and one layer on bottom side for round flaps, with locking clip.
- D. Horizontal Dampers: Galvanized steel, 22 gage frame, stainless steel closure spring, and lightweight, heat retardant non-asbestos fabric blanket. Dynamic type with spring actuated closure. Closure to be against elevated temperature airflow, against minimum 2400 FPM and against 4.5 in. wg. pressure.
- E. Curtain Type Dampers: Galvanized steel with interlocking blades. Provide stainless steel closure springs and latches for horizontal installations, closure under air flow conditions. Configure with blades out of air stream except for 1.0 inch pressure class ducts up to 12 inches in height. Dynamic type with spring actuated closure. Closure to be against elevated temperature airflow, against minimum 2400 FPM and against 4.5 in. wg. pressure.
- F. Multiple Blade Dampers: 16 gage galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, 1/8 x 2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock. Closure to be against elevated temperature airflow, against minimum 2400 FPM and against 4.5 in. wg. pressure.
- G. Fusible Links: UL 33, separate at 160 degrees F adjustable link straps for combination fire/balancing dampers.
- H. Round Dampers: Curtain type in square frame entirely out of air stream with round collar to match duct size on each side.
- I. Actuators must be factory installed.

#### 2.5 FLEXIBLE DUCT CONNECTIONS

- A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
- B. Connector: Fabric crimped into metal edging strip.
  - 1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz per sq yd.
  - 2. Net Fabric Width: Approximately 3 inches wide.



## SECTION 15910

### DUCTWORK ACCESSORIES

#### 2.6 VOLUME CONTROL DAMPERS

- A. Manufacturers:
  - 1. Ruskin.
  - 2. Air Balance.
  - 3. Vent Products.
- B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible and as indicated.
- C. Single Blade Dampers: Fabricate for duct sizes up to 6 x 30 inch.
- D. Multi- Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 4 x 72". Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
- E. End Bearings: Except in round ductwork 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon or sintered bronze bearings.
- F. Quadrants:
  - 1. Provide locking, indicating quadrant regulators on single and multi- blade dampers.
  - 2. On insulated ducts mount quadrant regulators on stand- off mounting brackets, bases, or adapters.
  - 3. Where rod lengths exceed 30 inches provide regulator at both ends.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible. Refer to Section 15890 for duct construction and pressure class.
- B. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, and elsewhere as indicated. Provide minimum 8 x 8 inch size for hand access, 18 x 18 inch size for shoulder access, and as indicated.
- C. Provide duct test holes where indicated and required for testing and balancing purposes.
- D. Provide fire dampers to match wall fire rating at locations indicated, where ducts and outlets pass through fire rated components, and where required by authorities having jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges. Fire dampers are required at walls:
  - 1. Building Fire Separations: See Architectural plans for locations.
  - 2. All mechanical rooms, floor penetrations, electrical rooms, stairs.
  - 3. ALL floor openings for ductwork.
- E. Demonstrate re- setting of fire dampers to Owner's representative.
- F. Provide flexible connections immediately adjacent to equipment in ducts associated with all fans and motorized equipment, and supported by vibration isolators.
- G. 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 2 duct widths from duct take- off.
- H. 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.
- I. Install automatic control dampers provided by BAS contractor in the locations indicated on the floor plans.
- J. Manual balancing dampers shall be multi blade type for any duct where the dimension perpendicular to the damper blades is greater than 14".

#### 3.2 INSTALLATION OF DIVISION 17 PRODUCTS

- A. Install valves, temperature and pressure sensors and other instrumentation in the locations directed by the BAS contractor.
- B. Install BAS valves and sensors in the locations shown on the plans.

**SECTION 15910**

**DUCTWORK ACCESSORIES**

- C. Failure of this contractor to adequately coordinate his work with the BAS contractor shall not be justification for any request for additional payment.
- D. This contractor shall include the cost of coordinating and installing related BAS components in his bid.

**END OF SECTION**

## **SECTION 15940**

### **AIR OUTLETS AND INLETS**

#### **PART 1 GENERAL**

##### **1.1 WORK INCLUDED**

- A. Registers/Grilles
- B. Relief & Intake roof hoods.

##### **1.2 REFERENCES**

- A. ADC 1062 - Certification, Rating and Test Manual.
- B. AMCA 500 - Test Method for Louvers, Dampers and Shutters.
- C. ARI 650 - Air Outlets and Inlets.
- D. ASHRAE 70 - Method of Testing for Rating the Air Flow Performance of Outlets and Inlets.
- E. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.
- F. NFPA 70 - National Electrical Code.
- G. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.

##### **1.3 SUBMITTALS**

- A. Submit under provisions of Division 1 General Requirements.
- 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.

##### **1.4 PROJECT RECORD DOCUMENTS**

- A. Record actual locations of air outlets and inlets.

##### **1.5 QUALITY ASSURANCE**

- A. Test and rate air outlet and inlet performance in accordance with ADC Equipment Test Code 1062 and ASHRAE 70.
- B. Test and rate louver performance in accordance with AMCA 500.

##### **1.6 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.

#### **PART 2 PRODUCTS**

##### **2.1 MANUFACTURERS**

- A. Carnes.
- B. Krueger.
- C. Metalaire.
- D. Price.
- E. Titus.
- F. Tuttle and Baily.
- G. Nailor.

##### **2.2 HEAVY DUTY BAR RETURN GRILLES**

- A. Type: Steel bar grilles, 1/2 inch blade spacing, 38 degree deflection.
- B. Frame: 1- 1/4 inch margin with countersunk screw mounting.
- C. Fabrication: Steel bars with 14 gauge blades and 16 gauge borders with factory aluminum colored baked enamel finish as selected by the Architect.

## **SECTION 15940**

### **AIR OUTLETS AND INLETS**

#### **2.3 ROOF HOODS**

- A. Manufacturers:
  - 1. Cook.
  - 2. Carnes.
  - 3. Greenheck.
  - 4. Twin City Fans.
- B. Fabricate air inlet or exhaust hoods in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- C. Fabricate of aluminum minimum 14 gage base and 14 gage hood; suitably reinforced; with hinged hood; birdscreen with 1/2 inch square mesh for exhaust and 3/4 inch for intake, and clear anodized finish. All vertical seams shall be continuously welded with lock formed seams on the hood ends. Hoods shall be stressed and sloped for drainage.
- D. Fabricate louver penthouses with mitered corners and reinforce with structural angles.
- E. Mount unit on minimum 18 inch high curb base with insulation between duct and curb.
- F. Make hood outlet area minimum of twice throat area.

### **PART 3 EXECUTION**

#### **3.1 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.
- C. Install registers to ductwork with air tight connection.
- D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.
- E. Paint ductwork visible behind air outlets and inlets matte black.
- D. Backpaint louver frames with bituminous paint before installation.

**END OF SECTION**

## SECTION 15960

### VARIABLE FREQUENCY DRIVES

#### PART 1 GENERAL

##### 1.1 WORK INCLUDED

- A. This section includes complete stand-alone Variable Frequency Drives (VFD's), as well as factory enclosed, combination, and bypass packages up to 480V, for speed control of 3-phase NEMA Design B induction motors and optimized for HVAC applications. General purpose VFD's are not acceptable.
- B. VFD – Variable Frequency Drive, also known as and applies to the following:
  - 1. VSD – Variable Speed Drive
  - 2. VSD – Variable Speed Drive
  - 3. AFD – Adjustable Frequency Drive
  - 4. ASD – Adjustable Speed Drive
  - 5. VSC – Variable Speed Controller
  - 6. AC Drive
  - 7. Inverter

##### 1.2 RELATED WORK

- A. Drawings, schedules and general provisions related to the contract apply to this section, and along with it shall govern work related to procurement, installation, and startup of Variable Frequency Drives to satisfy the project needs.
  - 1. Division 23 – applicable sections
  - 2. Division 23, 25, 26, & 28 – applicable sections

##### 1.3 REFERENCES

- A. Underwriters Laboratories (UL)
  - 1. UL 61800-5-2
  - 2. UL508
  - 3. UL508A
  - 4. UL508C
- B. International Electrotechnical Commission (IEC)
  - 1. EN 61800-5-1 – Low Voltage Directive / Adjustable speed electrical power drive systems
  - 2. EN 61800-3 – EMC Directive / Adjustable speed electrical power drive systems
  - 3. EN 60204-1 – Low Voltage Directive / Electrical Equipment of Machines
  - 4. EN 50178 – Low Voltage Directive / Electrical Equipment for use in Power Installations
  - 5. EN 61800-1/2/4 – Low Voltage Directive / Rating specifications for Power Drive Systems
  - 6. EN 61000-3-2 – Low Voltage Directive / Requirements for harmonic current caused by equipment (under 16A per phase)
  - 7. EN 61000-3-12 - Low Voltage Directive / Requirements for harmonic current caused by equipment (up to 75A per phase)
  - 8. EN 60204-1-5 – Machine Directive / Electrical Equipment of Machines
- C. Institute of Electrical and Electronic Engineers (IEEE)
  - 1. IEEE 519-2014, Guide for Harmonic Content and Control
- D. National Electrical Code (NEC)
  - 1. NEC 430.120, Adjustable-Speed Drive Systems
- E. National Electrical Manufacturer's Association (NEMA)
  - 1. ICS 7.0, AC Adjustable Speed Drives
- F. International Building Code (IBC)
  - 1. IBC 2012 Seismic – referencing ASC 7-05 and ICC AC-156
- G. Office of Statewide Health Planning and Development (OSHPD)
  - 1. Seismic Compliance Unit (SCU) Approval

## SECTION 15960

### VARIABLE FREQUENCY DRIVES

#### 1.4 SUBMITTALS

- A. Product Data:
  - 1. For each VFD include current and/or HP ratings, voltage ratings, UL enclosure rating, package configuration, and nameplate corresponding to equipment.
  - 2. Provide data sheet with operating characteristics, control input and output ratings, short circuit capacity, and protective feature overview.
  - 3. Include component level specifications for packaged products (i.e. disconnect, contactor, and overload ratings)
- B. Shop Drawings
  - 1. For each VFD provide front, side, and top view dimensional drawings of enclosure, overall dimensions, and conduit entrance locations.
- C. Wiring Diagrams
  - 1. For each VFD provide power and control wiring schematics.

#### 1.5 WARRANTY

- A. Warranty Period: Five years from date on installation
- B. Manufacturer will repair or replace VFD's determined to fail due to material or manufacturing defect within the warranty period.

### PART 2 PRODUCTS

#### 2.1 VARIABLE FREQUENCY DRIVES

- A. ACCEPTABLE MANUFACTURERS
  - 1. Franklin Control Systems
  - 2. Danfoss
  - 3. Equal
- B. PRODUCT REQUIREMENTS
  - 1. DESIGN
    - a. All VFD's must be solid state, utilizing PWM control with energy optimizing control algorithms for lower operating temperature.
    - b. VFD's shall be current rated, with each model capable of operating on voltages of 200~480 VAC +/- 10%, 3 Phase.
    - c. VFD's shall be suitable for use on a circuit capable of delivering not more than 100,000 rms symmetrical amperes, 480 V per UL 61800-5-2 guidelines, without the use of external fused protection. Manufacturer's short circuit testing shall be performed at full rated capacity of 100,000 Amps.
    - d. The VFD must be minimum UL Type 1 for indoor applications.
    - e. VFD must utilize R3Filtering or equivalent to reduce harmonics on the line side of the VFD. Harmonic mitigation shall reduce THDi to 35% or less without the use of external reactors or filters.
    - f. With cover removed, VFD shall have a minimum IP20 (finger safe) rating, with high voltage terminals protected from contact with the installer/operator.
    - g. Circuit boards shall be conformal coated to protect against dust and corrosion.
    - h. VFD cooling fans shall be easily replaceable without the use of special tools, or removal of the VFD from the wall. Cooling fans shall also be replaceable without removal of circuit boards, field wiring, and factory wiring. Cooling fans shall only run when needed based on the internal temperature of the VFD.
    - i. Programming of the VFD shall be HVAC specific, with guides that walk the operator through the start-up procedure with access to troubleshooting info through the display.
    - j. All VFD shall include two independent analog inputs as standard, programmable for 0 –10VDC or 4-20mA. Both analog inputs shall be utilized as speed references, or as PID inputs. The analog inputs shall be programmed as an individual reference at a time, or as a combined reference together.

## SECTION 15960

### VARIABLE FREQUENCY DRIVES

- k. There shall be a minimum of (2) configurable digital inputs, and (2) configurable voltage inputs. Digital inputs shall be configurable as normally open or normally closed, and be rated up to 8mA at 24 VDC. Voltage inputs shall be capable of interfacing with 12-240V, 8mA max.
- l. There shall be a minimum of (2) relay outputs rated up to 1 amp at 240 VAC normally open contact. SW configurable for Fault, Run and status. 240V 1A maximum rating.
- 2. KEYPAD
  - a. The VFD display shall be a backlit, full color OLED display. The VFD shall display information in complete English words (alpha-numeric codes are not acceptable unless accompanied by complete English descriptions on the display). Faults shall also be written in complete English words.
  - b. The VFD shall have dedicated HOA buttons, and LED indicator lights to clearly designate HOA position.
  - c. The VFD display shall clearly indicate the operational state of the VFD, in addition to running values on the home (default) screen. This shall include at minimum:
    - 1) Run status
    - 2) Fault status
    - 3) Forward/Reverse
    - 4) Speed in Hz or RPM
    - 5) Running current
    - 6) Average RMS voltage
    - 7) Run source (Terminal, Keypad, HOA, Communications)
    - 8) Min/Max Speed
    - 9) PID set point, and min/max units when running in PID mode
  - d. VFD keypad shall be capable of passcode protection.
- 3. ELECTRICAL RATINGS
  - a. Voltage: Input 200~480 VAC +/- 10%, 3 phase, 48-63Hz
  - b. Current/HP: 2.4 amp - 31.0 amp, 1-10 HP (200V), 1.1 amp – 27.0 amp, 1-20HP (400V)
  - c. Output Frequency: 0-400 Hz
  - d. Power factor:  $\geq .9$
  - e. Efficiency:  $\geq 98\%$ , full load
  - f. Overload capacity: 110% for 60s @ 40°C, 83% for 30s @ 50°C
  - g. Carrier Frequency: 2kHz - 10kHz, 0.1kHz resolution, Default 2.5kHz
  - h. Harmonics: R3Filtering  $\leq 35\%$  THDi, without external reactors or filters
  - i. EMI/RFI: VFD's shall include EMI/RFI filters acceptable for the 1st Environment (Category C2), compliant to EN 61800-3 Radiated and Conducted Emissions
- 4. ENVIRONMENTAL RATINGS
  - a. Temperature
    - 1) Operating Temperature: -10 to 50°C
    - 2) Storage Temperature: -20 to 65°C
  - b. Altitude
    - 1) Max 1000m above sea level
    - 2) De-rate 1% per 100m from 1000-2000m and 2% per 100m from 2000-3000m
  - c. Humidity: 95% relative humidity, non-condensing
  - d. Seismic
    - 1) Shaker table testing under the guidelines of IBC 2012, up to seismic IP factor of 1.5 is required
    - 2) OSPHD certification required
  - e. Enclosures
    - 1) UL Type 1 minimum for indoor mounting locations
    - 2) UL Type 3R minimum for outdoor mounting locations
    - 3) VFD shall be IP20 (finger safe) with cover removed

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### VARIABLE FREQUENCY DRIVES

#### 5. STANDARD FEATURES

- a. VFD shall provide start-up report in PDF format that details all running values, and settings. All settings that have been changed from factory default shall be highlighted in the report such that changes are easily distinguishable.
- b. The VFD shall incorporate a real-time clock with battery back-up allowing faults and setting changes to be logged with real time and date. The battery shall be replaceable without removal of factory wiring or circuit boards. Battery shall have a minimum life span of 10 years under normal operating conditions.
- c. All programming shall be HVAC specific, with common HVAC applications available to expedite the start-up process by automatically adjusting parameters to according to the application selection.
- d. All VFD must have a motor preheat function to prevent moisture accumulation in an idle motor.
- e. All VFD must be capable of maintaining a set point via microprocessor based PID control on closed loop systems utilizing external 4-10mA, or 0-10V analog transmitters. VFD's must be capable of providing auxiliary power up to 0.5 amp at 24 VDC for external transmitters. PID set points shall be adjustable via the VFD keypad, communication protocols. Digital inputs shall be programmable to switch between pre-configured user defined set points.
- f. PID: Control action, proportional plus integral derivative.
- g. All VFD display units shall be selectable, and shall automatically adjust based on Applications selected at start up. VFD shall be capable of displaying PSI, Degrees F/C, inWC, Bar, mBar, Pa, kPa.
- h. VFD's shall have sleep and wake functions to save energy when set point is met in PID mode, and there is no additional demand on the system.
- i. Sleep boost functionality shall be used on PID controlled pressurized water systems to ensure the drive doesn't start and stop too frequently when at or near the desired pressure set point
- j. The VFD shall provide frequency setting resolution of 0.01 Hz when its Digital Reference is utilized below 100 Hz and 0.1 Hz over 100 Hz. The VFD shall provide frequency setting resolution of 0.03 Hz / 60 Hz when Analog Reference is utilized.
- k. The VFD shall have the ability to automatically restart after an over-current, over-voltage, under-voltage, or loss of input signal protective trip. The number of restart attempts, trial time, and time between reset attempts shall be programmable.
- l. The VFD shall be capable of both Automatic and Manual Torque Boost function to overcome sudden fluctuation of the load.
- m. The VFD shall be capable of starting into a rotating load (forward or reverse) and accelerate or decelerate to set-point without safety tripping or component damage (flying start). The VFD shall also be capable of DC injection braking at start to stop a reverse spinning motor prior to ramp.
- n. All VFD shall have 1 analog output (0-10VDC) which can be programmed to function as one of the following: Output Frequency, Output Current, and DC Bus Voltage. Default is set to Output Frequency.
- o. If the input reference (4-20mA or 0-10V) is lost, the VFD shall give the user the option of either (1) stopping and automatically reset once a signal restored (2) displaying a fault, (3) holding the VFD speed based on the last good reference received 1 second prior to losing the signal. The drive shall be programmable to signal this condition via a keypad warning, relay output and/or over the serial communication bus.
- p. The customer terminal strip shall be isolated from the line and ground.



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### VARIABLE FREQUENCY DRIVES

- q. The VFD shall have dedicated damper control terminals capable of providing up to 1 amp, 24VDC to open a damper actuator, and ensure end switch closure with normally open dry contact. To ensure proper damper functionality a damper time delay shall be programmable. The VFD shall fault in the event that the damper fails to make contact with the end switch within the user defined time delay. Use of external relays and CPT's is prohibited unless damper loads exceed 1 Amp max.
- r. The Maximum current limit shall be fixed at 150% (minimum, instantaneous) of the VFD normal duty current rating.
- s. The VFD shall be capable of 2 preset speeds that are activated via Digital Input Terminals.
- t. The VFD shall provide from 1 to 6000 seconds of Acceleration and Deceleration time setting parameters.
- u. The VFD shall be optimized for various levels of carrier frequency programmable from 2 to 10 kHz to reduce motor noise and to provide high system efficiency.
- v. VFD's shall have a minimum of 3 critical lockout skip frequency ranges. Low and high frequency settings shall be programmable for each lockout skip frequency range.
- w. VFD's shall be capable of recording minimum of 100 faults and 25 setting changes with true time and date stamping. Faults and settings shall be downloadable in PDF format.
- x. VFD's shall allow settings to be stored as configuration templates in manufacturer provided mobile application. Configuration templates shall be capable of being uploaded into un-configured VFD's to expedite the start-up process.
- y. The VFD shall have the following protection circuits. In the case of a protective trip, the drive shall stop and announce the fault condition. Options shall be available for faults to auto reset and retry with adjustable time delay. When VFD's are in fault conditions, display shall clearly indicate the name of the fault in plain English. Fault codes are not acceptable. The display shall also clearly indicate if the VFD is awaiting an automatic restart by counting down time until next restart.
  - 1) Motor overload
  - 2) Motor overcurrent
  - 3) VFD overcurrent
  - 4) VFD short circuit
  - 5) Overvoltage
  - 6) Undervoltage
  - 7) Input phase open
  - 8) Output phase open
  - 9) No motor
  - 10) Ground Fault
- z. The VFD shall have the following faults to ensure desired operation
  - 1) BMS communication loss
  - 2) Speed signal loss
  - 3) Transducer failure
- aa. All VFD shall be capable of configuring digital inputs or voltage inputs for dedicated shutdown, or fireman's override functionality under the following premise.
  - 1) Shutdown
    - a) When configured for shutdown, the digital input or voltage input terminal shall override all other commands and stop the VFD in any mode. This condition shall be stored in the VFD fault log.

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### VARIABLE FREQUENCY DRIVES

- 2) Fireman's Override
  - a) When configured for Fireman's Override, the digital input or voltage input terminal shall override all other commands and run the VFD at user defined preset speed until the terminal is deactivated. During a Fireman's override condition, all non-critical faults shall be ignored, and VFD shall "run to destruct" if configured terminal is not deactivated. Once the override signal is removed the VFD shall automatically return to normal operation.
6. COMMUNICATIONS
  - a. All VFD's must have both Ethernet, and RS-485 ports as standard. The following BAS communication protocols shall be native to the VFD, without the need for option boards:
    - 1) BACnet MS/TP, BACnet IP
  - b. Serial communications shall include the following capabilities; start/stop and speed control, monitoring of all running values, fault and alarm indication, fault detail, power consumption data, I/O configuration and status, VFD firmware and hardware identification, configuration of startup parameters, and configuration of protective functions.
  - c. VFD's must be accompanied by wireless mobile application to assist with start-up, troubleshooting, uploading/downloading of parameters, firmware updates, reporting, and fault logging. Application to be provided at no additional charge.
  - d. Minimum 128-bit AES encryption shall be used for any wireless communication.
7. BYPASS
  - a. VFD Bypass shall be integral to the VFD, and provide the same level of protection as the base VFD unit when in Bypass mode. Thermal overload protection is not acceptable.
  - b. VFD Bypass shall not have a separate set of customer control terminals. A single set of control terminals shall be provided, with electrical isolation and control logic isolation to ensure operation of the bypass is unaffected in the event of VFD failure.
  - c. VFD shall have the ability to automatically switch to bypass mode in the event of a VFD fault. For protective functions with automatic restart enabled, the VFD shall attempt to restart in VFD mode prior to switching to bypass. Auto-bypass functionality shall be user selectable, not applicable to faults related to motor overcurrent or thermal overload.
  - d. Bypass shall maintain BACnet or Modbus communication when in bypass mode, and in the event of VFD failure.
  - e. Bypass shall have the following SmartStart protection features to ensure smooth across the line operation when in bypass mode:
    - 1) Stall prevention
    - 2) Locked rotor
    - 3) Max time to start
  - f. Bypass shall be capable of monitoring current. Thermal overload protection is not acceptable.
  - g. VFD bypass shall maintain control by monitoring the VFD's analog input. This will control the bypass in an on or off state to maintain

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### VARIABLE FREQUENCY DRIVES

#### PART 3 EXECUTION

##### 3.1 INSTALLATION

- A. The mechanical contractor shall be responsible for installation and commissioning of VFD's. The VFD's shall be installed per the manufacturers guidelines and recommendations provided in the installation and operation manual.
- B. All power wiring shall be performed by a certified electrical contractor. Power wiring shall be installed in accordance with NEC 430.122 guidelines, and the VFD manufactures recommendations.

##### 3.2 FIELD WIRING REQUIREMENTS

- A. Mechanical contractor shall coordinate wiring requirements with electrical and building automation contractors.
- B. Input and output power wiring shall not share conduit.
- C. Multiple VFD's shall not share output current.
- D. Control wiring shall be installed in separate conduit, and wiring space.

##### 3.3 EXAMINATION

- A. Inspect all VFD's prior to installation. Examine for water, moisture, or mold damage.
- B. Ensure that mounting location meets the enclosure rating of the provided VFD.
- C. Generate report for any VFD's that are in unacceptable condition.

##### 3.4 START-UP

- A. VFD's shall be commissioned by an authorized start-up technician in accordance with manufacturer's instructions.
- B. Start-up report shall be provided for each commissioned VFD. Reports shall include a summary of all running values and settings. Settings should be highlighted if changed from a factory default setting. Report shall also include a photo of the installation with date and time of commissioning.

##### 3.5 TRAINING

- A. An overview of the VFD operation and recommended maintenance shall be provided to the owner's representative.
- B. Train shall include at minimum:
  - 1. Overview of the basic operating modes of the VFD (Hand, Auto, Bypass, etc.).
  - 2. Display and menu navigation for operation and programming.
  - 3. Demonstration of fault condition, fault reset, and fault logging.
  - 4. Demonstration of troubleshooting report.
  - 5. Demonstration of mobile application and establishing Bluetooth connection.
  - 6. Demonstration of recommended maintenance.

##### 3.6 PRODUCT SUPPORT

- A. Factory trained and authorized representatives shall be available locally for support during design and installation.
- B. Technical support shall be available 24 hours a day, 365 days a year via a toll-free hotline. Hotline representatives shall be available for troubleshooting and start-up assistance, in addition to design assistance with custom applications.

#### END OF SECTION



## SECTION 15980

### TESTING, ADJUSTING AND BALANCING

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Testing, adjustment, and balancing of air systems.
- B. Measurement of final operating condition of HVAC systems.

##### 1.2 RELATED SECTIONS

- A. General Conditions - Starting of Systems.
- B. Division 15 Specifications.
- C. Division 16 Specifications.
- D. Division 17 Specifications.

##### 1.3 REFERENCES

- A. AABC - National Standards for Total System Balance.
- B. ADC - Test Code for Grilles, Registers, and Diffusers.
- C. ASHRAE 111 - Practices for Measurement, Testing, Adjusting, and Balancing of Building Heating, Ventilation, Air-conditioning, and Refrigeration Systems.
- D. NEBB - Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems.
- E. SMACNA - HVAC Systems Testing, Adjusting, and Balancing.

##### 1.4 SUBMITTALS

- A. Submit under provisions of Division 1 General Requirements.
- B. Submit name of adjusting and balancing agency for approval within 30 days after notice of award of Contract.
- C. Field Reports: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
- D. Prior to commencing work, submit report forms or outlines indicating adjusting, balancing, and equipment data required.
- E. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect/Engineer and for inclusion in operating and maintenance manuals.
- F. Provide reports in soft cover, letter size, 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.
- G. Test Reports: Indicate data on AABC National Standards for Total System Balance forms.
- H. Test & Balance Company shall provide the following minimum information to help expedite the initial review of the HVAC System:
  - 1. Provide design drawings and specifications for balancing review.
  - 2. Layout the project on data sheets to further review the design for correct total air flows, pump flows, box sizes, etc.
  - 3. Provide sheet metal shop drawings.
  - 4. Provide equipment submittals.
  - 5. Provide control company submittals.
- I. Submit complete background experience of Air and Water Testing and Balancing Contractor for Architect/Engineer's approval before executing a contract for the work.

##### 1.5 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Division 1 General Requirements.
- B. Record actual locations of flow measuring stations, balancing valves and rough setting.

##### 1.6 QUALITY ASSURANCE

- A. The TAB firm shall be a sub-contractor to the Mechanical Contractor and have at least fifteen (15) years successful testing, adjusting and balancing experience on projects with testing and balancing requirements similar to those required for this project.

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### **TESTING, ADJUSTING AND BALANCING**

- B. The TAB firm SHALL NOT BE THE ORIGINAL INSTALLER of the systems or equipment to be tested and shall not be related to any of the successful Mechanical Contractors. He shall otherwise act as an independent contractor that specializes in and whose business is limited to testing and balancing.
- C. Work shall be done under the direct supervision of a qualified test and balance engineer employed by the TAB contractor. Instruments used by this contractor shall be accurately calibrated and maintained in good working order. If requested, tests shall be conducted in the presence of the Engineer or Owner.

#### **1.7 SEQUENCING AND SCHEDULING**

- A. Sequence work to commence after completion of each system and schedule completion of work before Substantial Completion of Project. TBS Contractor shall coordinate his work with the Building Automation Contractor's work. Refer to Division 1 for Sequence of Construction for each school. TAB Contractor shall be required to start and stop work as required to accommodate phase sequence of each school.

### **PART 2 PRODUCTS**

#### **2.1 ACCEPTABLE BALANCING COMPANIES**

- A. Aero Test and Balance.
- B. Superior Test and Balance.
- C. Independent Test and Balance.
- D. International Test & Balance, Inc.
- E. Nobel Air Test and Balance.

### **PART 3 EXECUTION**

#### **3.1 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 coil fins are cleaned and combed.
  - 9. Access doors are closed and duct end caps are in place.
  - 10. Air outlets are installed and connected.
  - 11. Duct system leakage is minimized.
- B. Submit field reports. Report defects and deficiencies noted during performance of services which prevent system balance.
- C. Beginning of work means acceptance of existing conditions.

#### **3.2 PREPARATION**

- A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect/Engineer to facilitate spot checks during testing.
- B. Provide additional balancing devices as required.

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### TESTING, ADJUSTING AND BALANCING

#### 3.3 INSTALLATION 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.
- C. Balance to reduce/eliminate objectionable noise and note on report as required.

#### 3.4 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.
- E. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.

#### 3.5 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, exhaust fresh air quantities.
- B. As a minimum, air system shall be prepared for testing in the following manner:
  - 1. Using pitot tube transverse, set main line dampers to deliver proper air volumes to zones.
  - 2. Using pitot tube transverse, set branch line dampers to deliver proper air volumes to air terminal outlets in each zone.
  - 3. Read CFM at each air terminal outlet and adjust to meet design requirements. Test and record items as listed in the following test procedures.
    - a. Test and adjust fan RPM to design requirements.
    - b. Test and record fan motor full amperes.
    - c. Make pitot tube transverse of main air ducts and obtain design volume at fans.
    - d. Test and record system static pressure at fan suction and discharge.
    - e. Test and adjust system for design recirculated air volume.
    - f. Test and adjust system for design outdoor air volume.
    - g. Adjust main duct to proper design volume.
    - h. Adjust zones to proper design volume supply and return/exhaust.
    - i. Test and adjust each air terminal to within tolerance of 10 percent or as specified on the drawings.
  - 4. In cooperation with the control manufacturer's representative, who is responsible for setting adjustments of automatically operated dampers to operate as specified, indicated and/or noted, TAB agency shall check controls for proper operation and list controls requiring adjustment by control installer.
  - 5. Air terminal outlets shall be adjusted to minimize drafts. Adjust air patterns to match plans.
- C. Adjust outside air automatic dampers, outside air, return air and exhaust dampers for design conditions.
- D. Measure temperature conditions across outside air, return air and exhaust dampers to check leakage.
- E. 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.
- F. Measure building static pressure and adjust supply, return and exhaust air systems to provide required relationship between each to maintain approximately 0.02 inches positive static pressure near the building entries.
- G. Test and Balancing Contractor shall be required to field measure and set the minimum outside air on ALL unit ventilators.

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### TESTING, ADJUSTING AND BALANCING

- H. The Mechanical contractor shall provide and install replacement sheaves, belts, pulleys, etc. as required to meet final balancing requirements.
- I. Measure outside air for each unit ventilator.

#### 3.6 SCHEDULES

- A. Equipment Requiring Testing, Adjusting, and Balancing (Including but Not Limited to):
  - Terminal Heat Transfer Units
  - Fans
  - Air Inlets and Outlets
  - Air Handling Units (Existing)
  - Return Fans
- B. Report Forms
  - 1. Title Page:
    - a. Name of Testing, Adjusting, and Balancing Agency
    - b. Address of Testing, Adjusting, and Balancing Agency
    - c. Telephone number of Testing, Adjusting, and Balancing Agency
    - d. Project name
    - e. Project location
    - f. Project Architect
    - g. Project Engineer
    - h. Project Contractor
    - i. Project altitude
    - j. Report date
  - 2. Summary Comments:
    - a. Design versus final performance
    - b. Notable characteristics of system
    - c. Description of systems operation sequence
    - d. Summary of outdoor and exhaust flows to indicate amount of building pressurization
    - e. Nomenclature used throughout report
    - f. Test conditions
  - 3. Instrument List:
    - a. Instrument
    - b. Manufacturer
    - c. Model number
    - d. Serial number
    - e. Range
    - f. Calibration date
  - 4. Electric Motors:
    - a. Manufacturer
    - b. Model/Frame
    - c. HP/BHP
    - d. Phase, voltage, amperage; nameplate, actual, no load
    - e. RPM
    - f. Service factor
    - g. Starter size, rating, heater elements
    - h. Sheave Make/Size/Bore
  - 5. V-Belt Drive:
    - a. Identification/location
    - b. Required driven RPM
    - c. Driven sheave, diameter and RPM
    - d. Belt, size and quantity
    - e. Motor sheave diameter and RPM
    - f. Center to center distance, maximum, minimum, and actual



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### TESTING, ADJUSTING AND BALANCING

6. Cooling Coil Data:
  - a. Identification/number
  - b. Location
  - c. Service
  - d. Manufacturer
  - e. Air flow, design and actual
  - f. Entering air DB temperature, design and actual
  - g. Entering air WB temperature, design and actual
  - h. Leaving air DB temperature, design and actual
  - i. Leaving air WB temperature, design and actual
  - j. Air pressure drop, design and actual
7. Water Heating Coil Data:
  - a. Identification/number
  - b. Location
  - c. Service
  - d. Manufacturer
  - e. Air flow, design and actual
  - f. Water flow, design and actual
  - g. Water pressure drop, design and actual
  - h. Entering water temperature, design and actual
  - i. Leaving water temperature, design and actual
  - j. Entering air temperature, design and actual
  - k. Leaving air temperature, design and actual
  - l. Air pressure drop, design and actual
8. Air Moving Equipment
  - a. Location
  - b. Manufacturer
  - c. Model number
  - d. Serial number
  - e. Arrangement/Class/Discharge
  - f. Air flow, specified and actual
  - g. Return air flow, specified and actual
  - h. Outside air flow, specified and actual
  - i. Total static pressure (total external), specified and actual
  - j. Inlet pressure
  - k. Discharge pressure
  - l. Sheave Make/Size/Bore
  - m. Number of Belts/Make/Size
  - n. Fan RPM
9. Return Air/Outside Air Data:
  - a. Identification/location
  - b. Design air flow
  - c. Actual air flow
  - d. Design return air flow
  - e. Actual return air flow
  - f. Design outside air flow
  - g. Actual outside air flow
  - h. Return air temperature
  - i. Outside air temperature
  - j. Required mixed air temperature
  - k. Actual mixed air temperature
  - l. Design outside/return air ratio
  - m. Actual outside/return air ratio

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### TESTING, ADJUSTING AND BALANCING

10. Return Fan Data:
  - a. Location
  - b. Manufacturer
  - c. Model number
  - d. Serial number
  - e. Air flow, specified and actual
  - f. Total static pressure (total external), specified and actual
  - g. Inlet pressure
  - h. Discharge pressure
  - i. Sheave Make/Size/Bore
  - j. Number of Belts/Make/Size
  - k. Fan RPM
11. Duct Traverse:
  - a. System zone/branch
  - b. Duct size
  - c. Area
  - d. Design velocity
  - e. Design air flow
  - f. Test velocity
  - g. Test air flow
  - h. Duct static pressure
  - i. Air temperature
  - j. Air correction factor
12. Duct Leak Test:
  - a. Description of ductwork under test
  - b. Duct design operating pressure
  - c. Duct design test static pressure
  - d. Duct capacity, air flow
  - e. Maximum allowable leakage duct capacity times leak factor
  - f. Test apparatus
    - 1)Blower
    - 2)Orifice, tube size
    - 3)Orifice size
    - 4)Calibrated
  - g. Test static pressure
  - h. Test orifice differential pressure
  - i. Leakage
13. Air Distribution Test Sheet:
  - a. Air terminal number
  - b. Room number/location
  - c. Terminal type
  - d. Terminal size
  - e. Area factor
  - f. Design velocity
  - g. Design air flow
  - h. Test (final) velocity
  - i. Test (final) air flow
  - j. Percent of design air flow

**END OF SECTION**

## **SECTION 16010**

### **BASIC ELECTRICAL REQUIREMENTS**

#### **PART 1 GENERAL**

##### **1.1 WORK INCLUDED**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and the General Requirement Specification, apply to this and the other sections of Division 16.
- B. The Section is hereby made a part of all other sections of Division 16 as fully as if repeated in each therein.

##### **1.2 SECTION INCLUDES**

- A. Descriptions.
- B. Quality assurance.
- C. Codes.
- D. Approvals.
- E. Permits and inspections.
- F. Fees.
- G. Submittals.
- H. Instruction.
- I. Overtime
- J. Alternates
- K. Guarantees.
- L. Warranty.
- M. Products
- N. Execution.

##### **1.3 RELATED SECTIONS**

- A. Substitutions: Refer to the General Requirements and 16 Sections.
- B. Shop Drawings: Refer to the General Requirements and 16 Sections.
- C. Operation and Maintenance Data: Refer to the General Requirements and 16 Sections.
- D. Coordination with Other Trades: Refer to the General Requirements, 15, and 16 Sections.

##### **1.4 DEFINITIONS**

- A. Provide all required products and execution for a complete and fully operational Electrical System. Such work includes, but is not limited to, that which is identified on the contract documents. For the purpose of this specification, the following terms are defined:
  - 1. "Contract documents" include the most current project drawings and specification.
  - 2. "Provide" includes furnishing and installation.
  - 3. "Furnish" includes purchasing and transporting new equipment, as specified, to the job site.
  - 4. "Install" includes mounting or setting equipment in place, in specified location, making all required electrical connections for a working product.
  - 5. "Electrical System" includes all distribution of power, lighting, fire protection, life safety, communications, security, special systems, and any other information, electrical in nature, identified on the Contract Documents, from the point(s) of service to utilization device(s).
  - 6. "Connecting" means providing a power source, overcurrent devices, raceways, conductors, terminations, insulation supports, and other materials and equipment required for the operation and control of the relevant operation.
- B. Provide materials, equipment, installation or testing identified on the drawings but not specified herein; or that which is specified herein, but not identified on the drawings shall be provided at no additional cost to the Owner.
- C. Provide materials or equipment including minor items, accessories, or devices reasonably inferable as necessary for the completion and proper operation of any systems or products identified on the Contract Documents.

## SECTION 16010

### BASIC ELECTRICAL REQUIREMENTS

#### 1.5 QUALITY ASSURANCE

- A. Discovery of any conflicting design information or any design intentions which are not readily interpreted shall be referred to the Architect/Engineer for further description or illustration prior to any product selection or execution of work.
- B. Discovery of any materials or equipment which are damaged, unsuitable, incompatible, or non-compliant with any applicable codes, laws, ordinances, or other regulations shall be brought to the direct attention of the Architect/Engineer.
- C. Generally, the Drawings establish the location, quantity and relationship of the parts of the work, and the specifications define the type and quality of materials and workmanship. Work shown in the drawings and not mentioned in the specifications, or required by the specifications and not shown on the drawings, shall be provided as if fully provided for in both. In the case of conflicts between the drawings and specifications, or within either document, the Architect/Engineer shall determine the intent. In such cases, in general, the more stringent requirement concerning greater quantity, quality, and/or resulting in a higher cost shall govern without further cost to the Owner.
- D. The equipment list contained in this specification includes only the major equipment requirements. Verify the completeness and suitability of device to meet the intent of the specifications. Any additional equipment required, even if not specifically mentioned herein, shall be provided without claim for additional payment; it being understood that a complete operating system, satisfactory to the Engineer and the Owner, is required in all cases.

#### 1.6 REGULATORY REQUIREMENTS

- A. Where governing codes indicate the Drawings and Specifications do not comply with the minimum requirements of applicable codes, the Contractor shall either notify the Architect/Engineer in writing during the bidding period identifying the revisions required to meet code requirements or provide an installation which will comply with the code requirements.
- B. All material, equipment, installation and testing should be in accordance with all applicable codes, laws, and ordinances of Federal, State and local governing bodies having jurisdiction.
- C. In case of differences between building codes, Federal and State laws, local ordinances and utility company regulations and the Contract Documents, the most stringent shall govern.
- D. Where any materials, equipment or installation is not in compliance with the more stringent of the applicable codes, laws, ordinances, regulations and contract documents, they shall be entirely removed, replaced, modified or otherwise corrected at no additional cost to the Owner.
- E. Materials, equipment, installation and testing shall conform to the latest editions of the applicable following codes:
  - 1. NEC National Electrical Code.
  - 2. State of Indiana Building Code.
  - 3. NFPA 72 National Fire Protection Association
  - 4. IBC International Building Code.
- F. All product materials and work shall comply with all local codes, including but not limited to the following codes and standards as applicable, in addition to any codes and standards referenced within individual specification sections. These codes and standards shall apply to all Division 16 Sections as applicable.
  - 1. ANSI American National Standards Institute.
  - 2. ASTM American Society for Testing Materials.
  - 3. CBM Certified Ballast Manufacturers.
  - 4. ETL Electrical Testing Laboratories.
  - 5. IEEE Institute of Electrical and Electronic Engineers.
  - 6. NBS National Bureau of Standards.
  - 7. NEMA National Electrical Manufacturer's Association.
  - 8. NFPA National Fire Protection Association.
  - 9. OSHA Occupation Safety and Health Act.
  - 10. UL Underwriters Laboratories.
  - 11. ADA Americans with Disabilities Act.
  - 12. BOCA National Building Code (1996).

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### BASIC ELECTRICAL REQUIREMENTS

- 13. NEC National Electrical Code.
- 14. IBC International Building Code.
- 15. IEC International Electrical Code.
- 16. IFC International Fire Code.
- G. Where a UL standard is available, the equipment supplied for the project shall be UL listed and shall bear the UL label.
- H. Notify the Architect/Engineer of any materials or apparatus believed to be inadequate, unsuitable, in violation of laws, ordinances, rules or regulations of authorities having jurisdiction.

#### 1.7 PERMIT AND INSPECTION

- A. Permit: Obtain and pay for all permits, bonds, license, tap-in fees, etc. Required by the City, State, or other authority having jurisdiction over the work.
- B. Inspections: Arrange and pay for all inspections required by the above when they become due as part of the work of sections affected. Conceal no work until approved by these governing authorities.

#### 1.8 SUBMITTALS

- A. Shop Drawings: As soon as practical and before any material or equipment is purchased, the Contractor shall submit shop drawings. A complete list in one category (example: all fixtures) of all shop drawings catalog cuts, material lists, etc. are to be submitted by this Contractor at one time. No consideration will be given to partial shop drawings submitted from time to time.
  - 1. Extended time for submitting special shop drawings may be requested; however, any extension of time approved does not relieve this Contractor of his responsibility of executing his work in accordance with this contract.
  - 2. Any listed materials, fixtures, apparatus, or equipment that are not in accordance with specifications requirements can and will be rejected for use in this installation and construction. Substitutions will not be permitted.
  - 3. Any materials, fixtures, apparatus or equipment installed without stamped or written approval shall be removed by the Contractor and replaced with specified equipment at the direction of the Architect/Engineer and without recourse for additional compensation.
  - 4. Review of shop drawings does not relieve the Contractor from any responsibility for deviation from the Contract Documents unless the deviation is specifically identified on the shop drawings.
  - 5. Contractor shall review and coordinate all shop drawings prior to submitting them for Architects/ Engineer's review. Contractor shall stamp each shop drawing to certify that all MEP related contractors have coordinated and reviewed it. Engineer will not check any shop drawings that Contractor has not stamped with his review certification. Shop drawings will be reviewed once. If a second or third review is required, the contractor will pay the engineer \$500.00 per review.
- B. Coordination and Installation Drawings:
  - 1. Electrical contractor shall verify total connected load/HP with mechanical contractor prior to the installation of conduit and wiring of any mechanical or plumbing equipment. If any work is installed prior to verifying the load/HP of the mechanical or plumbing equipment, the contractor shall remove, replace, modify or otherwise correct the work at no additional cost to the Owner. Make any changes to overcurrent devices or feeder size per the local authority having jurisdiction.
  - 2. Coordination and installation drawings shall be made under the direction and supervision of the Contractor and shall show all electrical work including conduit, wiring, electrical equipment and devices, lighting fixture locations and elevations, points where conduit enters or leaves structural slabs and walls, junction boxes, conduit supports and inserts. The complete electrical distribution system from source or sources up to and including each branch circuit panelboard shall be shown and dimensioned with feeders located on plan. Major equipment and apparatus shall be shown to scale and properly located. Drawings shall also show exact locations and depths of underground conduits and ducts and their terminations.
  - 3. Provide "as-built" drawings.

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- C. Operation and Maintenance Data: Refer to the General Requirements and Division 26 Sections. Submit four copies of maintenance manuals in hardbound covers containing approved shop drawings and manufacturer's repair manuals, guarantees, operating instructions, wiring diagram and part lists.

#### 1.11 OPERATION AND MAINTENANCE INSTRUCTION

- A. Provide operation and maintenance instruction for equipment and systems.

#### 1.12 OVERTIME WORK

- A. All construction work shall be done on regular working hours and days, unless otherwise specified. If overtime work, other than specified, is required on the project, it shall be performed as indicated.
- B. System shutdown shall occur during off business hours and shall be done on over-time basis.
- C. The base bid shall include overtime work specified. No compensation shall be made for other work done on overtime basis, unless authorized.

#### 1.13 GUARANTEE

- A. Electrical work shall be guaranteed for both materials and labor for a period of one year.
- B. On-the-premises maintenance shall be provided at no cost to the purchaser for one year from the date of an operational and accepted installation unless damage is caused by misuse or abuse.
- C. Guarantee all wiring and equipment to be free from inherent and mechanical defects due to workmanship and materials used for the period of one full year from date of operational and accepted installation. Replacement of all or part of the equipment and/or correction of such defects, including labor, shall be rendered without cost to the Owner with the guarantee period.
- D. Manufacturer's equipment guarantees or warranties for periods of more than one year shall be included in the Operation and Maintenance Data.

#### 1.14 WARRANTY

- A. Warranty period shall be one year after final acceptance and payment of the system. Repairs or replacements made under the warranty shall bear an additional 1-year warranty dated from final acceptance of the repair or replacement. The Owner shall receive the benefit of all warranties furnished by manufacturers.

#### 1.15 PROJECT/SITE CONDITIONS

- A. Carefully examine the contract documents, visit the site, and thoroughly become familiar with the local conditions relating to the work prior to bidding. Failure to do so will not relieve the contractor of the obligations of the Contract.
- B. Install Work in locations shown on Drawings, unless prevented by Project conditions.

#### 1.16 CONTRACTOR'S RESPONSIBILITY TO VERIFY EXISTING CONDITIONS AND OPENINGS

- A. Contractor shall field verify the size of existing openings, windows, doors, corridors, rooms, etc. for access of the new equipment into the existing building. If openings are too small for access, then Contractor shall provide new or enlarged openings, at his own expense, to facilitate entrance into existing space or building. Contractor may elect to order the equipment disassembled and/or with split housing for entrance into the existing space or building. Contractor shall reassemble equipment after it is in the space at his own expense.

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### **BASIC ELECTRICAL REQUIREMENTS**

#### **PART 2 PRODUCTS**

##### **2.1 MATERIALS AND EQUIPMENT**

- A. Proposal shall be based upon the furnishing of all materials and equipment as specified, which in every case shall be new and, where not specifically referred to by manufacturer's name, of the best grade and quality available.
- B. Equipment and material shall be without blemish or defect and shall not be used for temporary light or power purposes, including lamps, without the Architect/ Engineer's written authorization.
- C. Items of equipment of one generic type (such as fuses), except conduit, conduit fittings, outlet boxes, wiring and cable, shall be the product of one manufacturer throughout, unless otherwise indicated or accepted by the Architect/Engineer.
- D. Where two or more makes or kinds of materials or equipment are specified, indicate which of these choices will be used. This information shall be included with the list of manufacturers for equipment and materials to be submitted to the Architect/Engineer.
- E. Manufacturers of equipment shall be firms regularly engaged in manufacturing factory-fabricated systems and equipment whose products have been in satisfactory use in similar service for not less than 5 years.

##### **2.2 MANUFACTURERS NAMEPLATES**

- A. Each major electrical component such as switchgear, transformers, motor control centers, panelboards, circuit breakers, disconnect switches, etc. shall have the manufacturer's name, address, catalog number, model number, rating, and any other required specified markings on a plate or label located inside the cover or otherwise inconspicuously but readily accessible.

#### **PART 3 EXECUTION**

##### **3.1 DELIVERY AND STORAGE**

- A. Receive, handle, and store electrical items and materials at the project site. Materials and electrical items shall be so placed that they are protected from damage and deterioration.
- B. Existing equipment which is to be reused shall be cleaned and protected against damage. Equipment which is removed and stored for reuse shall be stacked, boxed or crated in such a manner as to prevent damage. The cost to repair/replace this equipment due to damage incurred during its removal, storage or reinstallation shall be borne by the Contractor.
- C. The Contractor shall bear full responsibility for equipment judged unacceptable due to his failure to comply with these specifications.

##### **3.2 INSTALLATION**

- A. The Drawings for work under Division 16 are diagrammatic and are intended to convey the scope of work and indicate the general arrangement of conduit, boxes, equipment, fixtures and other work included in the Contract.
- B. Location of items required by the Drawings or specifications not definitely fixed by dimensions are approximate only and exact locations necessary to secure the best conditions and results shall be determined at the site and shall be subject to the approval of the Architect/Engineer.
- C. Follow Drawings in laying out work, check drawings of other trades to verify spaces in which work will be installed, and maintain maximum headroom and space conditions at all points.
  - 1. Where headroom or space conditions appear inadequate, the Architect/Engineer shall be notified before proceeding with installation.
  - 2. Minor conduit rerouting and changes shall be made at no additional cost to the Owner.
- D. Perform all work with skilled mechanics of the particular trade involved in a neat and workmanlike manner.
- E. Perform all work in cooperation with other trades and schedule.
- F. Perform all work in accordance with the manufacturer's recommendations.

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### BASIC ELECTRICAL REQUIREMENTS

- G. Furnish other trades advance information on locations and sizes of frames, boxes, sleeves and openings needed for the work, and also furnish information and shop drawings necessary to permit trades affected to install their work properly and without delay.
- H. Where there is evidence that work of one trade will interfere with the work of other trades, all trades shall assist in working out space allocations to make satisfactory adjustments and shall be prepared to submit and revise coordinated shop drawings.
- I. With the approval of the Architect/Engineer and without additional cost to the Owner, make minor modifications in the work as required by structural interferences, by interferences with work of other trades or for proper execution of the work.
- J. Work installed before coordinating with other trades so as to cause interference with the work of such other trades shall be changed to correct such condition without additional cost to the Owner and as directed by the Architect/Engineer.
- K. Architect/Engineer reserves the right to change location of electrical equipment or device within 10'-0" radius before work is installed without extra charge.
- L. Electrical Contractor shall cooperate with other trades and coordinate work so that conflicts with other work are eliminated.
- M. Equipment shall be installed with adequate space allowed for removal, repair or changes to equipment. Ready accessibility to removable parts of equipment and to wiring shall be provided without moving other equipment which is to be installed or which is in place. Electrical Contractor shall verify measurements. Discrepancies shall be brought to the Architect/Engineer's attention for interpretation.
- N. Determine temporary openings in the buildings that will be required for the admission of apparatus furnished under this Division, and notify the Architect/Engineer accordingly. In the event of failure to give sufficient notice in time to arrange for these openings during construction, assume all costs of providing such openings thereafter.
- O. Location of electrical outlets, lighting fixture, lighting panels, cabinets, equipment, etc. is approximate and exact locations shall be determined at the project.
- P. Electrical Contractor shall refer to contract documents for details, reflected ceiling plans, and large scale drawings.
- Q. Apparatus, lighting fixtures, material or work not shown on the drawings, but mentioned in the project specifications, or vice versa or any included accessories such as wiring, relays, switches, transformers (line voltage or low voltage), etc., necessary to make the work complete and ready for operating, even though not specified or shown on the electrical drawings shall be furnished and installed without additional expenses to the Owner. It is the Contractor's responsibility prior to bids to review all project documents.
- R. Verify final locations for rough-ins with field measurements of the actual equipment to be connected. Refer to equipment specifications in Division 1 through 16 for rough-in requirements.
- S. Equipment specified under other divisions and requiring electrical supply shall be erected, aligned, leveled and prepared for operation. Provide required controls and accessories along with installation instructions, diagrams, dimensions and supervision of installation and start-up. Provide the required electrical rough-ins and connections and confirm the electrical controls and accessories furnished under the specifications for the other divisions. Install those controls and accessories not located in the mechanical piping and ductwork. Provide additional electrical controls, accessories, fittings and devices not specified under the equipment but required for a finished, operating job. Make all final electrical connections. Participate in the start-up and test procedure.
- T. Where surface mounted conduit or surface mounted raceway is installed on new or existing walls, the electrical contractor shall paint the surface mounted conduit or surface mounted raceway to match the new or existing wall.
- U. Electrical Contractor shall weatherproof all openings and penetrations through foundations and exterior walls created by fixtures and conduits to prevent moisture from entering through.



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### BASIC ELECTRICAL REQUIREMENTS

- V. Contractor shall furnish other trades advance information and/or shop drawings on locations and sizes of conduits, raceways, equipment, frames, boxes, sleeves and openings, etc. needed for their work to install their work properly and without delay.
- W. Contractor shall provide sleeves in beams, floors, columns and walls as shown on the drawings, as required by job site conditions, and/or as specified, when installing their work. All beams and columns which are required to be sleeved shall be cut and reinforced as required by field conditions and locations and sizes shall be checked and approved by Architect before contractor cuts any structural building member.
- X. Contractor shall refer to the architectural and structural contract drawings (before submitting their bids) to familiarize themselves with the extent of the general contractors work, ceiling heights and clearance for installing their work.
- Y. Contractor shall install all auxiliary supporting steel as required for the supporting of their conduit, fixtures, devices, equipment, etc. All supporting steel for items above a suspended ceiling shall be from new building structure members only. All supports in the existing building shall be from walls. No connection to wood, roof deck or structure is allowed.
- Z. The locations shown for all lighting fixtures and ceiling mounted electrical equipment are diagrammatic. Exact location shall be determined from the reflected ceiling plans and/or on the job site by the construction manager. It shall be the contractor's responsibility to maintain code required spacing for items such as fire alarm devices.
- AA. Contractor shall be required to maintain the fire rated integrity of floors and/or wall partitions. All penetrations through fire rated building elements shall be effectively sealed using approved materials and methods.
- BB. Unless indicated otherwise, the Architect/Engineer makes no representation as to whether or not any hazardous or contaminated materials (including but not limited to asbestos, PCB's, contaminated soils, etc.) are present within the existing building or on the site. Work shown on the drawings and/or indicated in the specifications shall not be construed to call for contact with any of these materials. If these materials are encountered or suspected, the contractor shall not disturb them and shall contact the architect/engineer immediately.
- CC. Contractor shall store all materials and equipment shipped to the site on a protected area. If material is stored outside the building, it must be stored off the ground a minimum of six inches (6") set on 6 x 6 planks and/or wood pallets. All material and equipment must be completely covered with waterproof tarps or visquin. All conduit will have the ends closed to keep out dirt and other debris. No equipment will be allowed to be stored on the site unless it is sitting on wood planks and completely protected with weatherproof covers.
- DD. This contractor shall be responsible for furnishing all labor and material required to patch all openings in existing floors, walls, ceilings and fire separations created by the removal of this trades material and equipment where these openings are not to be reused.

#### 3.3 PROTECTION

- A. Protect conduit and wireway openings against the entrance of foreign matter by means of plugs or caps. Cover fixtures, materials, equipment and devices or otherwise protect against damage from any cause, both before and after installation. Fixtures, materials, equipment, or device damaged prior to final acceptance of the work shall be restored to their original condition or replaced, all at no additional cost to Owner.
- B. Equipment shall be inherently safe and moving parts shall be covered with guards.

#### 3.4 COOPERATION

- A. Where jurisdictional rules require the assistance of electrical mechanics in the moving and setting of electrically power equipment, provide such assistance.
- B. Where work covered by this section connects to equipment furnished under other sections, verify electrical work involved in the field and make proper connection to such equipment.

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### **BASIC ELECTRICAL REQUIREMENTS**

#### **3.5 CUTTING AND PATCHING**

- A. Do drilling, cutting, fitting and patching necessary for the installation of conduits, wireways, and other electrical equipment, and provide supports necessary for same and for bracing and anchorage of work. No cutting of structural work or of fireproofing shall be done without the written consent of the Architect/Engineer.
- B. Conduits passing through roofs or other surfaces exposed to weather shall be properly flashed as specified in roofing and waterproofing sections. This flashing work shall be paid for as part of the electrical work.

#### **3.6 WALL CHASES**

- A. Provide templates or details of wall chases, where conduits, pull boxes, cabinets, and other items of equipment are to be concealed or recessed, before the work of other trades is performed in the respective areas. Show exact locations and sizes of such equipment.

#### **3.7 SLEEVES AND OPENINGS**

- A. Provide sleeves and openings for exposed wires, cables, and wireways where they pass through walls and floors.
- B. Sleeves for individual cables shall be hot-dip galvanized inside and outside. Sleeve shall be equal in gauge to heavy wall steel conduit and extended 3 inches above finished surface or wall.
- C. Furnish complete dimensioned drawings of openings required through walls and floors, for conduits, or busways, or wireways, before the work of other sections is performed in the respective areas.
- D. Installation of 3-inch high concrete curbs around openings through concrete slabs in electrical closets and other openings, shall be provided under Division 3.
- E. Pack or fill sleeves and openings after the completed work is in place. Filling shall comply with U.L., match rating of original construction and shall provide a waterproof and fireproof packing to prevent leakage of liquid, smoke, or fire through the sleeve or opening.

#### **3.8 EQUIPMENT NOISE LIMITATION**

- A. Noise levels of electrical devices and equipment shall be within acceptable limits as established by NEMA or other valid noise rating agencies. Noise levels shall be subject to the Architect/Engineer's acceptance, based on practical and reasonable consideration of occupancy requirements.
- B. Check and tighten the fastenings of sheet metal plates, covers, doors, and trims to prevent vibration isolation and chatter under normal conditions of use.
- C. When located elsewhere than in high-noise-level equipment rooms, the enclosures of solenoid-operated switching devices and other noise-producing device shall have anti-vibration mountings and non-combustible sound-absorbing linings.
- D. Reactors, dimmers, lamp ballasts, and solenoids shall be designed and rated for "quiet" operation.
- E. Remove and replace any individual electrical item or device that is found to produce a sound energy output exceeding that of other identical devices installed at the project.

#### **3.9 ADJUSTMENTS**

- A. The primary adjustments of the system(s) shall be accomplished by the Contractor to the complete satisfaction of the Owner and Architect/Engineer at the time of completion of the installation.

## **SECTION 16010**

### **BASIC ELECTRICAL REQUIREMENTS**

#### **3.10 TESTING**

- A. General: Furnish meters, instruments, cable connections, equipment or apparatus necessary for making all tests.
- B. Insulation Tests:
  - 1. After being pulled in place and before being connected, test all service and feeder cables with 1000 volt, 60 Hz insulation tester for one minute to determine that conductor insulation resistance to ground is not less than that recommended by the manufacturer. Test all branch circuit conductors for lighting, receptacle and miscellaneous loads prior to connection of loads. Tests shall not register less than one megohm to ground during an insulation test as described above for service and feeder cables. Remove, replace and retest all cable failing insulation test.
  - 2. Measure insulation resistance of electrical wiring with a self-contained instrument such as direct-indicating ohmmeter of the generator battery or electronic type.
  - 3. When using any type of d-c voltage source, it is essential that the output voltage is steady to prevent fluctuations in charging current. Where protective resistors are used in test instruments, take into account their effect on the magnitude of the voltage applied to the insulation under test. Properly maintain the instrument used in insulation resistant testing. Make periodic checks to insure that rated voltage is delivered and that the instrument is in calibration.
  - 4. Unless otherwise specified, the insulation resistance shall be approximately one megohm for each 1000 volts of operating voltage with a minimum value of one megohm.
- C. Test all motors under load, with ammeter readings taken in each phase and the RPM of motors recorded at the time. Test all motors for correct direction of rotation.
- D. Documentation: Keep records of all tests, in tabulated, permanent, reproducible form, completely indexed and explained, indicating the specific test performed, environmental conditions such as temperature and humidity, date of performance, results obtained, corrective actions taken (if any), final results, and comments, if required. Copies of all tests shall be delivered to the Architect/Engineer prior to this final project review.

**END OF SECTION**



## **SECTION 16060**

### **ELECTRICAL DEMOLITION FOR REMODELING**

#### **PART 1 GENERAL**

##### **1.1 RELATED DOCUMENTS**

- A. The General Provisions and Supplementary Conditions of the Contract of the General Requirement Specifications, apply to the work in this Section.
- B. This Section is hereby made a part of all other sections of Division 16 as fully as if repeated in each therein.

##### **1.2 SECTION INCLUDES**

- A. Electrical demolition: The work specified in this section includes providing labor, material, equipment, and services necessary for electrical demolition as shown on the drawings and as herein specified to accommodate new construction. The project includes demolition, relocation and replacement of existing electrical equipment, feeders, branch wiring, signal cables, etc. with new work. Contractor shall remove, reinstall or relocate that portion of the existing equipment, system, wiring, fixtures and drawings which are a part of or which applies to the electrical trade.
- B. Selective demolition including:
  - 1. Non-destructive removal of materials and equipment for reuse or salvage as indicated.
  - 2. Dismantling electrical materials and equipment made obsolete by these installations.

##### **1.3 RELATED SECTIONS**

- A. Section 16010 – Basic Electrical Provisions.

##### **1.4 REQUIREMENTS**

- A. Contractor shall provide caution and warning signs at all hazardous areas and at all door entries to construction rooms and areas during the entire construction period per law and regulations.

##### **1.5 SEQUENCING**

- A. Sequence the Work in the following order:
  - 1. Complete new or temporary system as specified.
  - 2. Cut-over to new or temporary system.
    - a. Schedule with Owner at least one week in advance.
  - 3. Remove items specified.

##### **1.6 SCHEDULING**

- A. Schedule work to coincide with other trades and project schedule.
- B. Cease operations immediately when structure appears to be in danger and notify Architect/Engineer. Do not resume operations until directed.

##### **1.7 COORDINATION**

- A. Conduct demolition to minimize interference with adjacent and occupied building areas.
- B. Coordinate demolition work with the construction manager and other related trades.
- C. Coordinate and sequence demolition so as not to cause shutdown of operation of surrounding areas.

## **SECTION 16060**

### **ELECTRICAL DEMOLITION FOR REMODELING**

- D. Shut-down periods:
  - 4. Arrange timing of shut-down periods of system, service with Owner. Do not shut down any service, without prior written approval.
  - 5. Keep shut-down period to minimum or use intermittent period as directed by the Owner.
  - 6. Maintain life-safety system in full operation in occupied facilities, or provide notice minimum 15 working days in advance.

#### **1.8 MAINTAIN CONTINUITY OF SERVICE**

- A. Any downtime time period shall be at the convenience of the Owner and approved by the General Contractor. Contractor shall give a minimum of 15 working days prior written notice to the General Contractor in advance of any desired shutdown. Prior written notice shall include a schedule for downtime, work to be performed. All downtime period shall be on weekends or off hours with exact time period approved in advance in writing by the General Contractor. Coordinate an overall schedule that is to be submitted and approved by the General Contractor.
- B. An electrician shall be on the premises when any trade is working in close proximity to live equipment or within electric rooms during renovation by any trade.
- C. All premium time, overtime, labor, material and equipment costs required to accomplish the above shall be included in the Contractor's bid proposal.

#### **1.9 PROTECTION**

- A. Perform removal of equipment and related components, in such manner as to eliminate hazards to persons and property; to minimize interference with use of adjacent areas, utilities and structures or interruption of use of such utilities; and to provide free passage to and from such adjacent areas of structures.
- B. Provide safeguards, including warning signs, barricades, temporary fences, warning lights, and other similar items that are required for protection of all personnel during demolition and removal operations.

### **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 field measurements and circuiting arrangements.
- B. Verify that abandoned wiring and equipment serve only abandoned facilities.
- C. Demolition Drawings are based on casual field observation and existing record documents. Contractor may purchase a copy of existing record documents for reference during bidding or construction. Report discrepancies to Architect/Engineer before disturbing existing installation. Verify existing conditions before performing any work.
- D. Beginning of demolition means installer accepts existing conditions.

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### **ELECTRICAL DEMOLITION FOR REMODELING**

- E. Where work is concealed above ceiling spaces which are to be removed, cut opening in ceiling and examine condition above the ceiling. If work requires certain devices to remain and the ceiling is supporting the device, contractor shall support device adequately from floor slab above, prior to ceiling demolition or at his option, remove the device and reinstall completely.
- F. Contractor shall verify existing circuit feeding each receptacle in demolition and remodeled area and document in the panelboard directory on record drawings. Contractor shall identify to Architect/ Engineer any wiring in poor condition or overload condition which exists.

#### **3.2 PREPARATION**

- A. Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.
- B. 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.
- C. Existing Electrical Service: Maintain existing system in service until new system is ready for installation. Obtain permission from Owner at least 15 working days before completely disabling system. If outage lasts more than 24 hours, Contractor shall provide and install a generator for temporary service. Temporary service shall be provided until new service is in operation. Refer to Division 1 for temporary power. Make temporary connections to maintain service in areas adjacent to work area while switchovers are completed.
- D. Existing Suspended Ceiling System: Disconnect and remove light fixtures, fire alarm devices, speakers and conduit, etc. to facilitate demolition work.
- E. Protect adjacent materials that are to remain. Install and maintain dust and noise barriers to keep dirt, dust and noise from being transmitted to adjacent areas. Remove protection and barriers after demolition operations are complete.
- F. Locate, identify, and protect electrical services passing through demolition areas and serving other areas outside the demolition limits. Maintain services to areas outside demolition lines. When services must be interrupted, or relocated, install temporary and/or permanent services for affected areas. Services originating within demolition limits and serving areas outside demolition limits shall be maintained.

#### **3.3 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK**

- A. Demolish and extend existing electrical work under provisions of the General Requirement Specification Sections and this Section.
- B. Remove, relocate, and extend existing installations to accommodate new construction.
- C. Remove abandoned wiring to source of supply.
- D. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes to source of supply. Cut concealed conduit flush with walls and floors, and patch surfaces. Remove conduit within walls to be removed. Provide cap on abandoned conduits on each end. If the existing concealed conduits are in conflict with new work remove them.
- E. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets which are not removed.
- F. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.

## SECTION 16060

### ELECTRICAL DEMOLITION FOR REMODELING

- G. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.
- H. Disconnect and remove abandoned panelboard and distribution equipment.
- I. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.
- J. Extend existing installations and provide alterations using acceptable materials and methods compatible with existing electrical installations and in accordance with the equipment manufacturers recommendations.
- K. Remove, demount, and disconnect existing electrical materials and equipment indicated to be moved and salvaged, and deliver materials and equipment to the location designated for storage. Salvaged material shall be stacked, boxed or crated in such a manner as to prevent damage.
- L. Any existing circuits or equipment not shown on drawings and which are logically expected to be continued in service and which may be interrupted or disturbed during construction shall be reconnected in an approved manner. Check and maintain continuity for all existing devices/equipment to remain. In addition, any existing circuits or equipment which may require relocation or rerouting as a result of the work of this project shall be done by the this Contractor with no additional compensation. Provide blank cover plates on empty outlets which are to remain.
- M. Provide new lighting switch(es) so each lighting area affected by new work shall be controlled locally.
- N. Provide code required disconnects to existing and relocated, equipment when affected by new work.
- O. Where existing equipment, devices and fixtures are to remain but are affected by new work such as replacement of ductwork and piping, reconditioning of walls, ceilings, roofs and floors of relaminating of counters, cabinets and casework, disconnect these items and add extension rings, clean and reinstall same in line with new walls, ceilings and surfaces. Note that certain work (such as replacement of piping, ductwork, etc) may be outside the limit to direct renovation. Electrical contractor shall review drawings of other trades for such work and incorporate that in his scope of work. Provide all necessary materials and labor and rewire in accordance with present code requirements.
- P. Owner shall have the option of selecting any or all of the items, including copper wiring, which are designated to be removed by the contractor as salvage for the Owner. Contractor shall remove such items with extreme care and return such items to the Owner. Any equipment which the Owner does not want will become the property of the contractor and promptly removed from the site.
- Q. All cutting and patching, relocating of any equipment, lighting fixtures, conduit, piping, etc., necessary for any work under this contract will be by the respective contractors unless noted otherwise in the architectural sections.
- R. Reference shall be given to Owner to keep any removed device, fixture or equipment. If Owner does not want to keep any of them, dispose them as required.
- S. HID and fluorescent lamps containing mercury shall be disposed of by a federal or state E.P.A. approved method and in accordance with specifications.



## **SECTION 16060**

### **ELECTRICAL DEMOLITION FOR REMODELING**

- T. Before disconnecting, verify with Owner removal or relocation of all existing devices/equipment. No additional cost will be permitted for lack of such verification.
- U. This contractor shall coordinate all his work with the other contractors at the job site before removing existing electrical and installing new items.
- V. Equipment removal in certain locations may require the installation of a junction box to reconnect circuits that remain in operation. Extend conduit and wiring as required to maintain power to remaining equipment.
- W. It is the intent of the electrical demolition drawing(s) to indicate areas in which electrical equipment, conduit, lighting fixtures, devices, etc. are to be removed to allow for the renovation phase of construction. The electrical demolition plan is for reference purposes only and it is not intended to be the sole source of existing conditions.
- X. Electrical Contractor shall be responsible for his own clean-up throughout the course of the demolition work. In the event he fails to provide such clean-up the Architect/Engineer will direct the clean-up to be performed by another contractor and the electrical contractor will be back-charged as deemed appropriate by Architect/Engineer.
- Y. The contractor performing the demolition work, shall remove no more than 8" of building material around each device being demolished.
- Z. Disconnect all electrical connections to mechanical, plumbing and architectural equipment for removal by others. Remove all starters, disconnect switches and related conduit and wiring serving such equipment which is indicated to be removed. Refer to mechanical, plumbing and architectural drawings for exact requirements.
- AA. It shall be the contractors option to reuse existing concealed conduit and flush mounted backboxes where applicable. If existing conduit and/or backboxes are utilized it shall be the electrical contractor's responsibility to provide additional supports and fittings required to conform to the specification.
- BB. Remove all exposed abandoned and exposed non-required conduits together with their associated wires. Remove inaccessible conduits together with all their wires if they are in conflict with renovation work.

#### **3.4 FLOOR AND WALL OPENINGS**

- A. Opening through floors and walls where piping or equipment has been removed shall be sealed to maintain any fire ratings and to seal off cold, smoke and toxic fumes. Use appropriate sealing materials and methods to maintain existing rating of the floor and wall.

#### **3.5 DAMAGE TO OTHER WORK**

- A. The Contractor shall be held responsible for any damage caused to existing installations not pertinent to the Contract. The cost of repairs to such damaged work shall be charged against the Contractor.

#### **3.6 CLEAN-UP**

- A. On completion of work of this section and after removal of all debris, site shall be left in clean condition satisfactory to the Construction Manager. Clean-up shall include off the premises disposal of all items and materials not required to remain the property of the Contractor as well as all debris and rubbish resulting from demolition operations.

## **SECTION 16060**

### **ELECTRICAL DEMOLITION FOR REMODELING**

- B. Debris, including brick, asphalt, concrete, stone and similar materials shall become property of Contractor and shall be disposed of by the Contractor, off the property. Remove concrete foundations, conduits, anchor bolts, and all appurtenances.

#### **3.7 INSTALLATION**

- A. Install relocated materials and equipment under the provisions of the General Requirement Specification Sections.

**END OF SECTION**

## **SECTION 16111**

### **CONDUIT**

#### **PART 1 GENERAL**

##### **1.1 RELATED DOCUMENTS**

- A. The General Provisions of the Contract, including Conditions of the Contract and the General Requirement Specification Sections, apply to the work in this Section.
- B. This Section is hereby made a part of all other sections of Division 16 as fully as if repeated in each therein.

##### **1.2 SECTION INCLUDES**

- A. Metal conduit.
- B. Flexible metal conduit.
- C. Liquidtight flexible metal conduit.
- D. Electrical metallic tubing.
- E. Nonmetal conduit.
- F. Fittings and conduit bodies.

##### **1.3 RELATED SECTIONS**

- A. Section 16130 - Boxes.
- B. Section 16170 - Grounding and Bonding.
- C. Section 16190 - Supporting Devices.
- D. Section 16195 - Electrical Identification.

##### **1.4 REFERENCES**

- A. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
- B. ANSI C80.3 - Electrical Metallic Tubing, Zinc Coated.
- C. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
- D. Local Electrical Code.
- E. NECA "Standard of Installation."
- F. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
- G. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.

##### **1.5 SUBMITTALS**

- A. Submit under provisions of the General Requirement Specification Sections and Section 16010.
- B. Product Data: Provide for metallic conduit, flexible metal conduit, liquid-tight flexible metal conduit, metallic tubing, nonmetallic conduit, fittings, and conduit bodies.
- C. Project Record Documents: Accurately record actual routing of conduits 1 1/4 inches and larger.

##### **1.6 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing Products specified in this Section with minimum three years' experience.

##### **1.7 REGULATORY REQUIREMENTS**

- A. Conform to requirements of local electrical code.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

## SECTION 16111

### CONDUIT

#### 1.8 COORDINATION

- A. Design Requirements: Conduit Size per local electrical code.
- B. Field Measurements: Verify that field measurements are as shown on Drawings.
- C. Field Locations: Verify routing and termination locations of conduit prior to rough-in.
- D. Where conduit routing is shown on Drawings, it is in approximate locations unless dimensioned. Include conduit lengths within 10 ft. of length where shown.
- E. Where conduit destination is indicated and routing is not shown on Drawings, determine exact routing and lengths required.

#### 1.9 DELIVERY, STORAGE, PROTECTION, AND HANDLING

- A. Accept Products and inspect for damage.
- B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- C. Conduit that shows corrosion within the guarantee period shall be replaced.

### PART 2 PRODUCTS

#### 2.1 CONDUIT SCHEDULE

| A.<br>Conduit<br>Location         | From 0 V<br>up thru<br>50V | Above 50V<br>up thru<br>250V | Above 250V<br>up thru<br>600V |
|-----------------------------------|----------------------------|------------------------------|-------------------------------|
| Above an<br>Accessible<br>Ceiling | ≤ 2 1/2" EMT<br>≥ 3" IMC   | ≤ 2 1/2" EMT<br>≥ 3" IMC     | ≤ 2 1/2" EMT<br>≥ 3" IMC      |
| Concealed<br>in Walls             | ≤ 2 1/2" EMT<br>≥ 3" IMC   | ≤ 2 1/2" EMT<br>≥ 3" IMC     | ≤ 2 1/2" EMT<br>≥ 3" IMC      |
| Exposed<br>Interior               | ≤ 2 1/2" EMT<br>≥ 3" IMC   | ≤ 2 1/2" EMT<br>≥ 3" IMC     | ≤ 2 1/2" EMT<br>≥ 3" IMC      |
| Corrosive<br>Environments         |                            | HWG – PVC<br>Coated          | HWG – PVC<br>Coated           |

\* All voltages are line-to-line or line-to-neutral.

#### 2.2 CONDUIT REQUIREMENTS

- A. Minimum Size: 3/4 inch. All remaining conduits shall be minimum of 3/4" including conduits for telephone, data, any other control, intercom device, etc.
- B. Conduit installed below grade at exterior locations may be Schedule 40 PVC when encased within a 3-inch concrete enclosure.
- C. Flexible conduit connections to recessed lighting fixtures shall be made with UL approved flexible steel conduit, except where UL listed liquid tight flexible conduit is required by code, such as in air plenums, etc.
- D. Final connections to motors shall be made through UL listed liquid tight flexible steel conduits, 1/2-inch minimum size unless otherwise indicated.

## SECTION 16111

### CONDUIT

- E. Flexible connections, where required, shall be made with flexible metallic tubing 3/4 inch minimum size or sized in accordance with code, except in areas where such connections will be exposed to oil, grease, water, or where installed out of doors. In those areas of adverse exposure, flexible connections shall be made with UL listed liquid tight flexible steel conduit. Grounding conductors with green colored insulation shall be extended through all flexible connections including fixture "whips", and fastened to terminals within the first junction boxes on either side of the flexible length. Refer to Section 16510 for flexible connections to lighting fixtures.

#### 2.3 METAL CONDUIT

- A. Manufacturers:
  - 1. Allied.
  - 2. LTV/Republic.
  - 3. Steelduct.
  - 4. Wheatland.
- B. Rigid Steel Conduit: ANSI C80.1; hot dipped galvanized or electro-galvanized steel.
- C. Intermediate Metal Conduit (IMC): Rigid steel.
- D. Fittings and Conduit Bodies: ANSI/NEMA FB 1; all steel fittings of threaded joints.

#### 2.4 FLEXIBLE METAL CONDUIT

- A. Description: Interlocked galvanized steel construction.
- B. Fittings: ANSI/NEMA FB 1; steel or malleable iron.
- C. Minimum Size: 1/2 inch (13 mm), unless otherwise specified.
- D. Flexible metal conduit shall only be used as a final connection to equipment, and shall not exceed 72" in total length. Extending flexible runs beyond 72" by adding a junction box or small run of conduit is not allowed.

#### 2.5 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

- A. Manufacturers:
  - 1. Anaconda.
  - 2. American Brass.
  - 3. Electri-Flex Company.
- B. Description: Interlocked galvanized steel construction with UL PVC jacket.
- C. Fittings: ANSI/NEMA FB 1; steel or malleable iron.
- D. Liquid tight flexible metal conduit shall be used for final connection to the following equipment;
  - 1. Fans
- E. Liquid tight flexible metal conduit shall only be used as a final connection to equipment, and shall not exceed 72" in total length. Extending flexible runs beyond 72" by adding a junction box or small run of conduit is not allowed.

#### 2.6 ELECTRICAL METALLIC TUBING (EMT)

- A. Manufacturers:
  - 1. Allied.
  - 2. LTV/Republic.
  - 3. Steelduct.
  - 4. Wheatland.
- B. Description: ANSI C80.3; hot dipped or electro-galvanized tubing.

#### 2.7 EMT FITTINGS AND CONDUIT BODIES

- A. Manufacturers:
  - 1. Appleton.
  - 2. Crouse Hinds/Midwest.
  - 3. OZ/Gedney.
  - 4. Raco.
  - 5. Steel City.
  - 6. T&B

## SECTION 16111

### CONDUIT

- B. Description: ANSI/NEMA FB 1; steel or malleable iron, compression type with insulated throat.
  - 1. Set-screw type fittings are not acceptable.
  - 2. Die-cast fittings of pot metal are not acceptable.

#### 2.8 NONMETALLIC CONDUIT

- A. Manufacturers:
  - 1. Carlon.
  - 2. Sedco.
- B. Description: NEMA TC 2; Schedule 40 PVC, type EB for concrete encasement.
- C. Fittings and Conduit Bodies: NEMA TC 3; material to match conduit.

#### 2.9 EXPANSION FITTINGS

- A. Provide a suitable expansion fitting in each concealed or exposed electrical raceway crossing a building expansion joint. Fittings shall be complete with bonding jumper and clamps.
- B. Manufacturers: OZ/Gedney, Crouse-Hinds and Appleton.

#### 2.10 BUSHINGS

- A. Bushings for conduits 1 inch and smaller shall be self-extinguishing thermoplastic grounding type – 150 degrees C. and insulating type.
- B. Bushings for conduits 1 ¼ inch and larger shall be malleable iron body with 150 degree C. insulating ring and shall be grounding type. Insulating material shall be locked in place and non-removable.

#### 2.11 CONDUIT SYSTEM FOR CORROSIVE ENVIRONMENTS – POOL AREA

- A. All PVC coated conduit, fittings, and accessories shall be supplied by the same manufacturer.
- B. Acceptable Manufacturers:
  - 1. Plasti-Bond
  - 2. Perma-Cote
  - 3. KorKap
- C. The PVC coated galvanized rigid steel conduit must be UL Listed. The PVC coating must have been investigated by UL as providing the primary corrosion protection for the rigid metal conduit. Ferrous fittings for general service locations must be UL Listed with PVC as the primary corrosion protection. Hazardous location fittings, prior to PVC coating must be UL listed. All PVC coated conduit, fittings, and accessories must be new, unused material. Applicable UL standards may include: UL 6 Standard for Safety, Rigid Metal Conduit, UL 514B Standard for Safety, Fittings for Conduit and Outlet Boxes.
- D. The PVC coated galvanized rigid conduit must be ETL Verified to the Intertek ETL SEMKO High Temperature H2O PVC Coating Adhesion Test Procedure for 200 Hours. The PVC coated galvanized rigid conduit must bear the ETL Verified PVC-001 label to signify compliance to the adhesion performance standard.
- E. The bond between the PVC coating and the conduit surface shall be greater than the tensile strength of the coating. This bond shall be verified by testing described in NEMA Standard RN-1, section 3.8.
- F. The conduit shall be hot dip galvanized inside and out with hot galvanized threads.
- G. A PVC sealing sleeve extending one pipe diameter or two inches, whichever is less, shall be formed at every female fitting opening, except unions. The inside sealing sleeve diameter shall be matched to the outside diameter of the conduit.
- H. The PVC coating on the outside of conduit couplings shall be 40 mils in thickness and have a series of raised longitudinal ribs to protect the coating from tool damage during installation.
- I. Form 8 condulets, 1/2" through 2" diameters, shall have a tongue-in-groove, V-Seal gasket to effectively seal against the elements. The design shall be equipped with a positive placement feature to ease and assure proper installation. Certified results confirming seal performance at 15 psig (positive) and 25 in. of mercury (vacuum) for 72 hours shall be available.
- J. Form 8 condulets shall be supplied with plastic encapsulated stainless steel cover screws.

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### CONDUIT

- K. A urethane coating shall be uniformly and consistently applied to the interior of all conduit and fittings. This internal coating shall be a nominal 2-mil thickness. Conduit or fittings having pinholes or areas with thin or no coating shall be unacceptable.
- L. The PVC exterior and urethane interior coatings applied to the conduit shall afford sufficient flexibility to permit field bending without cracking or flaking at temperatures above 30°F.
- M. All factory cut threads on conduit, elbows, nipples, and fittings shall be protected by application of a urethane coating.
- N. Right angle beam clamps and U bolts shall be specially formed and sized to snugly fit the outside diameter of the PVC coated conduit. All U bolts will be supplied with plastic encapsulated nuts that cover the exposed portions of the threads.

### PART 3 EXECUTION

#### 3.1 INSTALLATION - CONDUIT

- A. Install conduit in accordance with NECA "Standard of Installation."
- B. Install nonmetallic conduit in accordance with manufacturer's instructions.
- C. Installation of the PVC coated conduit system shall be performed in accordance with the manufacturer's installation manual. To assure correct installation, the installer shall be certified by the PVC coated conduit manufacturer before the installation can begin.
- D. Arrange conduit to maintain headroom and present neat appearance.
- E. Route conduit parallel and perpendicular to walls.
- F. Route conduit installed above accessible ceilings parallel and perpendicular to walls.
- G. Route conduit in and under slab from point-to-point.
- H. Do not cross conduits in slab.
- I. Maintain adequate clearance, minimum of 12 inches, between conduit and piping.
- J. Maintain 12 inch clearance between conduit and surfaces with temperatures exceeding 104 degrees F.
- K. Cut conduit square using saw or pipecutter; de-burr cut ends.
- L. Install no more than equivalent of three 90-degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one-shot bender to fabricate bends in metal conduit larger than 2 inch size, or provide factory elbows.
- M. Provide suitable pull string in each empty conduit except sleeves and nipples.
- N. Ground and bond conduit under provisions of Section 16170.
- O. Identify conduit under provisions of Section 16195.
- P. In general, conduits shall be run concealed. Where exposed conduit runs are shown or required, they shall be run parallel to building construction and shall be suitably supported at required intervals.
- Q. Conduits run to and from cabinets shall be run neatly, in accurate manner, and shall emerge from the floors and ceilings at right angles thereto.
- R. Conduit stub-ups and stub-downs shall be arranged in a neat and orderly manner and shall emerge at right angles to floors or ceilings.
- S. In equipment spaces, such as fan rooms, plenums, etc., conduits and outlets may be exposed, but shall avoid interference with ventilating ducts, piping, etc.
- T. Exposed conduit installed on or adjacent to ventilating ducts shall be installed after the ducts are in place, and shall be run from ceiling or wall junction boxes in such manner as to retain accessibility to junction box covers and to permit future removal or replacement of ducts.
- U. Non-metallic conduit changes of direction shall be made by use of large radius bends, sweeps, or offsets.
- V. Steel conduit bends of same size as the non-metallic conduit shall be used to terminate non-metallic conduit underground runs above ground.

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### CONDUIT

- W. Steel conduit sections of the same size as the non-metallic conduit shall be used to terminate non-metallic conduit runs in handholes, power pits, building line, etc. Length of steel conduit sections shall extend a minimum of 5 feet from outside face of handhole, or power pit, building line, etc.
- X. All underground conduit shall be water-tight using water-tight compounds and fittings.

#### 3.2 INSTALLATION - FITTINGS

- A. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.
- B. Use conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.
- C. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.
- D. Provide conduit seals for conduits and ducts entering/exiting hazardous locations.
- E. Provide suitable fittings to accommodate expansion and deflection where conduit crosses expansion joints and in each uninterrupted run of horizontal or vertical conduit in excess of 100 feet. Fittings shall be complete with bonding jumpers and clamps.
- F. Use suitable caps to protect installed conduit against entrance of dirt and moisture.
- G. Double locknuts shall be used at termination of IMC and HWG conduit in knock-out openings.
- H. Ends of conduits shall be equipped with insulating bushings for 1 inch and smaller and insulated metallic bushings for 1- 1/4 inches and larger. Ends of conduit shall be temporarily capped prior to installation and during construction to exclude foreign material.
- I. Joints in conduit run underground or in slabs on ground shall be made watertight with copper base anti-corrosive conductive compound.
- J. Provide wall flanges and gasketing on conduits entering fan housings to minimize air leakage at points of penetration of housing.
- K. No running threads shall be cut or used.
- L. Transitions between non-metallic and steel conduit shall be made by means of conduit manufacturer's standard adapters.

#### 3.3 INSTALLATION - SUPPORTS

- A. Arrange supports to prevent misalignment during wiring installation.
- B. Conduit embedded in underground concrete shall be adequately supported to prevent movement during concrete placement. Compact gravel fill and soil below underground conduit or support conduit with suitable separators and chairs prior to placing concrete.
- C. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- D. Group related conduits; support using conduit rack. Construct rack using steel channel.
- E. Fasten conduit supports to building structure and surfaces under provisions of Section 16190.
- F. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports
- G. Do not attach conduit to ceiling support wires.
- H. Bring conduit to shoulder of fittings; fasten securely.
- I. Conduit risers shall be rigidly supported on the building structure, using appropriate supports only.
- J. Conduits and other electrical items shall not be fastened to or supported from ventilating ducts, but shall be separately supported. The method of supporting and details of the supporting members shall be reviewed by the Architect/Engineer. In no case shall screws penetrate the sheet metal of the ducts.
- K. Exposed conduits run on surfaces shall be supported according to code and within 3 feet of each outlet, junction box, or cabinet, by galvanized malleable conduit clamps and clamp backs. Suspended conduits shall be supported every 5 feet by conduit hangers and round rods, or where 2 or more conduits are run parallel, by trapeze hangers suitably braced to prevent



## **SECTION 16111**

### **CONDUIT**

swaying.

- L. Screws for exposed work shall be stainless steel.
- M. Cadmium plated steel screws may be used for interior unexposed dry locations only.
- N. All trenching, coring, backfilling and compacting for the electrical installation is by the electrical contractor. All excess debris from trenching and coring shall be removed from the site by the electrical contractor.

#### **3.4 INTERFACE WITH OTHER PRODUCTS**

- A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods under the provisions of the General Requirements.
- B. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pipe portals. Coordinate location with roofing installation.

**END OF SECTION**



## **SECTION 16123**

### **BUILDING WIRE AND CABLE**

#### **PART 1 GENERAL**

##### **1.1 RELATED DOCUMENTS**

- A. The General Provisions of the Contract, including Conditions of the Contract and Division 1 Specification Sections, apply to the work in this Section.
- B. This Section is hereby made a part of all other sections of Division 16 as fully as if repeated in each therein.

##### **1.2 SECTION INCLUDES**

- A. Building wire and cable.
- B. Wiring connectors and connections.

##### **1.3 RELATED SECTIONS**

- A. Section 16195 - Electrical Identification.
- B. Section 16170 - Grounding and Bonding.

##### **1.4 REFERENCES**

- A. NECA Standard of Installation (National Electrical Contractors Association).
- B. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems (International Electrical Testing Association).
- C. NFPA 70 - National Electrical Code.

##### **1.5 SUBMITTALS**

- A. Submit under provisions of the General Requirement Specification Sections and Section 16010.
- B. Product Data: Provide for each cable assembly type.
- C. Test Reports: Indicate procedures and values obtained.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.
- E. Project Record Documents: Record actual locations of components and circuits.

##### **1.6 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' experience.

##### **1.7 REGULATORY REQUIREMENTS**

- A. Conform to requirements of local electrical code, unless otherwise specified.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

##### **1.8 COORDINATION**

- A. Coordinate under provisions of the General Requirement Specification Sections and Section 16010.
- B. Field Measurements: Verify that field measurements are as shown on Drawings.
- C. Where wire and cable routing is shown on Drawings, it is approximate unless dimensioned. Include wire and cable lengths within 10 ft of length where shown.
- D. Where wire and cable destination is indicated and routing is not shown on Drawings, determine exact routing and lengths required.

## SECTION 16123

### BUILDING WIRE AND CABLE

#### PART 2 - PRODUCTS

##### 2.1 BUILDING WIRE

- A. Manufacturers:
1. American Insulated Wire Corp.
  2. Cerro.
  3. Collyer.
  4. Capitol Wire and Cable.
  5. Okonite.
  6. Senetor.
  7. South Wire.
  8. Triangle.
- B. Description: Single conductor insulated copper wire.
1. AWG No. 12 minimum, unless otherwise specified.
  2. AWG No. 10 and smaller may be solid or stranded, unless otherwise specified.
  3. AWG No. 8 and larger shall be stranded.
  4. AWG No. 14 stranded, for control and signal wire, unless otherwise specified.
  5. Provide wire and cable suitable for the temperature, conditions and location where indicated.
  6. Conductivity: Copper conductors shall have a conductivity of not less than 98% at 20°C (68°F). Conductor resistance values shall be in accordance with the values in NEMA WC 8.
  7. Jackets: Factory-applied nylon or PVC external jacketed wires and cables for pulls in raceways over 100-feet in length, for pulls in raceways with more than three equivalent 90° bends, for pulls in conduits underground or under slabs on grade, and where indicated.
- C. Insulation: 600 volts NFPA 70 Types as follows:

|    |                    |                                                                |                                                  |
|----|--------------------|----------------------------------------------------------------|--------------------------------------------------|
| 1. | Wire Location      | Line/Load terminations on OCP devices rated from 15A thru 600A | Line/Load Terminations on 100% rated OCP devices |
|    | Interior Locations | THHN/THWN XHHW                                                 | <45°C ambient XHHW<br>>45°C ambient              |
|    | Exposed Exterior   | THHN/THWN                                                      | XHHW damp locations<br>XHHW-2 wet locations      |
|    | Below Grade        | XHHW                                                           | XHHW-2                                           |

##### 2.2 WIRING CONNECTORS

- A. Solderless Insulated Mechanical Connectors:
1. Manufacturers:
    - a. Burndy DUC.
    - b. Dossert GTC.
    - c. OZ/Gedney XTPC.
    - d. Thomas & Betts CTC.
  2. Provide parallel clamp connector with insulating cover.
  3. Connector shall be constructed of an all copper alloy with bolted tangential plates which will receive the clamping pressure and redistribute the pressure uniformly over the entire surface of the clamping mechanism.
  4. Insulating cover shall be of the same manufacturer as the connectors and shall have cable openings suitable for the cable insulation being installed. Where insulating covers do not completely seal taps, tape the installation. The insulating cover shall not kink or crimp the cable insulation when cover is completely closed.

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### BUILDING WIRE AND CABLE

- B. Spring Wire Connectors:
  - 1. Manufacturers:
    - a. Thomas & Betts PT.
    - b. 3M Scotchloc.
- C. Compression Connectors:
  - 1. Manufacturers:
    - a. Burndy Hydent.
    - b. Thomas & Betts 54000.
  - 2. One-hole lugs for AWG No. 4/0 and smaller.
  - 3. Two-hole lugs for AWG No. 250 kcmil and larger.
  - 4. Feeders 1200 Amps and larger shall include cable limiter type lugs at each end of each phase conductor.

#### 2.3 ADDITIONAL ACCESSORIES

- A. In the event that conduit and wire sizes increase beyond the motor or equipment manufacturer's normal provisions for conduit and wire terminations, due to voltage-drop or other considerations in motor branch-circuit designs, provide necessary auxiliary termination facilities with adequate boxes, lugs, terminals, and other components as may be required. Consult with the suppliers of motors and other items to ensure that the equipment is furnished with suitable components to accept the required conduits and wires.
- B. Riser cables shall have cable supports as required by code.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify that interior of building has been protected from weather.
- B. Verify that raceway installation is complete and supported.

#### 3.2 PREPARATION

- A. Completely and thoroughly swab raceway before installing wire.
- B. Install wiring in conduits buried in plaster or in poured concrete after the encasing medium is set and dry.

#### 3.3 INSTALLATION

- A. Route wire and cable as required to meet Project Conditions.
- B. Install cable in accordance with the NECA "Standard of Installation."
- C. Pull all conductors into raceway at same time.
- D. Use pulling means including fish tape, cable, rope and basket weave wire/cable grips which will not damage cables or raceways.
- E. Feeders shall be installed as continuous conductors without splices whenever possible. Where feeder splices are required, the contractor shall submit a request for approval in writing to the engineer indicating the feeder and splice location. Where splices are installed without written approval, the engineer reserves the right to have the contractor replace the spliced conductors with continuous conductors at no additional cost to the Owner.
- F. Use suitable wire pulling lubricant for building wire 4 AWG and larger.
  - 1. Cable lubricants shall be less than 6 percent solid residue after drying for 24 hours at 105°C. Cable lubricants shall not contain any waxes, greases, polyakylene glycol oils, or silicones. Manufacturer: Polywater J by American Polywater Corp.
- G. Protect exposed cable from damage. Install exposed cable, parallel and perpendicular to surfaces, or exposed structural members, and follow surface contours, where possible.
- H. Support signal cables above accessible ceiling, using cable ties to support cables from structure. Do not rest cable on ceiling grid.

## SECTION 16123

### BUILDING WIRE AND CABLE

- I. Use suitable cable fittings, connectors, and supports.
  - 1. Cable supports shall be as required by Code and shall be compatible with the wire and cable type and the associated conduit size.
    - a. Manufacturer: OZ/Gedney or Thomas & Betts.
- J. Increase conductor size as required due to availability. Minimum feeder conductor sizes are shown on Drawings. If increased, be responsible for associated feeder conduit size and increased ground conductor size per NEC.
- K. Provide conductors of the same size from the protective device to the last load.
- L. Make conductor length identical for parallel feeders.
- M. Support conductors in vertical raceways. One cable support shall be provided at the top or as close to the top as practical, plus a support for each additional interval of spacing per Table 300-19a of the NEC.
- N. Provide slack wire for all future connections with ends of wires taped and blank box covers installed.
- O. Do not bend cables, either permanently or temporarily during installation, to radii less than that recommended by the manufacturer.
- P. Use conductors with 90°C insulation when wiring is within seven feet of, passing over or attached to the following:
  - 1. Boilers.
  - 2. Hot water heaters.
  - 3. Other heat producing equipment.
- Q. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- R. Splices, Taps and Terminations
  - 1. Make splices and taps in wiring #10 AWG and smaller mechanically and electrically secure with mechanical pressure type splicing devices.
  - 2. Make splices and taps of conductors #8 AWG or larger and all splices in motor terminal boxes using compression connectors requiring the use of compression tools for securing the conductors in the connectors. Termination of conductors at all distribution equipment, except transformers, shall be made using mechanical lugs. Connectors shall be of high conductivity, corrosion-resistant material and have actual contact area that shall provide at least the current carrying capacity of the wire or cable. For conductors #1/0 and larger, connector lugs shall be of the two-hole type. Connector lugs shall be bolted to bussing using Belleville washers in combination with flat washers and nuts.
  - 3. Each conductor lug or bus shall be individually made with separate lug and/or bolt as required for the termination.
  - 4. Provide insulated connectors for splices and taps with a self-fusing rubber insulating tape that is non-corrosive to the connector and the conductor. Insulation tape shall have a minimum of 350 volts per mil dielectric strength. Friction or vinyl tape shall be applied directly over rubber insulating tape equal to 3M Scotch 88 type.
- S. Tighten electrical connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values. Where manufacturer's torquing requirements are not indicated, tighten connector and terminals to comply with tightening torques specified in UL Standards 486A and B.

## SECTION 16123

### BUILDING WIRE AND CABLE

- T. Identify and color code wire and cable under provisions of Section 260553. Identify each conductor with its circuit number or other designation indicated. Wire color coding shall be as follows or as required by local codes:

**Normal Power**

120/208 Volts:  
Phase A – Black  
Phase B – Red  
Phase C – Blue  
Neutral – White  
Ground – Green

277/480 Volts:  
Phase A – Brown  
Phase B – Orange  
Phase C – Yellow  
Neutral – Gray  
Ground – Green

**Powered from TVSS Panel**

120/208 Volts:  
Phase A - Purple  
Phase B - Pink  
Phase C - Tan  
Neutral – White with Gray Stripe  
Ground – Green with Orange Stripe

### 3.4 MAXIMUM BRANCH CIRCUIT LENGTHS

- A. The following indicates maximum installed length a circuit can have and still maintain an adequate voltage level at the last point of use for 20 amp circuit. If the 20 amp circuit length exceeds the length listed, use the next larger wire sized. Multiple circuit runs in the same raceway shall have all conductors sizes the same based on worst case circuit lengths.

**BRANCH CIRCUIT LENGTH (IN FEET)**

| Wire Size | 2 Wire<br>120 V | 2 Wire<br>277 V | 1 Phase<br>208V | 1 Phase<br>480 V | 3 Phase<br>208 V | 3 Phase<br>480 Volt |
|-----------|-----------------|-----------------|-----------------|------------------|------------------|---------------------|
| 12        | 0 to 61'        | 0 to 141'       | 0 to 105'       | 0 to 244'        | 0 to 122'        | 0 to 282'           |
| 10        | 62' to 97'      | 142' to 224'    | 106' to 168'    | 245' to 388'     | 123' to 194'     | 283' to 449'        |
| 8         | 98' to 154'     | 225' to 357'    | 169' to 267'    | 389' to 618'     | 195' to 309'     | 450' to 714'        |
| 6         | 155' to 246'    | 358' to 567'    | 268' to 426'    | 619' to 983'     | 310' to 491'     | 715' to 1135'       |

### 3.5 FIELD QUALITY CONTROL

- A. Testing: Upon installation of wires and cables and before electrical circuitry has been energized, demonstrate product capability and compliance with requirements.
1. Procedures: Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification, Section 7.3.1. Certify compliance with test parameters.
- B. Correct malfunctioning products at site, where possible, and retest to demonstrate compliance; otherwise remove and replace with new units, and retest.
- C. Inspection: Inspect wire and cable for physical damage and proper connection.
- D. Insulation Resistance Test: Prior to energization of circuitry, check installed wires and cables with megohm meter to ensure insulation resistance requirements are fulfilled.
- E. Continuity Test: Perform continuity test on all power and equipment branch circuit conductors. Verify proper phasing connections. Correct if necessary.
- F. Branch Circuits with Receptacles: Branch circuit receptacle wiring shall be tested using a Daniel Woodhead Co. circuit tester Model #1750.
- G. Torque Test: Torque test conductor connections and terminations to manufacturer's recommended values.

### END OF SECTION





## SECTION 16130

### BOXES

#### PART 1 GENERAL

##### 1.1 RELATED DOCUMENTS

- A. The General Provisions of the Contract, including Conditions of the Contract and the General Requirement Specification Sections, apply to the work in this Section.
- B. This Section is hereby made a part of all other sections of Division 16 as fully as if repeated in each therein.

##### 1.2 SECTION INCLUDES

- A. Wall and ceiling outlet boxes.
- B. Floor boxes.
- C. Pull and junction boxes.

##### 1.3 RELATED SECTIONS

- A. Section 16140 - Wiring Devices.
- B. Section 16170 - Grounding and Bonding.
- C. Section 16190 - Supporting Devices.
- D. Section 16195 - Electrical Identification.

##### 1.4 REFERENCES

- A. NECA (National Electrical Contractor's Association) Standard of Installation.
- B. NEMA FB 1 - Fittings and Supports for Conduit and Cable Assemblies.
- C. NEMA OS 1 - Sheet-steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- E. Local electrical code.

##### 1.5 SUBMITTALS

- A. Submit under provisions of General Requirement Specification Sections and Sections 16010.
- B. Product Data: Provide for outlet boxes.

##### 1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this Section with minimum three years experience.

##### 1.7 1.1 REGULATORY REQUIREMENTS

- A. Conform to requirements of local electrical code.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

##### 1.8 COORDINATION

- A. Coordinate under provisions of the General Requirement Specification Sections and Section 16010.
- B. Field Measurements: Verify that field measurements are as shown on Drawings.
- C. Field Locations: Verify locations of boxes prior to installation.

#### PART 2 PRODUCTS

##### 2.1 OUTLET BOXES

- A. Manufacturers:
  - 1. Appleton
  - 2. Raco
  - 3. Steel City

## SECTION 16130

### BOXES

- B. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel with knockouts.
  - 1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 1/2 inch male fixture studs where required.
  - 2. Concrete Ceiling Boxes: Concrete type.
- C. Cast Boxes: NEMA FB 1, Type FD, cast ferrous alloy. Provide gasketed cover and threaded hubs.
- D. Wall Plates for Finished Areas: As specified in Section 16140.

### 2.2 PULL AND JUNCTION BOXES

- A. Sheet Metal Boxes: NEMA OS 1.
  - 1. Material: Hot-dipped galvanized steel.
  - 2. Covers: Secured with stainless steel screws.
  - 3. Finish: Paint interior and exterior with rust-inhibitive paint.
  - 4. Gaskets: Provide in accordance with applicable Code.
- B. Hinged Enclosures: As specified.
- C. Surface Mounted Cast Metal Box: NEMA 250, flat-flanged, surface mounted junction box:
  - 1. Material: Galvanized cast iron.
  - 2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.
- D. Fiberglass Handholes: Die molded glass fiber hand holes:
  - 1. Cable Entrance: Pre-cut 6 inch x 6 inch cable entrance at center bottom of each side.
  - 2. Cover: Glass fiber weatherproof cover with nonskid finish.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify locations and mounting heights of floor boxes and outlets prior to rough-in.

### 3.2 INSTALLATION

- A. Install boxes in accordance with NECA "Standard of Installation."
- B. Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.
- C. Set wall mounted boxes at elevations to accommodate mounting heights indicated.
- D. Electrical boxes are shown on Drawings in approximate locations unless dimensioned. Adjust box location up to 10 feet if required to accommodate intended purpose.
- E. Box sizes shall not be smaller than that required by Code for the number and size of wires and/or conduits to be installed.
- F. Orient boxes to accommodate wiring devices oriented as specified in Section 16140.
- G. Maintain headroom and present neat mechanical appearance.
- H. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- I. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.
- J. Plenum Ceiling Areas: Install boxes in accordance with applicable Code.
- K. Install boxes to preserve fire resistance rating of partitions and other elements, using materials and methods specified in the General Requirements.
- L. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.
- M. Locate outlet boxes to allow luminaires positioned as shown on reflected ceiling plan.
- N. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.
- O. Outlet boxes for toggle switches shall be located on the strike side of the door.
- P. Use flush mounting outlet box in finished areas.
- Q. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
- R. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- S. Use stamped steel bridges to fasten flush mounting outlet box between studs.
- T. Install flush mounting box without damaging wall insulation or reducing its effectiveness.

## **SECTION 16130**

### **BOXES**

- U. Use adjustable steel channel fasteners for hung ceiling outlet box.
- V. Do not fasten boxes to ceiling support wires.
- W. Support boxes independently of conduit.
- X. Use gang box where more than one device is mounted together. Do not use sectional box.
- Y. Use gang box with plaster ring for single device outlets.
- Z. Set floor boxes level.

#### **3.3 INTERFACE WITH OTHER PRODUCTS**

- A. Coordinate installation of outlet box for equipment connected under Section 16180.

#### **3.4 ADJUSTING**

- A. Adjust installed work under the provisions of the General Requirements.
- B. Adjust flush-mounting outlets to make front flush with finished wall material.
- C. Install knockout closures in unused box openings.

#### **3.5 CLEANING**

- A. Clean installed work under the provisions of the General Requirements Specification Sections.
- B. Clean interior of boxes to remove dust, debris, and other material.
- C. Clean exposed surfaces and restore finish.

**END OF SECTION**



## **SECTION 16170**

### **GROUNDING AND BONDING**

#### **PART 1 GENERAL**

##### **1.1 RELATED DOCUMENTS**

- A. The General Provisions of the Contract, including Conditions of the Contract and the General Requirement Specification Sections, apply to the work in this Section.
- B. This Section is hereby made a part of all other sections of Division 16 as fully as if repeated in each therein.

##### **1.2 SECTION INCLUDES**

- A. Grounding electrodes and conductors.
- B. Equipment grounding conductors.
- C. Bonding.

##### **1.3 REFERENCES**

- A. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems (International Electrical Testing Association).
- B. Local Electrical Code.

##### **1.4 SUBMITTALS**

- A. Submit under provisions of the General Requirements and Section 16010.
- B. Product Data: Provide for grounding electrodes and connections.
- C. Test Reports: Indicate overall resistance to ground and resistance of each electrode.
- D. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.
- E. Project Record Documents: Record actual locations of components and grounding electrodes.
- F. Certificate of Compliance: Submit detailed drawings including grounding details and material specifications to the authority having jurisdiction. Indicate approval of installation by authority having jurisdiction.

##### **1.5 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

##### **1.6 REGULATORY REQUIREMENTS**

- A. Conform to requirements of local electrical code.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

##### **1.7 COORDINATION**

- A. Coordinate under provisions of the General Requirements and Section 16010.

#### **PART 2 PRODUCTS**

##### **2.1 GROUNDING SYSTEM**

- A. Description: Complete grounding system of ground ring and rod electrodes, with connections to metal underground water pipe and building frame.
- B. Grounding System Resistance: 1-5 ohms.

## SECTION 16170

### GROUNDING AND BONDING

#### 2.2 ROD ELECTRODES

- A. Manufacturers:
  - 1. Harger Lightning Protection, Inc.
  - 2. Thompson Lightning Protection, Inc.
  - 3. Independent Protection Co., Inc.
- B. Material: Copper.
- C. Diameter: 3/4 inch.
- D. Length: 10 feet.

#### 2.3 MECHANICAL CONNECTORS

- A. Manufacturers:
  - 1. Appleton.
  - 2. OZ/Gedney.
  - 3. Thomas & Betts.
  - 4. Harger Lightning Protection, Inc.
  - 5. Thompson Lightning Protection, Inc.
  - 6. Independent Protection Co., Inc.
- B. Material: Bronze.

#### 2.4 WIRE

- A. Material: Stranded copper.
- B. Grounding Electrode Conductor: Size to meet local code requirements.
- C. Grounding Conductors: Size to meet electrical code requirements. Green insulated, 600 volt minimum, stranded copper within raceway.

#### 2.5 GROUNDING BUSHINGS

- A. Manufacturers:
  - 1. Appleton GIB-50L.
  - 2. OZ/Gedney IBC-50L.
  - 3. Thomas & Betts 3870.
- B. Material: Malleable iron, threaded, with insulated liner and solderless lug.

### PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. Verify conditions under provisions of the General Requirement Specification Sections.
- B. Verify that final backfill and compaction has been completed before driving rod electrodes.

#### 3.2 INSTALLATION

- A. Install rod electrodes at locations indicated. Install additional rod electrodes as required to achieve specified resistance to ground. Drive rod electrodes into permanent moisture where soil conditions permit. Rod spacing shall be minimum two and one half rod lengths to nearest electrode.
- B. Install bare copper wire in foundation footing where indicated.
- C. Provide grounding electrode conductor and connect to reinforcing steel in foundation footing where indicated.
- D. Provide bonding to meet Regulatory Requirements.
- E. Bond together metal components including supports, elevator rails, pipes, and ducts not attached to grounded structure.
- F. Provide isolated grounding conductor for circuits as indicated.

## **SECTION 16170**

### **GROUNDING AND BONDING**

- G. Provide a separate ground conductor in each feeder and branch circuit wiring.
  - 1. The Equipotential Grounding System shall consist of grounding and bonding conductors connected to ground bars arranged to minimize potential differences between exposed conductive surfaces of electrical and non-electrical equipment.
  - 2. All bonding and grounding conductors shall be installed in one continuous length, without splice, to ground bar.
  - 3. Minimum size:
    - a) No. 12 AWG to receptacles, light switches, and light fixtures.
- H. Equipment Ground Bus: Provide ground bus within each switchboard, motor control center, and panelboard.
- I. Isolated Ground Bus: Provide ground bus insulated from enclosure within panelboards as indicated.
- J. Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.
- K. Flexible Conduit Connections: Provide separate, insulated ground bonding-jumper conductor within each flexible conduit.
- L. Interface with site grounding system installed under the General Requirement Specification Sections.
- M. Bond together metal sides not attached to grounded structure; bond to ground.
- N. Bond together reinforcing sheet and metal accessories in pool and fountain structures.
- O. Install transient suppression plate where indicated.
- P. Install ground grid under access floors where indicated. Construct bare copper wire grid and bond each access floor pedestal to grid.
- Q. Bond together each metallic raceway, pipe, duct and other metal object entering space under access floors. Bond to underfloor ground grid.
- R. Provide isolated grounding conductor for circuits as indicated.
- S. Provide grounding and bonding in patient care areas to meet requirements of NFPA 99 and local electrical code.
- T. Provide grounding and bonding in data processing areas to meet requirements of local electrical code.
- U. Interface with lightning protection system installed under Section 16670.
- V. Provide red plastic sign at main water service meter indicating "main ground location".

### **END OF SECTION**





**SECTION 16180**  
**EQUIPMENT WIRING**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Electrical connections to equipment.

**1.2 RELATED SECTIONS**

- A. Section 16111 - Conduit.
- B. Section 16123 - Building Wire and Cable.
- C. Section 16130 - Boxes.

**1.3 REFERENCES**

- A. Section 01090 - Reference Standards: Requirements for references and standards.
- B. NEMA WD 1 - General Purpose Wiring Devices.
- C. NEMA WD 6 - Wiring Devices - Dimensional Requirements.
- D. NFPA 70 - National Electrical Code.

**1.4 SUBMITTALS FOR REVIEW**

- A. Submit under provisions of the General Requirements.

**1.5 SUBMITTALS FOR INFORMATION**

- A. Submit under provisions of the General Requirements.

**1.6 REGULATORY REQUIREMENTS**

- A. Conform to requirements of local electrical code.
- B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

**1.7 COORDINATION**

- A. Section 16010 - Basic Electrical Requirements.
- B. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
- C. Determine connection locations and requirements.
- D. Sequence rough-in of electrical connections to coordinate with installation of equipment.
- E. Sequence electrical connections to coordinate with start-up of equipment.

**PART 2 PRODUCTS**

Not Used.

## **SECTION 16180**

### **EQUIPMENT WIRING**

#### **PART 3 EXECUTION**

##### **3.1 EXAMINATION**

- A. Section 16010 - Basic Electrical Requirements: Verification of existing conditions prior to beginning work.
- B. Verify that equipment is ready for electrical connection, wiring, and energization.

##### **3.2 ELECTRICAL CONNECTIONS**

- A. Make electrical connections in accordance with equipment manufacturer's instructions.
- B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.
- C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.
- D. Provide receptacle outlet to match attachment plug.
- E. Provide cord and cap where field-supplied attachment plug is required.
- F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
- G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
- H. Install terminal block jumpers to complete equipment wiring requirements.
- I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.
- J. Seal roof penetrations properly and as recommended by roofing manufacturer.

**SECTION 16180****EQUIPMENT WIRING****3.3 MECHANICAL EQUIPMENT SCHEDULE**

- A. As soon as practical and before any material or equipment is purchased or installed, the contractor shall submit for review, the mechanical equipment connection schedule for all mechanical equipment, completely filled in. The mechanical contractor shall stamp the mechanical equipment schedule to certify that he has coordinated and reviewed it. Any material or equipment installed without stamped or written approval of the mechanical equipment connection schedule shall be removed, modified or otherwise corrected at no additional cost to the Owner.
- B. The schedule below is a sample of what is to be submitted.

| MECHANICAL EQUIPMENT CONNECTION SCHEDULE |       |       |      |                 |              |                          |
|------------------------------------------|-------|-------|------|-----------------|--------------|--------------------------|
| EQUIPMENT<br>DESIGNATION TAG             | LOAD  |       |      | BREAKER<br>SIZE | FUSE<br>SIZE | CONDUIT AND<br>WIRE SIZE |
|                                          | VOLTS | PHASE | H.P. |                 |              |                          |
| AIR SUPPLY UNIT                          |       |       |      |                 |              |                          |
| ROOF TOP<br>UNIT                         |       |       |      |                 |              |                          |
| AIR COOLED<br>CONDENSING UNIT            |       |       |      |                 |              |                          |
| CHILLER                                  |       |       |      |                 |              |                          |
| HOT WATER BOILER                         |       |       |      |                 |              |                          |
| HOT WATER PUMP                           |       |       |      |                 |              |                          |
| BOILER<br>CIRCULATION PUMP               |       |       |      |                 |              |                          |
| CHILLED WATER<br>PUMP                    |       |       |      |                 |              |                          |
| COIL BOOSTER PUMP                        |       |       |      |                 |              |                          |
| SINGLE PHASE<br>EXHAUST FANS             |       |       |      |                 |              |                          |
| THREE PHASE<br>EXHAUST FANS              |       |       |      |                 |              |                          |
| FAN POWERED BOX                          |       |       |      |                 |              |                          |
| CABINET UNIT<br>HEATER                   |       |       |      |                 |              |                          |
| SUSPENDED UNIT<br>HEATER                 |       |       |      |                 |              |                          |
| UNIT<br>VENTILATOR                       |       |       |      |                 |              |                          |
| FIRE PUMP                                |       |       |      |                 |              |                          |
| JOCKEY PUMP                              |       |       |      |                 |              |                          |
| DOMESTIC WATER<br>PUMP                   |       |       |      |                 |              |                          |
| KITCHEN MAKE-UP<br>UNIT                  |       |       |      |                 |              |                          |
| ELEVATOR                                 |       |       |      |                 |              |                          |
| DECK ELEVATOR                            |       |       |      |                 |              |                          |
| ALL GYM EQUIPMENT                        |       |       |      |                 |              |                          |

**END OF SECTION**



## SECTION 16190

### SUPPORTING DEVICES

#### PART 1 GENERAL

##### 1.1 RELATED DOCUMENTS

- A. The General Provisions of the Contract, including Conditions of the Contract and the General Requirement
- B. This Section is hereby made a part of all other sections of Division 16 as fully as if repeated in each therein.

##### 1.2 SECTION INCLUDES

- A. Conduit and equipment supports.
- B. Anchors and fasteners.
- C. Vibration Isolation.

##### 1.3 RELATED SECTIONS.

- A. Section 16170 - Grounding and Bonding.

##### 1.4 REFERENCES

- A. NECA - National Electrical Contractors Association.
- B. National Electrical Code.

##### 1.5 SUBMITTALS

- A. Submit under provisions of the General Requirements and Section 16010.
- B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

##### 1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this Section with minimum three years' experience.

##### 1.7 REGULATORY REQUIREMENTS

- A. Conform to requirements of local electrical code, unless otherwise specified.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

##### 1.8 COORDINATION

- A. Coordinate under provisions of the General Requirement Specification Sections and Section 16010.

#### PART 2 PRODUCTS

##### 2.1 PRODUCT REQUIREMENTS

- A. Materials and Finishes: Provide adequate corrosion resistance.
- B. Provide materials, sizes, and types of anchors, fasteners and supports to carry the loads of equipment and conduit. Consider weight of wire in conduit when selecting products. Design of supports and methods of fastening to building structures shall be acceptable to the Architect/Engineer.
- C. Anchors and Fasteners: For point of attachment weight of 100 pounds or less.
  - 1. Concrete Structural Elements: Use precast insert system, expansion anchors, and preset inserts.
  - 2. Steel Structural Elements: Use beam clamps.
  - 3. Concrete Surfaces: Use self-drilling anchors and expansion anchors.
  - 4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts.
  - 5. Solid Masonry Walls: Use expansion anchors and preset inserts.
  - 6. Sheet Metal: Use sheet metal screws.
  - 7. Wood Elements: Use wood screws.

## **SECTION 16190**

### **SUPPORTING DEVICES**

- D. Anchors and Fasteners: For point of attachment weight of 100 pounds or more, obtain direction and approval from Architect/Engineer.

#### **2.2 STEEL CHANNEL**

- A. Manufacturer:
  - 1. B-Line.
  - 2. Unistrut.
  - 3. Allied.
- B. Description: Galvanized steel.

#### **2.3 VIBRATION ISOLATION**

- A. Suspended vibration producing equipment shall have spring elements in the hanger rods or isolation pads under the equipment.

### **PART 3 EXECUTION**

#### **3.1 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Provide anchors, fasteners, and supports in accordance with NECA "Standard of Installation".
- C. Do not fasten supports to pipes, ducts, mechanical equipment, and conduit.
- D. Do not use ceiling system components for support.
- E. Connections to vibration producing equipment shall be made with flexible conduit.
- F. Obtain permission from Architect/Engineer before using spring steel clamps.
- G. Obtain permission from Architect/Engineer before using powder-actuated anchors.
- H. Obtain permission from Architect/Engineer before drilling or cutting structural members.
- I. Fabricate supports from structural steel or steel channel. Rigidly weld members or use hexagon head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.
- J. Install surface-mounted cabinets and panelboards with minimum of four anchors.
- K. In wet and damp locations use steel channel supports to stand cabinets and panelboards one inch off wall.
- L. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.
- M. Support surface or pendant lighting fixtures:
  - 1. From an outlet box by means of an interposed metal strap, where weight is less than 5 pounds.
  - 2. From an outlet box by means of a hickey or other direct threaded connection, where weight is from 5 to 50 pounds.
  - 3. Directly from structural slab, deck, or framing member, where weight exceeds 50 pounds.
- N. Provide cushioned, swivel type hangers with appropriate outlet boxes for pendant fixtures in mechanical areas. Such hangers shall have a support rating at least twice that of the load supported.
- O. Provide weight-distributing facilities, where required, so as not to exceed the load-bearing capabilities of floors or walls that bear the weight of, or support, electrical items.
- P. Exposed parts of hangers and supports shall be painted with one coat of rust-inhibiting primer.
- Q. Equipment shall not be held in place by its own dead weight. Provide base anchor fasteners in each case.

### **END OF SECTION**

## SECTION 16195

### ELECTRICAL IDENTIFICATION

#### PART 1 GENERAL

##### 1.1 RELATED DOCUMENTS

- A. The General Provisions of the Contract, including Conditions of the Contract and the General Requirement Specifications, apply to the work in this Section.
- B. This Section is hereby made a part of all other sections of Division 16 as fully as if repeated in each therein.

##### 1.2 SECTION INCLUDES

- A. Nameplates and labels.
- B. Wire and cable markers.
- C. Conduit and Pullbox markers.
- D. Directories.
- E. Signs and Diagrams.

##### 1.3 RELATED SECTIONS

- A. Division 09 - Painting.

##### 1.4 REFERENCES

- A. National Electrical Code.

##### 1.5 SUBMITTALS

- A. Submit under provisions of the General Requirements and Section 16010.
- B. Product Data: Provide for nameplates, labels, and markers.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under regulatory requirements. Include instructions for storage, handling, protection, examination, preparation and installation of Product.

##### 1.6 REGULATORY REQUIREMENTS

- A. Conform to requirements of local electrical code, unless otherwise specified.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

#### PART 2 PRODUCTS

##### 2.1 NAMEPLATES

- A. Normal System Nameplates: Engraved three-layer laminated plastic, black letters on white background, identification as shown.
  - 1. Size: 1 1/4 inch by 3 inch minimum.
  - 2. Location: Each normal electrical distribution and control equipment enclosure: switchboards, motor control centers, panelboards, transformers, motor starters, disconnect switches, circuit breakers, contactors, relay panels, control panels, Cable TV, and associated apparatus. Communications control cabinets.
- B. Letter Size:
  - 1. Use 3/16 inch height lettering for identifying equipment and loads.
- C. Identification: Engraving marking.
  - 1. Switchboard, distribution panel: Equipment name and load device names.
  - 2. Branch circuit panelboard, relay panel, control panel, control cabinet: name.
  - 3. Transformer: name, primary and secondary voltage, service from.
  - 4. Motor starter, disconnect switch, individual circuit breaker, contactor: name, equipment served, service from.

## SECTION 16195

### ELECTRICAL IDENTIFICATION

#### 2.2 LABELS

- A. Labels: Engraved device plates for individual wall switches, receptacles, and other electrical devices as shown.
- B. Locations: special purpose switches, receptacles, and other electrical devices.
- C. Identification: Engraved device covers.
  - 1. Individual switches and receptacles: use or as indicated on drawings.
  - 2. 480 Volt System: 480

#### 2.3 WIRE AND CABLE MARKERS

- A. Description: Tape type wire markers.
- B. Locations: Each conductor at panelboard gutters, pull boxes, and each load connection.
- C. Legend:
  - 1. Power and Lighting Circuits: Branch circuit or feeder number indicated on drawings.
- D. Color: As indicated in Section 16123.

#### 2.4 BUS IDENTIFICATION

- A. Description: Stamped phase identification letters.
- B. Location: Switchboard, motor control center, and panelboard bus, in readily visible locations.

#### 2.5 CONDUIT MARKERS

- A. Description: Alkyd stenciled paint.
- B. Location: Each power conduit, except branch lighting and receptacle conduits, longer than 6 feet.
- C. Spacing: At intermediate pull boxes, enclosures, etc.
- D. Legend:
  - 1. 208 Volt System: 208 – panel name – panel number.
  - 2. 480 Volt System: 480 – panel name – panel number.

#### 2.6 FEEDER INTERMEDIATED BOX MARKERS

- A. Description: Alkyd stenciled paint.
- B. Location: On pull box, splice box, and junction box covers.
- C. Color:
  - 1. Grounding System: Green cover.
  - 2. Fire Alarm System: Red cover.

#### 2.7 PANELBOARD DIRECTORIES

- A. Description: Type written directory of branch circuit loads.
- B. Location: At branch circuit panelboards.
- C. Legend: circuit number - load location and description.

### PART 3 EXECUTION

#### 3.1 PREPARATION

- A. De-grease and clean surfaces to receive nameplates and labels.

#### 3.2 APPLICATION

- A. Install nameplate and label parallel to equipment lines.
- B. Secure nameplate to equipment front using screws or rivets.
- C. Secure nameplate to inside surface of door on panelboard that is recessed in finished locations.

### END OF SECTION



## SECTION 16441

### ENCLOSED SWITCHES

#### PART 1 GENERAL

##### 1.1 RELATED DOCUMENTS

- A. The General Provisions of the Contract, including Conditions of the Contract and Division 01 of the Specifications, apply to the work in this Section.
- B. This Section is hereby made a part of all other sections of Division 16 as fully as if repeated in each therein.

##### 1.2 SECTION INCLUDES

- A. Fusible switches.
- B. Nonfusible switches.

##### 1.3 RELATED SECTIONS

- A. Section 16195 - Fuses.
- B. Section 16477 - Electrical Identification.

##### 1.4 REFERENCES

- A. NECA - (National Electrical Contractors Association) Standard of Installation.
- B. NEMA FU1 - Low Voltage Cartridge Fuses.
- C. NEMA KS1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
- D. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems (published by the International Electrical Testing Association).
- E. Local electrical code.

##### 1.5 SUBMITTALS

- A. Submit under provisions of Division 01 Specification Sections and Section 16010.
- B. Product Data: Provide for enclosed switches.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.
- D. Project Record Documents: Record actual locations of enclosed switches in project record documents.

##### 1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years experience.

##### 1.7 REGULATORY REQUIREMENTS

- A. Conform to requirements of local electrical code.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. or suitable for the purpose specified and indicated.

##### 1.8 COORDINATION

- A. Coordinate under provisions of Division 01 Specification Sections and Section 16010.
- B. Field Measurements: Verify that field measurements are as shown on Drawings.
- C. Field Locations: Verify locations of transformers prior to rough-in.

## **SECTION 16441**

### **ENCLOSED SWITCHES**

#### **PART 2 PRODUCTS**

##### **2.1 ENCLOSED SWITCHES**

- A. Manufactures:
  - 1. GE.
  - 2. Siemens ITE.
  - 3. No Substitutions.

##### **2.2 FUSIBLE SWITCH ASSEMBLIES**

- A. Description: NEMA KS 1, Type HD (Heavy Duty) type, horsepower rated, with operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position.
- B. Fuse clips: Designed to accommodate NEMA FU1, Class R fuses only.

##### **2.3 NONFUSIBLE SWITCH ASSEMBLIES**

- A. Description: NEMA KS 1, Type HD (Heavy Duty) type, horsepower rated, with externally operable handle interlocked to prevent opening front cover with switch in ON position.

##### **2.4 ENCLOSURES**

- A. Description: Code gauge steel
- B. Finish: Phosphate coated, primed and finished with high grade lacquer, manufacturers standard color.
- C. Fabrication: NEMA KS 1.
  - 1. Indoor clean, dry locations: Type 1.
  - 2. Indoor dusty, dry locations: Type 12.
  - 3. Indoor wet locations: Type 4X.
  - 4. Outdoor locations: Type 3R.

#### **PART 3 EXECUTION**

##### **3.1 INSTALLATION**

- A. Install in accordance with NECA "Standard of Installation."
- B. Install fuses in fusible disconnect switches.
- C. Apply adhesive tag on inside door of each fused switch indicating NEMA fuse class and size installed.
- D. Apply Identification Tag.

##### **3.2 CLEANING**

- A. Clean installed work under the provisions of Division 01 Specification Sections.
- B. Clean interior of enclosures to remove dust, debris, and other material.
- C. Clean surfaces and restore finish.

**END OF SECTION**

## SECTION 16477

### FUSES

#### PART 1 GENERAL

##### 1.1 RELATED DOCUMENTS

- A. The General Provisions of the Contract, including Conditions of the Contract and the General Requirement Specifications, apply to the work in this Section.
- B. This Section is hereby made a part of all other sections of Division 16 as fully as if repeated in each therein.

##### 1.2 SECTION INCLUDES

- A. Fuses.
- B. Spare fuse cabinet.

##### 1.3 REFERENCES

- A. Local Electric Code.
- B. NEMA FU 1 - Low Voltage Cartridge Fuses.

##### 1.4 SUBMITTALS

- A. Submit under provisions of Division 01 and Section 16010.
- B. Product Data: Provide data sheets showing electrical characteristics including time-current curves.
- C. Manufacturers Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.
- D. Project Record Documents: Record actual fuse sizes in project record documents.
- E. Maintenance Data: Include spare parts listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

##### 1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum three years experience.

##### 1.6 REGULATORY REQUIREMENTS

- A. Conform to requirements of local electrical code.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

##### 1.7 COORDINATION

- A. Coordinate under provisions of the General Requirements and Section 16010.

#### PART 2 PRODUCTS

##### 2.1 FUSES

- A. Dimensions and Performance: NEMA FU 1, Class as specified or indicated.
- B. Voltage: Provide fuses with voltage rating suitable for circuit phase-to-phase voltage.
- C. Interrupting Rating: 200,000 rms amperes.
- D. Coordination: Provide fuses for properly coordinated system of overcurrent protection.

##### 2.2 MOTOR AND DRY TYPE TRANSFORMER LOAD FUSES

- A. Description: 600 amperes and smaller, 250 volts or less, Class RK5.
  - 1. Manufacturers (RK5):
    - a. Busmann Fusetron FRN-R
    - b. Gould Shawmut.

## SECTION 16477

### FUSES

- B. Description: 601 amperes and larger, 250 volts or less, Class L.
  - 1. Manufacturers (L):
    - a. Bussmann KRP-C
    - b. Gould Shawmut
- C. Description: 600 amperes and smaller, 600 volts or less, Class RK5.
  - 1. Manufacturers (RK5):
    - a. Bussmann Fusetron FRS-R
    - b. Gould Shawmut
  - 2. Manufacturers (J):
    - a. Bussmann Low Peak LPJ
    - b. Gould Shawmut
- D. Description: 601 amperes and larger, 600 volts or less, Class L.
  - 1. Manufacturers (L):
    - a. Bussmann KRP-C
    - b. Gould Shawmut

### 2.3 LIGHTING AND HEATING LOAD FUSES

- A. Description: 600 amperes and smaller, 250 volts or less, Class RK1, RK5.
  - 1. Manufacturers (RK5-time delay):
    - a. Bussmann Fusetron FRN-R
    - b. Gould Shawmut
  - 2. Manufacturers (J-time delay):
    - a. Bussman LPJ
    - b. Gould Shawmut
- B. Description: 601 amperes and larger, 250 volts or less, Class L.
  - 1. Manufacturers (L-time delay):
    - a. Bussmann KRP-C
    - b. Gould Shawmut
  - 2. Manufacturers (L-non-time delay):
    - a. Bussmann KTU
    - b. Gould Shawmut
- C. Description: 600 amperes and smaller, 600 volts or less, Class RK1, RK5.
  - 1. Manufacturers (RK1-time delay):
    - a. Bussmann Low Peak LPS-RK
    - b. Gould Shawmut
  - 2. Manufacturers (RK5-time delay):
    - a. Bussmann Fusetron FRS-R
    - b. Gould Shawmut
  - 3. Manufacturers (J-time delay):
    - a. Bussmann LPJ
    - b. Gould Shawmut
- D. Description: 601 amperes and larger, 600 volts or less, Class L.
  - 1. Manufacturers (L-time delay):
    - a. Bussmann KRP-C
    - b. Gould Shawmut
  - 2. Manufacturers (L-non-time delay):
    - a. Bussmann KTU
    - b. Gould Shawmut

## **SECTION 16477**

### **FUSES**

#### **PART 3 EXECUTION**

##### **3.1 INSTALLATION**

- A. Install fuses in accordance with manufacturer's instructions.
- B. Install fuse with label oriented such that manufacturer, type, and size are easily read.
- C. Install spare fuse cabinet in main electrical area.
- D. Do not install parallel sets of fuses for any single phase.
- E. Replace fuses blown during construction and during testing.

**END OF SECTION**



## SECTION 16510

### INTERIOR LUMINAIRES

#### PART 1 GENERAL

##### 1.1 RELATED DOCUMENTS

- A. The General Provisions of the Contract, including Conditions of the Contract and the General Requirement Specifications, apply to the work in this Section.
- B. This Section is hereby made a part of all other sections of Division 16 as fully as if repeated in each therein.

##### 1.2 SECTION INCLUDES

- A. LED Interior luminaires, drivers and integral controls.
- B. Luminaire accessories.

##### 1.3 RELATED SECTIONS

- A. Section 16190 - Supporting Devices.

##### 1.4 REFERENCES

- A. NEMA WD 6 - Wiring Devices-Dimensional Requirements.
- B. NFPA 70 - National Electrical Code.
- C. NFPA 101 - Life Safety Code.
- D. IESNA LM-80-08 IESNA - Approved Method for Measuring Lumen Maintenance of LED Light Source.
- E. IESNA TM-21-2011 - Projecting Long Term Lumen Maintenance of LED Light Sources.
- F. UL 1310 and 8750 - Light Emitting Diode (LED) Equipment for use in Lighting Products.
- G. IEC 61347-2-13 - Particular requirements for electronic control gear for LED modules.
- H. IEC-62384 - DC or AC supplied electronic control gear for LED modules - performance requirements.
- I. IEC 62386-101/102/207 - Digital addressable lighting interface (DALI).

##### 1.5 SUBMITTALS

- A. Submit under provisions of the General Requirement Specification Sections and Section 16010.
- B. Product Data: Provide for each luminaire, ballast, and lamp. Include dimensions, ratings, and performance data. Data shall be submitted in order of Luminaire Number as identified on drawings.
- C. Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
- D. Manufacturers Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.
- E. Project Record Documents: Record actual locations of luminaires and record actual circuiting arrangements in project record documents.
- F. Maintenance Data: Submit manufacturer's operation and maintenance instructions for each product. Include spare parts listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

##### 1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

##### 1.7 REGULATORY REQUIREMENTS

- A. Conform to requirements of local electrical code, unless otherwise specified.
- B. Conform to requirements of local electrical code.
- C. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

## SECTION 16510

### INTERIOR LUMINAIRES

#### 1.8 COORDINATION

- A. Coordinate under provisions of the General Requirements and Section 16010.
- B. Field Measurements: Verify that field measurements are as shown on Drawings.
- C. Field Locations: Verify locations of luminaires prior to rough-in.

#### 1.9 DELIVERY, STORAGE, PROTECTION, AND HANDLING

- A. Protect from moisture by using appropriate coverings. Store in dry interior locations.
- B. Do not install until building is closed in and suitable temperature conditions are controlled.
- C. Maintain suitable temperature and humidity conditions during and after installation of luminaires.

### PART 2 PRODUCTS

#### 2.1 LUMINAIRES

- A. Furnish Products as scheduled.
- B. Luminaires for general illumination, emergency lighting, and exit lighting, shall be complete with all required accessories and attachments. Luminaires of the same type shall be of the same manufacturer.
- C. Luminaires shall bear Underwriters Laboratories, Inc. label and shall be wired and installed in full compliance with applicable codes.
- D. Luminaires shall be recessed, surface, or pendant type, as specified in fixture schedule, and shall include housings, lamp holders, lenses, reflectors, ballasts, lamps, mounting hardware, and other required accessories.
- E. Recessed mounted luminaires shall be in compliance with local codes for plenum installation.
- F. Enameled finishes shall be electrostatically applied and baked. Finish of fixtures shall be uniform in quality and appearance, durable, and free from defects.
- G. Labels and inscriptions in luminaires shall be located in unobtrusive places so that they are not visible to occupants in the completed installation.
- H. Plaster frames, angles, and channels for recessed luminaires shall be furnished under this section where required. Plaster frames shall be specifically constructed for the application by the manufacturer of the related luminaire.
- I. Luminaire shall carry the lighting facts label, verified based on LM-85 test reports.

#### 2.2 LED LUMINAIRES

- A. Each luminaire shall consist of an assembly that utilizes LED's as the light source. In addition, a complete luminaire shall consist of a housing, LED array, and electronic driver (power supply) and integral controls as per this specification.
- B. Each luminaire shall be designed to operate at an average operating temperature of 25° C.
- C. The operating temperature range shall be 0° to + 25°
- D. Each luminaire shall meet all parameters of this specification throughout the minimum operation life of 50,000 hours when operated at the average operating temperature.
- E. Nominal luminaire dimensions: as scheduled.
- F. Luminaire Construction:
  - 1. Luminaire housing to have no visible welding, screws, springs, hooks, rivets, bare LED's or plastic supports.
  - 2. The luminaire shall be a single, self-contained device, not requiring on-site assembly for installation. The power supply and circuit board for the luminaire shall be integral to the unit.
  - 3. Luminaires shall be fabricated from post painted cold rolled steel and shall be a rigid structure with integral T-bar clips. Fixture may be mounted and wired in continuous rows.
  - 4. Finish: Polyester powder coat painted with 92% high-reflective paint after fabrication.
  - 5. Reflector: rugged one-piece cold rolled steel with linear facets to distribute soft light at multiple angles, without flashing thus reducing high luminance contrast.
  - 6. End caps shall be sloped at 70 degrees to create depth.



## SECTION 16510

### INTERIOR LUMINAIRES

7. Luminaire to have smooth transition between T-bar and reflector arch. No doorframe or exposed hardware.
  8. Lens shall be impact modified, single clear diffuser with advanced optical film and shall provide LED concealment and even illumination across the diffuser.
  9. Polymeric materials (if used) of enclosures containing either the power supply or electronic components of the luminaire shall be made of UL94VO flame retardant materials. Luminaire lenses are excluded from this requirement.
  10. Integral Grid Clips required on recessed mounted luminaires along with integral tie wire mounting points.
  11. Luminaire to have air removal capability as specified.
  12. The assembly and manufacturing process for the SSL luminaire shall be designed to assure all internal components are adequately supported to withstand mechanical shock and vibration.
- G. Led Sources
1. LED's shall be manufactured by, Nichia, Samsung, LG or Osram.
  2. Lumen Output - minimum initial output of the luminaire shall be as follows for the lumens exiting the luminaire in the 0-90 degree zone - as measured by IESNA Standard LM85 in an accredited lab. Exact tested lumen output shall be clearly noted on the shop drawings.
    - a. Type 2x2-2425 (24 watts max.) or 3617 (36 watts max.) initial lumens @ 3500k per specification.
    - b. Type 2x4 - 4026 (40 watts max.) or 4740 initial lumens (47 watts max.).
  3. Lumen output shall not decrease by more than 20% over the minimum operational life of 50,000 hours.
  4. Individual LED's shall be connected such that a catastrophic loss or the failure of one LED will not result in the loss of the entire luminaire.
  5. LED boards shall be suitable for field maintenance or service from below the ceiling with plug-in connectors. LED boards shall be upgradable.
  6. Light color/quantity:
    - a. Correlated color temperature (CCT) range as per specification, between 3500K and 4100 K shall be correlated to chromaticity as defined by the absolute (X,Y) coordinates on the 2-D CIE chromaticity chart.
    - b. Color shift over 6,000 hours shall be <0.007 change in u' v' as demonstrated in IES LM8- report.
    - c. The color rendition index (CRI) shall be 80 or higher.
- H. Power Supply and Driver
1. Driver: Acceptable manufacturer: eldoLED or equal.
  2. Ten-year expected life while operating at maximum case temperature and 90% non-condensing relative humidity.
  3. Driver shall be UL recognized under the component program and shall be modular for simple field replacement. Drivers that do not meet these requirements will not be accepted.
  4. Electrical characteristics: 120 - 277 volt, UL listed, CSA Certified, Sound Rated A+. Driver shall be > 80% efficient at full load across all input voltages. Input wires shall be 18AWG solid copper minimum.
  5. Dimming: Driver shall be suitable for full-range dimming. LED dimming shall be equal in range and quality to a commercial grade incandescent dimmer. The luminaire shall be capable of continuous dimming without perceivable flicker over a range of 100 % to 1 % of rated lumen output with a smooth shut off function.

## SECTION 16510

### INTERIOR LUMINAIRES

6. Dimming quality to be defined by dimming range, freedom from perceived flicker or visible stroboscopic flicker, smooth and continuous change in level (no visible steps in transitions), natural square law response to control input, inaudible in 26db environment, and stable when input voltage conditions fluctuate over what is typically experienced in a commercial environment. Demonstration of this compliance to dimming performance will be necessary for substitutions or prior approval.
    - a. Dimming shall be controlled by a 0-10V signal.
    - b. Driver shall include ability to provide no light output when the analog control signal drops below 0.5 V, or the DALI/DMX digital signal calls for light to be extinguished and shall consume 0.5 watts or less in this standby. Control dead band between 0.5V and 0.65V shall be included to allow for voltage variation of incoming signal without causing noticeable variation in fixture to fixture output.
    - c. Driver shall be capable of configuring a linear or logarithmic dimming curve, allowing fine grained resolution at low light levels.
    - d. Driver must be capable of 20 bit dimming resolution for white light LED driver.
    - e. Drivers shall track evenly across multiple fixtures at all levels, and shall have an input signal to output light level that allows smooth adjustment over the entire dimming range.
  7. Flicker: Driver and luminaire electronics shall deliver illumination that is free from objectionable flicker as measured by flicker index (ANSI/IES RP-16-10). At all points within the dimming range from 100-0.1% luminaire shall have:
    - a. Less than 1% flicker index at frequencies below 120 HZ.
    - b. Less than 12% flicker index at 120 Hz, and shall not increase at greater than 0.1% per Hz to a maximum of 80% flicker index at 800Hz.
  8. Driver disconnect shall be provided where required to comply with codes.
  9. The electronics/power supply enclosure shall be internal to the SSL luminaire and be accessible per UL requirements.
  10. The surge protection which resides within the driver shall protect the luminaire from damage and failure for transient voltages and currents as defined in ANSI/IEEE C64.41 2002 for location category A, where failure does not mean a momentary loss of light during the transient event.
- I. Electrical
1. Power Consumption: Maximum power consumption, +/- 5% when operating between 120 - 277V shall be as follows:
    - a. Type 2x2 - 24 or 36 W (100 Lumens per watt).
    - b. Type 2x4 - 47W (100 Lumens per watt).
  2. Operation Voltage - The luminaire shall operate from a 50 or 60 HZ  $\pm 3$  HZ AC line over a voltage ranging from 120 VAC to 277 VAC. The fluctuations of line voltage shall have no visible effect on the luminous output. The standard operating voltages are 120 VAC and 277 VAC.
  3. Power factor: The luminaire shall have a power factor of 90% or greater at all standard operating voltages and full luminaire output.
  4. THD: Total harmonic distortion (current and voltage) induced into an AC power line by a luminaire shall not exceed 20% at any standard input voltage and meet ANSI C82.11 maximum allowable THD requirements at full output. THD shall at no point in the dimming curve allow imbalance current to exceed full output THD.
  5. Surge Suppression: The luminaire shall include surge protection to withstand high repetition noise and other interference. Withstand up to a 1,000 volt surge without impairment of performance as defined by ANSI C62.41 Category A.
  6. Inrush Current: Meet or exceed NEMA 410 driver inrush standard of 430 Amps per 10 Amps load with a maximum of 370 A2s.
  7. RF Interference: The luminaire and associated on-board circuitry must meet Class A emission limits referred in Federal Communications Commission (FCC) Title 47, Subpart B, Section 15 Non-Consumer requirements for EMI/RFI emissions.

## SECTION 16510

### INTERIOR LUMINAIRES

8. Driver must support automatic adaptation, allowing for future luminaire upgrade and enhancements and deliver improved performance.
  - a. Adjustment of forward LED voltage, supporting 3V through 60V.
  - b. Adjustment of LED current from 200mA to 1.05A at the 100% control input point in increments of 1mA.
  - c. Adjustments for operating hours to maintain constant lumens (within 5%) over the 50,000 hour design life of the system, and deliver up to 20% energy savings early in the life cycle.
9. Electrical connections between normal power and driver must be modular utilizing a snap fit connector. All electrical components must be easily accessible after installation and be replaceable without removing the fixture from the ceiling.
10. All electrical components shall be RoHS compliant.
- J. Photometric Requirements:
  1. Luminaire performance shall be tested as described herein.
    - a. Luminaire performance shall be judged against the specified minimum illuminance in the specified pattern for a particular application.
    - b. Luminaire lighting performance shall be adjusted (depreciated) for the minimum life expectancy (Section 2.2.4).
    - c. The performance shall be adjusted (depreciated) by using the LED manufacturer's data from the IESNA Standard TM-21 test report, which ever one results in a higher level of lumen depreciation.
    - d. The luminaire may be determined to be compliant photometrical, if:
      - i. The initial minimum illuminance level is achieved in 100% of the area of the specified lighting pattern.
      - ii. The measurements shall be calibrated to standard photopic calibrations.
- K. Thermal Management
  1. The thermal management (of the heat generated by the LED's) shall be of sufficient capacity to assure proper operation of the luminaire over the expected useful life (Section 2.2.7 (c)).
  2. The LED manufacturer's maximum junction temperature for the expected life (Section 2.2.7 (c)) shall not be exceeded at the average operating ambient (Section 2.2.2).
  3. The LED manufacturer's maximum junction temperature for the catastrophic failure shall not be exceeded at the maximum operating ambient (Section 2.2.3).
  4. The luminaire shall have an UL IC rating.
  5. The driver manufacturer's maximum case temperature shall not be exceeded at the maximum operating ambient. Thermal management shall be passive by design. The use of fans or other mechanical devices shall not be allowed.
- L. Optics
  1. The optical assembly shall provide volumetric distribution to eliminate cave effect and provide uniform illumination in the space and increased luminance on vertical surfaces.
  2. Optics shall consist of a ribbed metal reflector system and extruded refracting optical lens with high-transmission internal optical film applied to the inside of the refracting lens. No individual LED images shall be visible to the occupant of the space.
  3. Refractor or lens shall be 2 piece assembly composed of impact-resistant (20%) DR acrylic with a polymer optical film.
  4. 2x2 and 2x4 luminaire shall have center optic and faceted reflector.
- M. Integrated (Optional by manufacturer)
  1. Each luminaire may be equipped with two (2) digital RJ45 ports and interface with other digital control equipment.
  2. May connect to devices compatible with 0 to 10V Analog Control Protocol, Class 2, capable of sinking 0.6ma per driver at a low end of 0.3V. Limit the number of drivers on each 0-10V control output based on voltage drop and control capacity.
  3. May connect to digital (DALI Low Voltage Controlled) Dimming drivers.

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### INTERIOR LUMINAIRES

4. Must meet IEC 62386.
  5. May connect to digital multiplex (DMX Low Voltage Controlled) Dimming drivers.
  6. Must meet DMX/RDM: USITT DMX512A and ANSI E1.20 (Explore & Address).
  7. Lumen Management: The luminaire may be capable of continuously monitoring system performance to allow for constant lumen management/compensation function. Lumen output to be maintained at 80% for life of the luminaire, initial input to be 80% of rated input watts and climb to rated watts by end of rated life of luminaire.
  8. Each luminaire may be supplied with a unique network address. This address shall be printed on two identification labels. One label shall be permanently affixed to the luminaire and one label shall be easily removed for network control commissioning purposes. Both labels shall be in a location which is easily accessible by the installing contractor.
  9. Control Input:
    - a. 4-Wire (0-10V DC Voltage Controlled) Dimming Driver:
      - i. Must meet IEC 60929 Annex E for General White Lighting LED drivers.
      - ii. Must meet ESTA E1.3 for RGBW LED drivers.
- N. Luminaire Identification
1. Each luminaire shall have the manufacturer's name, trademark, model number, serial number, date of manufacturer (month-year), and lot number as identification permanently marked inside each unit and the outside of each packaging box.
  2. The following operating characteristics shall be permanently marked inside each unit: rated voltage and rated power in Watts and Volt-Ampere.
- O. Quality Assurance
1. The luminaires shall be manufactured in accordance with a manufacturer quality assurance (QU) program. The QA program shall include two types of quality assurance: (1) design quality assurance and (2) production quality assurance. The production quality assurance shall include statistically controlled routine tests to ensure minimum performance levels of the modules built to meet this specification. These tests shall include: CCT, CRI, Lumen output and wattage. Tests shall be recorded, analyzed and maintained for future reference.
  2. QA process and test results documentation shall be kept on file for a minimum period of seven years.
  3. LED luminaire designs not satisfying design qualification testing and the production quality assurance testing performance requirements described below shall not be labeled, advertised, or sold as conforming to this specification.
- P. Design Qualification Testing
1. Design Qualification Testing shall be performed by a National Voluntary Laboratory Accreditation Program (NVLAP) testing facility. Such testing may be performed by the manufacturer or an independent testing lab hired by the manufacturer on new luminaire designs, and when a major design change has been implemented on an existing design. A major design change is defined as a design change (electrical or physical) which changes any of the performance characteristics of the luminaire, results in a different circuit configuration for the power supply, or changes the layout of the individual LED's in the module.
  2. A quantity of two units for each design shall be submitted for Design Qualification Testing.
  3. Product submittals shall be accompanied by product specification sheets or other documentation that includes the designed parameters as detailed in this specification. These parameters include (but not limited to):
    - a. Maximum power in Watts.
    - b. L80 in hours, when extrapolated for the worse case operating temperature (section 2.2.3). TM21 report shall be submitted to demonstrate this.
    - c. Product submittals shall be accompanied by performance data that is derived in accordance with appropriate IESNA testing standards and tested in a laboratory that is NVLAP accredited for Energy Efficient Lighting Products.
  4. Luminaire shall be tested per IESNA LM85.

## SECTION 16510

### INTERIOR LUMINAIRES

#### Q. Warranty

1. The manufacturer shall provide a warranty against loss of performance and defects in materials and workmanship for the Luminaires for a period of 5 years after acceptance of the Luminaires. Warranty shall cover all components comprising the luminaire. All warranty documentation shall be provided to customer prior to the first shipment.
2. Provide manufacturer's warranty covering 5 years on drivers from date of purchase. Refer to manufacturer's terms and conditions on the website for detailed information.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Install suspended luminaires and exit signs directly from building structure using rigid stem pendants supported from swivel hangers. Provide pendant length required to suspend luminaire at indicated height.
- B. Support luminaires larger than 2'x 4' size independent of ceiling framing.
- C. Locate recessed ceiling luminaires as indicated on reflected ceiling plan.
- D. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prevent movement.
- E. Grid Ceilings: Provide auxiliary members spanning ceiling grid members to support surface mounted luminaires. Fasten surface mounted luminaires to ceiling grid members using bolts, screws, rivets, or suitable clips.
- F. Install recessed luminaires to permit removal from below.
- G. Install recessed luminaires using accessories and fire stopping materials to meet regulatory requirements for fire rating.
- H. Install clips to secure recessed grid-supported luminaires in compliance with applicable codes.
- I. Install wall mounted luminaires and exit signs at height as shown.
- J. Install accessories furnished with each luminaire.
- K. Connect luminaires and exit signs to emergency power as indicated branch circuit under Section 16130 using flexible conduit, 3/8" minimum.
- L. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.
  1. Recessed LED: AWG No. 14 RHH or THWN.
- M. Bond products and metal accessories to branch circuit separate green equipment grounding conductor.
- N. Install specified lamps in each luminaire and exit sign in accordance with manufactures instructions for handling and burning position.

### 3.2 INTERFACE WITH OTHER PRODUCTS

- A. Coordinate installation of recessed luminaire frames and trims with ceiling construction.
- B. Coordinate the installation of suspended luminaires with building components, verify exact locations and mounting heights.

### 3.3 FIELD QUALITY CONTROL

- A. The use of permanent luminaires for temporary lighting shall only be as permitted by the Architect/Engineer.
- B. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

### 3.4 ADJUSTING

- A. Adjust installed work under provisions of the General Requirement Specification Sections.
- B. Aim and adjust luminaires as indicated and as directed.
- C. Position exit sign directional arrows as indicated.

## **SECTION 16510**

### **INTERIOR LUMINAIRES**

#### **3.5 CLEANING**

- A. Clean installed work under provisions of the General Requirement Specification Sections.
- B. Clean electrical parts to remove conductive and deleterious materials.
- C. Remove dirt and debris from enclosures.
- D. Clean photometric control surfaces to remove all dust and smudges with cleaning solution as recommended by manufacturer.
- E. Clean finishes and touch up damage.

#### **3.6 DEMONSTRATION AND INSTRUCTIONS**

- A. Demonstrate installed work under provisions of the General Requirement Specification Sections.
- B. Demonstrate luminaire operation for minimum of two hours.

#### **3.7 PROTECTION OF FINISHED WORK**

- A. Protect installed work under provisions of the General Requirement Specification Sections.
- B. Relamp luminaires used for temporary lighting and luminaires that have failed lamps at the time of project turn-over.

**END OF SECTION**

## SECTION 16515

### INTERIOR LUMINAIRES LED DIMMING DRIVERS

#### PART 1 GENERAL

##### 1.1 RELATED DOCUMENTS

- A. The General Provisions of the Contract, including Conditions of the Contract and the General Requirement Specifications, apply to the work in this Section.
- B. This Section is hereby made a part of all other sections of Division 16 as fully as if repeated in each therein.

##### 1.2 RELATED SECTIONS

- A. Edit the following subparagraphs to coordinate with other sections in the Project Manual.
- B. Section 16140 - Wiring Devices
- C. Section 16510 - Interior Luminaires

##### 1.3 REFERENCES

- A. Underwriters Laboratories, Inc. (UL)
  - 1. 1310 and 8750 - Light Emitting Diode (LED) equipment for use in lighting products.
- B. American National Standards Institute (ANSI)
  - 1. ANSI C82.11 - Performance requirement for high frequency ballasts.
  - 2. ANSI/IES RP-16-10 - Nomenclature and definitions for illuminating engineering.
  - 3. ANSI E1.20 - Remote Device Management Over DMX512 Networks.
  - 4. ANSI C62.41 - Recommended practice in low power circuits.
- C. International Electro technical Commission (IEC).
  - 1. IEC 61347-1 - General and safety requirements for lamp control gear.
  - 2. IEC 61347-2-13 - Particular requirements for electronic control gear for LED modules.
  - 3. IEC 62384 - DC or AC supplied electronic control gear for LED modules - performance requirements.
  - 4. IEC 61000-3-2 - Harmonic current emissions.
  - 5. IEC 61547 - EMC immunity requirements.
  - 6. IEC 62386 -101/102/207 - Digital addressable lighting interface (DALI).
- D. European Mark of electro technical products (ENEC)
  - 1. EN55015 - Radio disturbances <30 Mhz.
  - 2. EN55022 - Performance requirement for EMC, information technology and Telecommunications equipment.
  - 3. EN60929/IEC60929 - Performance requirement for AC supplied electronic equipment.
- E. Federal Communications Commission (FCC) rules - Part 15 Class B : Radio Frequency Devices.
  - 1. Commercial rated.
- F. Entertainment Services and Technology Association.
  - 1. ESTA E1.3 - Entertainment Technology - Lighting Control System - 0 to 10V Analog Control Protocol.

##### 1.4 SUBMITTALS

- A. See Section 16010
- B. Shop Drawings: Clearly indicate the name of the job, Architects/Engineer and list fixture type (s) for each specific driver. Contractor shall endeavor to submit all drivers as one package along with the luminaire package.
- C. Product Data: Provide dimensions, ratings and specific catalog number and identification of items and accessories and performance data.
- D. Wiring Diagrams - as needed for special operation or interaction with other system (s).

## SECTION 16515

### INTERIOR LUMINAIRES LED DIMMING DRIVERS

#### 1.5 DESCRIPTION

- A. LED dimming driver.
  - 1. 4-Wire (0-10V DC Voltage Controlled) Dimming Drivers.
  - 2. Digital (DALI Low Voltage Controlled) Dimming Drivers.
  - 3. Digital Multiplex (DMX Low Voltage Controlled) Dimming Drivers.

#### 1.6 QUALITY ASSURANCE

- A. Manufacturer: Minimum 5 years' experience in manufacture of dimmable electronic lighting drivers.
- B. Recognized by UL for use in the US and Canada. Provide evidence of compliance upon request.

#### 1.7 PROJECT CONDITIONS

- A. Do not install equipment until following conditions can be maintained in spaces to receive equipment:
  - 1. Ambient temperature: -20 degrees to 50 degrees C (-4 degrees to 122 degrees F).
  - 2. Relative humidity: Maximum 90 percent, non-condensing.
  - 3. Protected from dust and excess moisture during installation.

#### 1.8 WARRANTY

- A. Provide manufacturer's warranty covering 5 years on drivers from date of purchase. Luminaire manufacturer to operate driver at or below the required driver warranty temperature. Luminaire manufacturers failing to operate the driver, at the project required ambient temperature, within the driver manufacturer warranty parameters will be responsible for all driver warranty related costs over the warranty period.

## PART 2 PRODUCTS

#### 2.1 MANUFACTURERS

- A. Acceptable Manufacturer: eldoLED or equal.

#### 2.2 GENERAL

- A. LED dimming shall be equal in range and quality to a commercial grade incandescent dimmer. Quality of dimming to be defined by dimming range, freedom from perceived flicker or visible stroboscopic flicker, smooth and continuous change in level (no visible steps in transitions), natural square law response to control input, and stable when input voltage conditions fluctuate over what is typically experience in a commercial environment. Demonstration of this compliance to dimming performance will be necessary for substitutions or prior approval.
- B. Ten-year expected life while operating at maximum case temperature and 90 percent non-condensing relative humidity.
- C. Driver must limit inrush current:
  - 1. Base specification: Meet or exceed NEMA 410 driver inrush standard of 430 Amps per 10 Amps load with a maximum of 370 Amps<sup>2</sup> - seconds.
  - 2. Preferred Specification: Meet or exceed 30mA2s at 277VAC for up to 50 watts of load and 75A at 240us at 277VAC for 100 watts of load.
- D. Withstand up to 1,000 volt surge without impairment of performance as defined by ANSI C62.41 Category A.
- E. No visible change in light output with a variation of plus/minus 10 percent line voltage input.
- F. Total Harmonic Distortion less than 20% percent and meet ANSI C82.11 maximum allowable THD requirements at full output. THD shall at no point in the dimming curve allow imbalance current to exceed full output THD.



## SECTION 16515

### INTERIOR LUMINAIRES LED DIMMING DRIVERS

- G. Driver must support automatic adaptation, allowing for future luminaire upgrades and enhancements and deliver improved performance:
  - 1. Adjustment of forward LED voltage, supporting 3V through 55V.
  - 2. Adjustment of LED current from 200mA to 1.05A at the 100 percent control input point in increments of 1mA.
  - 3. Adjustment for operating hours to maintain constant lumens (within 5 percent) over the 50,000 hour design life of the system, and deliver up to 20 percent energy savings early in the life cycle.
- H. Driver must be able to operate for a (+/- 10%) supply voltage of 120V through 277VAC at 60Hz.
- I. Driver should be UL Recognized under the component program and shall be modular for simple field replacement. Drivers that are not UL Recognized or not suited for field replacement will not be considered.
- J. Driver shall include ability to provide no light output when the analog control signal drops below 0.5 V, or the DALI/DMX digital signal calls for light to be extinguished and shall consume 0.5 watts or less in this standby. Control dead band between 0.5V and 0.65V shall be included to allow for voltage variation of incoming signal without causing noticeable variation in fixture to fixture output.

#### 2.3 LIGHT QUALITY

- A. Over the entire range of available drive currents, driver shall provide step-free, continuous dimming to black from 100 percent to 0.1 percent and 0% relative light output, or 100 - 1% light output and step to 0% where indicated. Driver shall respond similarly when raising from 0% to 100%.
  - 1. Driver must be capable of 20 bit dimming resolution for white light LED drivers or 15 bit resolution for RGBW LED drivers.
- B. Driver must be capable of configuring a linear or logarithmic dimming curve, allowing fine grained resolution at low light levels.
- C. Drivers to track evenly across multiple fixtures at all light levels, and shall have an input signal to output light level that allows smooth adjustment over the entire dimming range.
- D. Driver and luminaire electronics shall deliver illumination that is free from objectionable flicker as measured by flicker index (ANSI/IES RP-16-10). At all points within the dimming range from 100-0.1 percent luminaire shall have:
  - 1. LED dimming driver shall provide continuous step-free, flicker free dimming similar to incandescent source.
  - 2. Base specification: Flicker index shall less that 5% at all frequencies below 1000 Hz.
  - 3. Preferred specification: Flicker index shall be equal to incandescent, less that 1% at all frequencies below 1000 Hz.

#### 2.4 CONTROL INPUT

- A. 4-Wire (0-10V DC Voltage Controlled) Dimming Drivers
  - 1. Must meet IEC 60929 Annex E for General White Lighting LED drivers.
  - 2. Connect to device compatible with 0 to 10V Analog Control Protocol, Class2, capable of sinking 0.6 ma per driver at a low end of 0.3V. Limit the number of drivers on each 0-10V control output based on voltage drop and control capacity.
  - 3. Must meet ESTA E1.3 or RGBW LED drivers.
- B. Digital (DALI Low Voltage Controlled) Dimming Drivers.
  - 1. Must meet IEC 62386.
- C. Digital Multiplex (DMX Low Voltage Controlled Dimming Drivers).
  - 1. Must meet DMX/RDM: USITT DMX512A and ANSI E1.20 (Explore & Address).
  - 2. Capable of signal interpolation and smoothing of color and intensity transitions.

## **SECTION 16515**

### **INTERIOR LUMINAIRE LED DIMMING DRIVERS**

#### **2.5 INSTALLATION**

- A. To be installed per manufacturers prescribed methods.
- B. Driver may be remote mounted up to 300 ft. (100 m) depending on power level and wire gauge.
- C. 0-10 V input shall be protected from line voltage mis-wire, and shall be immune and output unresponsive to induce AC voltage on the control leads.

**END OF SECTION**

## SECTION 17100

### DIRECT DIGITAL CONTROLS

#### PART 1 GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 1, 15 and 16 Specification Sections, apply to this Section.

##### 1.2 SECTION INCLUDES

- A. Control equipment.
- B. Software.
- C. Instrument and control elements.

##### 1.3 RELATED SECTIONS

- A. Section 17600 - Sequence of Operation for HVAC controls.

##### 1.4 REFERENCES

- A. ASME MC85.1 - Terminology for Automatic Control.
- B. NEMA EMC1 - Energy Management Systems Definitions.
- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- D. NFPA 70 - National Electrical Code.
- E. NFPA 90A - Installation of Air Conditioning and Ventilation Systems.

##### 1.5 SYSTEM DESCRIPTION

- A. Provide hardware and software as required to fully integrate and support extension to existing JCI Building Automation System. All control points listed in Section 17600 "Sequence of Operation for HVAC controls" shall be performed by the DDC system and displayed on the Operator Workstation. Any other control work required to complete the sequence of operation specified in Section 17600 may be electric or electronic. Contractor shall provide all transformers, sensors, switches, relays etc. necessary for a complete operating system.
- B. Provide automatic temperature control field monitoring and control system using BACnet field programmable micro-processor based units with communications to the existing Building Automation System.
- C. Provide base system on distributed system of fully intelligent, stand-alone controllers, operating in a multi-tasking, multi-user environment on token passing network, with central and remote hardware, software, and interconnecting wire and conduit.
- D. Include computer software and hardware, operator input/output devices, control units, local area networks (LAN), sensors, control devices, actuators.
- E. Provide control systems consisting of temperature sensors, thermostats, control valves, dampers, indicating devices, interface equipment and other apparatus and accessories required to operate mechanical systems, and to perform functions specified.
- F. Furnish and install all power wiring and conduit necessary for the BAS control system for a complete operating system. Install per Division 16.
- G. Install Owner provided Field Server device from NYLE dehumidification unit to interface (BACnet) with JCI control system.
- H. Include installation and calibration, supervision, adjustments, and fine tuning necessary for complete and fully operational system.
- I. Replace existing UNT controller currently in Mechanical Mezzanine with new FEC controller to integrate with NYLE Field Server and other new equipment.

## SECTION 17100

### DIRECT DIGITAL CONTROLS

#### 1.6 SUBMITTALS FOR REVIEW

- A. See Division 1 Requirements.
- B. Product Data: Provide data for each system component and software module.
- C. Shop Drawings:
  - 1. List connected data points, including connected control unit and input device.
  - 2. Indicate system graphics indicating monitored systems, data (connected and calculated) point addresses, and operator notations. Provide demonstration diskette containing graphics.
  - 3. Show system configuration with peripheral devices, batteries, power supplies, diagrams, modems, and interconnections.
  - 4. Indicate description and sequence of operation of operating, user, and application software.
  - 5. Ensure terminology used in submittals conforms to ASME MC85.1.

#### 1.7 SUBMITTALS FOR INFORMATION

- A. See Division 1 Requirements.
- B. Manufacturer's Instructions: Indicate manufacturer's installation instructions for all manufactured components.

#### 1.8 SUBMITTALS AT PROJECT CLOSEOUT

- A. See Division 1 Requirements.
- B. Project Record Documents: Record actual locations of control components, including control units, thermostats, and sensors.
  - 1. Revise shop drawings to reflect actual installation and operating sequences.
  - 2. Include data specified in "Submittals" in final "Record Documents" form.
- C. Operation and Maintenance Data:
  - 1. Include interconnection wiring diagrams complete field installed systems with identified and numbered, system components and devices.
  - 2. Include keyboard illustrations and step-by-step procedures indexed for each operator function.
  - 3. Include inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.
- D. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owners name and registered with manufacturer.

#### 1.9 APPROVED INSTALLING CONTRACTORS, QUALITY ASSURANCE

- A. General
  - 1. The Building Automation System Contractor shall be JCI, branch office; South Bend, IN. Contract Jim Davis @ (514) 876-7851 (Cell Phone) – No Substitutions.
- B. Workplace Safety and Hazardous Materials
  - 1. Provide a safety program in compliance with the Contract Documents.
  - 2. The BAS Contractor shall have a corporately certified comprehensive Safety Certification Manual and a designated Safety Supervisor for the Project.
  - 3. The Contractor and its employees and sub-trades comply with federal, state and local safety regulations.
  - 4. The Contractor shall ensure that all subcontractors and employees have written safety programs in place that covers their scope of work and that their employees receive the training required by the OSHA having jurisdiction for at least each topic listed in the Safety Certification Manual.
  - 5. Hazards created by the Contractor or its subcontractors shall be eliminated before any further work proceeds.
  - 6. Hazards observed but not created by the Contractor or its subcontractors shall be reported to either the General Contractor or the Owner within the same day. The Contractor shall be required to avoid the hazard area until the hazard has been eliminated.

## SECTION 17100

### DIRECT DIGITAL CONTROLS

7. The Contractor shall sign and date a safety certification form prior to any work being performed, stating that the Contractors' company is in full compliance with the Project safety requirements.
8. The Contractor's safety program shall include written policy and arrangements for the handling, storage and management of all hazardous materials to be used in the work in compliance with the requirements of the authority having jurisdiction at the Project site.
9. The Contractor's employees and subcontractor's staff shall have received training as applicable in the use of hazardous materials and shall govern their actions accordingly.
- C. Quality Management Program
  1. Designate a competent and experienced employee to provide BAS Project Management. The designated Project Manager shall be empowered to make technical, scheduling and related decisions on behalf of the BAS Contractor. At minimum, the Project Manager shall:
    - a. Manage the scheduling of the work to ensure that adequate materials, labor and other resources are available as needed.
    - b. Manage the financial aspects of the BAS contract.
    - c. Coordinate as necessary with other trades.
    - d. Be responsible for the work and actions of the BAS workforce on site.

#### 1.10 REGULATORY REQUIREMENTS

- A. Conform to the 2012 International Building Code (IBC).
- B. Conform to the 2012 International Fuel Gas Code (IFGC).
- C. Conform to the 2012 International Fire Code (IFC), excluding Chapter 4.
- D. Conform to the 2012 International Energy Conservation Code (IECC).
- E. Conform to the 2012 International Mechanical Code (IMC).
- F. Conform to the 2009 ICC Electrical Code.
- G. Conform to 2008 NFPA 70, National Electrical Code.
- H. Products: Listed and classified by Underwriter's Laboratories, Inc. as suitable for the purpose specified and indicated.

## PART 2 PRODUCTS

### 2.1 DDC SYSTEM CONTROLLERS

- A. **Approved Manufacturer: General Purpose Fully Programmable Controllers shall be JCI BACnet.**
  1. The General Purpose Programmable Controller (PCA/PCG) by JCI shall be a fully user-programmable, digital controller that communicates via BACnet MS/TP protocol. There shall be no substitutions made as the owner has standardized on these.
    - a. The PCG shall support BACnet Standard MS/TP Bus Protocol ASHRAE SSPC-135, Clause 9 on the controller network.
  2. The PCG shall employ a finite state control engine to eliminate unnecessary conflicts between control functions at crossover points in their operational sequences. Suppliers using non-state based DDC shall provide separate control strategy diagrams for all controlled functions in their submittals.
  3. The PCG shall be factory programmed with a continuous adaptive tuning algorithm that senses changes in the physical environment and continually adjusts loop tuning parameters appropriately. Controllers that require manual tuning of loops or perform automatic tuning on command only shall not be acceptable.
  4. The PCG shall be assembled in a plenum-rated plastic housing with flammability rated to UL94-5VB.
  5. The PCG shall include a removable base to allow pre-wiring without the controller.

## SECTION 17100

### DIRECT DIGITAL CONTROLS

6. The PCG shall include troubleshooting LED indicators to identify the following conditions:
  - a. Power On
  - b. Power Off
  - c. Download or Startup in progress, not ready for normal operation
  - d. No Faults
  - e. Device Fault
  - f. Field Controller Bus - Normal Data Transmission
  - g. Field Controller Bus - No Data Transmission
  - h. Field Controller Bus - No Communication
  - i. Sensor-Actuator Bus - Normal Data Transmission
  - j. Sensor-Actuator Bus - No Data Transmission
  - k. Sensor-Actuator Bus - No Communication
7. The PCG shall accommodate the direct wiring of analog and binary I/O field points.
8. The PCG shall support the following types of inputs and outputs:
  - a. Universal Inputs - shall be configured to monitor any of the following:
    - 1) Analog Input, Voltage Mode
    - 2) Analog Input, Current Mode
    - 3) Analog Input, Resistive Mode
    - 4) Binary Input, Dry Contact Maintained Mode
  - b. Binary Inputs - shall be configured to monitor either of the following:
    - 1) Dry Contact Maintained Mode
    - 2) Pulse Counter Mode
  - c. Analog Outputs - shall be configured to output either of the following:
    - 1) Analog Output, Voltage Mode
    - 2) Analog Output, current Mode
  - d. Binary Outputs - shall output the following:
    - 1) 24 VAC Triac
  - e. Configurable Outputs - shall be capable of the following:
    - 1) Analog Output, Voltage Mode
    - 2) Binary Output Mode
9. The PCG shall have the ability to reside on a Field Controller Bus (FC Bus).
  - a. The FC Bus shall be a Master-Slave/Token-Passing (MS/TP) Bus supporting BACnet Standard protocol SSPC-135, Clause 9.
  - b. The FC Bus shall support communications between the PCGs and the Supervisory Controller.
  - c. The FC Bus shall also support Expansion I/O (PCX) communications with the PCG and with the Supervisory Controller.
  - d. The FC Bus shall operate at a maximum distance of 15,000 Ft. between the PCG and the furthest connected device.
10. The PCG shall have the ability to monitor and control a network of sensors and actuators over a Sensor-Actuator Bus (SA Bus).
  - a. The SA Bus shall be a Master-Slave/Token-Passing (MS/TP) Bus supporting BACnet Standard Protocol SSPC-135, Clause 9.
  - b. The SA Bus shall support up to 10 devices per trunk.
  - c. The SA Bus shall operate at a maximum distance of 1,200 Ft. between the PCG and the furthest connected device.
11. The PCG shall have the capability to execute complex control sequences involving direct wired I/O points as well as input and output devices communicating over the FC Bus or the SA Bus.

## SECTION 17100

### DIRECT DIGITAL CONTROLS

12. The PCG shall support, but not be limited to, the following:
  - a. Chilled water/central plant automation applications including but not limited to:
    - 1) The selection and sequencing of up to 8 chillers of different sizes.
    - 2) The selection and sequencing of up to 8 (each) primary and secondary chilled water pumps of varying pump capacities.
    - 3) The selection and sequencing of up to 8 condenser water pumps.
    - 4) The selection and sequencing of cooling towers and bypass valve, including single speed, multi-speed, and Vernier control.
    - 5) A proven and documented central cooling plant optimization program that incorporates custom equipment efficiency profiles, without rewriting software code, in order to meet the building load using the least amount of energy as calculated.
    - 6) The use of advanced control algorithms that apply equipment specific parameters, including operational limits and efficiency profiles, in order to determine equipment start and runtime preferences.
    - 7) The identification of the most efficient equipment combination and automatic control of state and speed of all necessary equipment to balance runtime, optimize timing and sequencing and ensure the efficiency and stability of the central cooling plant.
    - 8) The control definition for the chiller plant in a single FX-PCG, as supported by available memory and point Input / Output (I/O), or capable of being split across multiple FX-PCGs.
  - b. Heating central plant applications.
  - c. Built-up air handling units for special applications.
  - d. Terminal and packaged units and unit ventilators.
  - e. Special programs as required for systems control.
13. The PCG shall support a Local Controller Display (DIS) either as an integral part of the PCG or as a remote device communicating over the SA Bus. Local displays shall be provided when controllers are used in central plant or AHU applications but are not required on simple systems such as unit ventilators.
  - a. The Display shall use a BACnet Standard SSPC-135, clause 9 Master-Slave/Token-Passing protocol.
  - b. The Display shall allow the user to view monitored points without logging into the system.
  - c. The Display shall allow the user to view and change set points, modes of operation, and parameters.
  - d. The Display shall provide password protection with user adjustable password timeout.
  - e. The Display shall be menu driven with separate paths for:
    - 1) Input / Output
    - 2) Parameter / Set point
    - 3) Overrides
  - f. The Display shall use easy-to-read English text messages.
  - g. The Display shall allow the user to select the points to be shown and in what order.
  - h. The Display shall support a back lit Liquid Crystal Display (LCD) with adjustable contrast and brightens and automatic backlight brightening during user interaction.
  - i. The display shall be a minimum of 4 lines and a minimum of 20 characters per line.
  - j. The Display shall have a keypad with no more than 6 keys.
  - k. The Display shall be panel mountable.

#### 2.2 ROOM SENSOR: PROVIDE JCI NS-BTXXXXX-2 (OR EQUAL)

- A. Sensors shall be provided with +/- 1 degree temperature adjustment and override button.

## SECTION 17100

### DIRECT DIGITAL CONTROLS

#### 2.3 CONTROL PANELS: PROVIDE JCI PAN-ENCXXXXWDP OF APPROPRIATE SIZE OR APPROVED EQUAL.

- A. Unitized cabinet type for each system under automatic control with relays and controls mounted in cabinet and temperature indicators, pressure gages, pilot lights, push buttons and switches flush on cabinet panel face.
- B. NEMA 250, general purpose utility enclosures with enameled finished face panel.
- C. Provide straight screw driver latch (no keying) for all panels.

#### 2.4 CONTROL VALVES: PROVIDE BELIMO B2/B3 CHARACTERIZED CONTROL VALVES AND BELIMO "F" SERIES BUTTERFLY VALVES OF APPROPRIATE SIZE AND TYPE (NO SUBSTITUTIONS PERMITTED). PROVIDE BELIMO LF/AF SPRING RETURN VALVE ACTUATORS OF APPROPRIATE SIZE AND TYPE (NO SUBSTITUTIONS PERMITTED)

- A. Electronic, positive positioning, spring return, low voltage (24 VAC) actuators to be properly selected for the valve body and service.
- B. Valve bodies to be 3-way mixing, 2-way normally open or normally closed to suit application. Bodies 2 inches and less to be 250 psig bronze, screwed connection, bronze seats, equal percentage plugs, stainless steel stems with teflon packing. Over 2 inch bodies to be 125 psig iron, flanged connection with modified equal percent plug. Valve selection to be based on 3 psig drop across fully open valve.
- C. The valves shall be sized by the control manufacturer and be provided with actuators of sufficient power for the duty intended. Valve body and actuator selection shall be sufficient to handle system pressure and shall close against the differential pressures to be encountered on the project.
- D. Where required by the sequence of operation, valves shall be capable of being sequenced either with other valves or other actuated devices. Where such sequencing is required, the actual spring range, when adjusted for spring shift, shall be such that no overlapping occurs. In the event that spring shift causes an overlap, a pilot positioning operator shall be furnished.
- E. Small Valves - 1/2 Inch through 2 Inch:
  - 1. Ball type.
  - 2. Valves shall be constructed with a two piece cast brass body and screwed ends. Valves shall have removable packing gland with threaded cap for shaft seal. O-Ring type seals are unacceptable.
  - 3. Electric actuator shall be Belimo. Body rating shall be 400 psi at 50 degrees F. Body rating shall also meet or exceed ANSI B6.5 Class 250.
- F. Valves - 2-1/2 Inches and Above:
  - 1. Ball or butterfly type.
  - 2. Valves shall be constructed with a cast iron body and have flanged connections. Valves shall have removable packing gland with threaded cap for shaft seal.
  - 3. Electric actuators shall be Belimo SY type actuators.
  - 4. Ball and butterfly valves need to achieve proper Cv. by use of reduced size and reducers or reduced port.
- G. All control valves shall fail safe by spring return as follows:
  - 1. Heating: Fails open (N.O.).
  - 2. Cooling: Fails closed (N.C.)
  - 3. VAV Box Valves shall fail to open.
- H. Electronic Operators:
  - 1. Acceptable Manufacturers:
    - a. Belimo.
    - b. **No Substitutions.**
  - 2. Valves shall spring return to normal position as indicated on freeze, fire, or temperature protection.
    - a. 2" and smaller shall be SY Actuators and must be wired to controllers that are powered on the generator.



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- b. 2-1/2" and larger shall be SY 24 volt Actuators and must be wired to controllers that are powered on the generator, they will not spring return they will fail to their current position.
- 3. Select operator for full shut off at maximum pump differential pressure.

#### 2.5 INTERIOR DAMPERS: PROVIDE JCI VD-1300 SERIES VOLUME CONTROL DAMPERS OF APPROPRIATE SIZE AND TYPE OR APPROVED EQUAL.

- A. Acceptable Manufacturer:
  - 1. Johnson Controls, Inc.
  - 2. Ruskin.
  - 3. Pottorf.
- B. Performance: Test in accordance with AMCA 500.
- C. Frames: Galvanized steel welded or riveted with corner reinforcement.
- C. Blades: Galvanized steel, maximum blade size 6 inches wide, 48 inches long, attached to minimum 1/2 inch shafts with set screws.
- E. Blade Seals: Synthetic elastomeric or Neoprene mechanically attached, field replaceable.
- F. Jamb Seals: Spring stainless steel.
- G. Shaft Bearings: Graphite impregnated nylon sleeve, with thrust washers at bearings or lubricant free, stainless steel, single row, ground, flanged, radial, antifriction type with extended inner race.
- H. Linkage Bearings: Graphite impregnated nylon.
- I. Leakage: Less than 2 percent based on approach velocity of 2000 ft/min and 4 inches w.g.
- J. Maximum Pressure Differential: 6 inches w.g.
- K. Temperature Limits: -40 to 200 degrees F.

#### 2.6 DAMPER OPERATORS: PROVIDE BELIMO DAMPER ACTUATORS OF APPROPRIATE SIZE (NO SUBSTITUTIONS PERMITTED)

- A. Acceptable Manufacturers:
  - 1. Belimo (LF Series)
  - 2. **No Substitutions.**
- B. General: Provide smooth proportional control with sufficient power for air velocities 20 percent greater than maximum design velocity and to provide tight seal against maximum system pressures. Provide spring return for two position control and for fail safe operation.
- C. Electric Operators: Actuators shall use a brushless DC motor and be protected from overload at all angles of rotation. Run time shall be constant and independent of torque. If required, 2 SPDT auxiliary switches shall be provided.
- D. Number: Sufficient to achieve unrestricted movement throughout damper range. Provide one damper operator for maximum 25 sq ft damper section.

#### 2.7 INPUT/OUTPUT SENSORS

- A. Electronic Sensors: Vibration and corrosion resistant; for wall, immersion, or duct mounting as required.
  - 1. Thermistor or Resistance Temperature Detectors temperature sensors as follows:
    - a. Accuracy: Plus or minus .3 C F at calibration point.
    - b. Wire: Twisted, shielded pair cable.
    - c. Insertion Elements in Ducts: Single point, 8 inches long; use where not affected by temperature stratification or where ducts are smaller than 9 sq. ft.
    - d. Averaging Elements in Ducts: 17 foot long; use where prone to temperature stratification or where ducts are larger than 9 sq. ft. length as required.
    - e. Insertion Elements for heating system: Brass well with minimum insertion length of 2-1/2 inches. Stainless steel wells are required for all chiller systems.
    - f. Room Sensors: Cover to be blank, with plus/minus 3 degree setpoint adjustable, and/or with override button at Owners choice.
    - g. Outside-Air Sensors: Watertight inlet fitting, shielded from direct sunlight.

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- h. Room Security Sensors: Stainless steel cover plate with insulated back and security screws.
- 2. Static-Pressure Transmitter: **Provide Veris PXPLX series of appropriate range or approved equal.**
  - a. Non-directional sensor with suitable range for expected input, and temperature compensated.
  - b. Accuracy: 2 percent of full scale with repeatability of 0.5 percent.
  - c. Output: 4 to 20 mA.
  - d. Building Static-Pressure Range: 0 to 0.25 inch w.g.
  - e. Duct Static-Pressure Range: 0 to 5 inches w.g.
- 3. Pressure Transmitters: **Provide Veris PWLX series of appropriate range with AA16A bypass valve assembly (No Substitutions Permitted)**  
Direct acting for gas or liquid; range suitable for system; proportional output 4 to 20 MA. Water differential pressure sensors shall be as manufactured by Veris with a three valve manifold.
- B. Equipment operation sensors as follows: **Provide Veris H708 current sensor of appropriate range or approved equal.**
  - 1. Status inputs for Fans and Pumps: Current-sensing relay with current transformers, adjustable and set to 175 percent of rated motor current.
- B. **Carbon Dioxide Room Sensors: Provide JCI CD-W00-N0-1 series wall mounted CO2 sensor (No Substitutions Permitted).**
- C. **Outside Air Humidity and Temperature Sensor: Provide JCI HE-68P3-0N000 series OA mounted humidity and temperature sensor (No Substitutions Permitted).**
- D. **Outside Photocell: Provide Kele EM-24A2 series OA mounted photocell sensor or approved equal.**

#### 2.8 MISCELLANEOUS DEVICES

- A. Relays: **Provide IDEC RR2P-ULAC24V series relay with corresponding SR2P-06 relay base (Or Equal)**
  - 1. All relays are to be installed in control panels. Relays in box (RIB's) are not acceptable.
  - 2. Control relays shall be UL listed plug-in type with dust cover. Contact rating, configuration, and coil voltage suitable for application. Relays to be IDEC RR2P-UL AC24V with SR2P-06 base.
- B. Transformers and Power Supplies: **Provide Core Components LE series transformers of appropriate size & type, or Core LD05763 Power Supply mounted in control panels or approved equal.**
  - 1. Control transformers shall be UL listed, Class 2 current-limiting type, or shall be furnished with over-current protection in both primary and secondary circuits for Class 2 service.
  - 2. Unit output shall match the required output current and voltage requirements. Current output shall allow for a 50% safety factor. Output ripple shall be 3.0 mV maximum Peak-to-Peak. Regulation shall be 0.10% line and load combined, with 50 microsecond response time for 50% load changes. Unit shall have built-in over-voltage protection.
  - 3. Unit shall operate between 0° C and 50° C.
  - 4. Unit shall be UL recognized.

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### DIRECT DIGITAL CONTROLS

#### 2.9 COMMUNICATION CABLE

- A. Provide plenum rated when running above ceilings.
- B. Exposed cable in mechanical, storage, electrical, etc. rooms to run in minimum ¾" conduit.
- C. Cable drops to unit ventilators are to be concealed in pipe chases (either sheet metal by mechanical contractor or architectural chases provided by general contractor) and run in minimum ¾" conduit to allow future removal of cable. Horizontal runs of cable between unit ventilators and in shelving cabinets to also be run in minimum ¾" conduit. Exposed cable drops in Classrooms are not allowed. See electrical drawings of additional requirements.
- D. Where exposed cable drops in occupied areas are unavoidable cable to be run in series 500/700 raceway/wiremold.

#### 2.10 CONTACTORS

- A. Provide definite purpose controllers equal to Siemens, Square D or Furnas Model 423F35AF. Provide 2, 3 or 4 pole as required by site conditions.

### PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that conditioned power supply is available to the control units and to the operator work station. Verify that field end devices, wiring, and pneumatic tubing is installed prior to installation proceeding.

#### 3.2 INSTALLATION

- A. Install control units and other hardware in position on permanent walls where not subject to excessive vibration.
- B. Provide metal thermostat/sensor guards for all thermostats/sensors located in pool area. Plastic are not acceptable.
- C. Install software in control units and in operator workstation. Implement all features of programs to specified requirements and appropriate to sequence of operation. Refer to Section 17600.
- D. Electrical material and installation shall be in accordance with appropriate requirements of Division 16.
- E. Provide liquid tight flexible conduit for all BAS connections to equipment located in the Boiler Room and Mechanical Room.
- F. Provide liquid tight flexible conduit for all equipment with vibration isolation.
- G. BAS Wiring
  - 1. All conduit, wiring, accessories and wiring connections required for the installation of the BAS, as herein specified, shall be provided by the BAS Contractor unless specifically shown on the Electrical Drawings under Division 16 Electrical. All wiring shall comply with the requirements of applicable portions of Division 16 and all local and national electric codes, unless specified otherwise in this section.
  - 2. All BAS wiring materials and installation methods shall comply with BAS manufacturer recommendations.
  - 3. The sizing type and provision of cable, conduit, cable trays, and trunking shall be the design responsibility of the BAS Contractor. If complications arise, however, due to the incorrect selection of cable, cable trays, trunking and/or conduit by the BAS Contractor, the Contractor shall be responsible for all costs incurred in replacing the selected components.
- H. BAS Raceway
  - 1. All wiring in rooms (Mechanical, Boiler, Mezzanine, Storage, Etc.) with no drop ceiling shall be installed in conduit. Wiremold or equal raceway shall be used in occupied spaces and below drop ceiling. Minimum control wiring conduit size ¾ inch.
  - 2. All conduits and raceways shall be installed level, plumb, at right angles to the building

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### **DIRECT DIGITAL CONTROLS**

- lines and shall follow the contours of the surface to which they are attached.
3. Flexible Metal Conduit shall be used for vibration isolation and shall be limited to 3 feet in length when terminating to vibrating equipment. Flexible Metal Conduit may be used within partition walls. Flexible Metal Conduit shall be UL listed."
  - I. Provide setup time to configure Owner's smartphones for remote web access.

#### **3.3 MANUFACTURER'S FIELD SERVICES**

- A. Prepare and start systems.
- B. Start and commission systems. Allow sufficient time for start-up and commissioning prior to placing control systems in permanent operation.

#### **3.4 TRAINING**

- A. Provide competent service engineer to instruct Owner's representative in operation of automatic control systems. Onsite training shall consist of an 8 hours in two 4 hours increments. This time shall be for training only, not maintenance of system. Contractor shall prepare a time log sheet, obtaining owner's signature after training sessions and provide updates to owner after each session.

#### **3.5 INPUT/OUTPUT SCHEDULES**

- A. See Specification Section 17600 "Sequence of Operation for HVAC controls".

**END OF SECTION**

## SECTION 17600

### SEQUENCE OF OPERATION

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Pool Dehumidification System Control.
- B. Single Zone Air Handling Unit Control.
- C. Fire Shut Down of Air Supply Units Over 2000 CFM.
- D. Exhaust Fan Control.
- E. Pool Excess Pressure Control.

##### 1.2 RELATED WORK

- A. Division 17 - Building Automation System.

##### 1.3 SYSTEM DESCRIPTION

- A. This section defines the manner and method by which controls function. Requirements for each type of control system operation are specified. Equipment, devices and system components required for control systems are specified in other sections.

##### 1.4 SUBMITTALS

- A. Submit under provisions of the general conditions and general requirements of the contract.
- B. Submit diagrams indicating mechanical systems controlled and control system components. Label with settings, adjustable range of control and limits. Include written description of control sequence.
- C. Include flow diagrams for each control system, graphically depicting control logic.
- D. Include draft copies of graphic displays indicating mechanical system components, control system components and controlled function status and value.
- E. Contractor shall review all shop drawings prior to submitting them for Architect/ Engineer's review. Contractor shall stamp each shop drawing to certify that he has reviewed it. Engineer will not check any shop drawings that contractor has not stamped with his review certification.

##### 1.5 PROJECT RECORD DOCUMENTS

- A. Submit documents under provisions of the general conditions and general requirements of the contract.
- B. Accurately record actual setpoints and settings of controls, including changes to sequences made after submission of shop drawings.

#### PART 2 PRODUCTS

Not Used.

#### PART 3 EXECUTION

##### 3.1 SCOPE OF WORK

- A. This sequence of operation section is inclusive of all requirements of all Division 17 and specified related sections.
- B. There is specific information in the other section of this specification that directly affects the scope of work required for this sequence of operation: Especially, but not limited to, the system description, scope of work and schedule requirements set forth in Division 17.

## SECTION 17600

### SEQUENCE OF OPERATION

- C. Any contradictory information/requirements between sections shall be interpreted to mean that the most stringent, safe or costly requirement shall be included in the scope of work, unless identified by the BAS contractor, in writing, prior to bidding and specifically directed otherwise, in writing, by the owner/architect/engineer.
- D. Failure of the contractor to read and understand all sections of this specification and the contract documents shall not be grounds for any additional cost to the owner for materials and labor required to meet the requirements of the contract documents.
- E. The BAS contractor for this contract shall furnish and install all new controls for All HVAC equipment in the building in compliance with the controls sequences of operation described below (the BAS Contractor shall obtain any programs the owner has prior to building any of the programs below and modify them as required to meet the sequence, any program the owner doesn't have will have to be completely built by the BAS Contractor). Any equipment that is not specifically addressed below shall be provided with complete controls based on the most stringent or greatest cost sequence described below.

### 3.2 SEQUENCE OF OPERATION

#### A. Pool Dehumidification System Control

- 1. General:
  - a. The existing NYLE dehumidification unit shall continue to operate under its own factory control system.
  - b. JCI to install owner supplied Field Server (provided from NYLE) to allow interface to JCI BAS system.
  - c. JCI shall replace the existing controller in the Mechanical Mezzanine room with new FEC controller. All current points from the existing shall be transferred to the new controller.
  - d. The NYLE Field Server is to be integrated into the new controller and all points available through the Field Server picked up on the controller.
  - e. JCI shall contact NYLE Systems for operating criteria/characteristics of existing system prior to integration. 1-800-777-6953 extension 212.
  - f. Points List – The BAS shall monitor the following minimum points;
    - 1) Pool Room Temp.
    - 2) Pool Room Humidity
    - 3) Discharge Air Temp.
    - 4) Return Air Temp.
    - 5) OA Temp. (DB & WB)
    - 6) OAD, RAD & EAD damper positions
    - 7) Pressure of Pool Room
    - 8) Status of Supply Fan on NYLE unit
    - 9) Status of Return Fan
    - 10) Status of Compressors on NYLE unit
    - 11) Status of hot water heating coil valves
    - 12) Discharge set point

## SECTION 17600

### SEQUENCE OF OPERATION

#### **B. Pool Dehumidification Unit Control**

1. General:
  - a. Control electronically with dedicated stand-alone HVAC controller.
  - b. Match current building schedules.
  - c. All set points will be adjustable through the BAS, at the operator workstation, or through a computer with internet service.
  - d. Provide damper operators (Belimo).
  - e. Controls, controllers and relays shall be mounted in hinge control boxes installed in the Mechanical Mezzanine at an accessible height for servicing. Verify location with Architects, Engineers and Owner.
2. Occupied Cycle:
  - a. Unit shall run continuously.
  - b. NYLE system controller shall control refrigeration cycle for temperature control and dehumidification.
  - c. Return fan (REF-1) shall be interlocked with NYLE supply fan to run continuously.
  - d. Initial Settings: Outdoor air dampers to be set at a minimum of 3800 CFM. Return air dampers to be set at 14,200 CMP and Exhaust air dampers to be set at 5300 CFM.
  - e. Return air fan shall be controlled by Pool Room space pressure sensor to maintain  $\pm .05$  inches negative pressure by controlling REF-1 variable frequency drive.
  - f. System shall continuously monitor OA dry bulb and wet bulb temperatures and if OA enthalpy is at or below the supply discharge air set point the OA dampers shall modulate open, the return air dampers to modulate closed and exhaust air dampers to modulate open to maintain space temperature and humidity by utilizing outdoor air in lieu of mechanical cooling.
  - g. When supply air discharge temperatures fall below set point, and hot water heating is available, the BASD system shall modulate the control valve(s) on the existing hot water heating coil to maintain supply air discharge temperature.
  - h. Furnish and install averaging freeze-stat prior to hot water heating coil. If temperature falls below 35° F., the heating coil shall modulate open and the OA dmper shall modulate closed.
  - i. OA damper shall fail closed, the RA damper shall fail open, and EA damper fail closed.
  - j. Smoke/Fire Fan Shut Down:
    - 1) On a signal from the addressable relay, provided by the Electrical Contractor, the associated supply and return fans shall be shut down. See electrical plans for quantity and locations. BAS to provide relay and wire to duct smoke detectors for fan shut down.

#### **C. Fire Shut Down for Air Supply Unit Over 2000 CFM**

1. The Electrical Contractor shall furnish and install smoke and/or heat detectors in air supply system over 2000 CFM. An addressable fire alarm relay shall be furnished and installed by the Electrical Contractor and mounted by the control box for each system. BAS Contractor shall pick up signal from relay and provide a program to stop all supply and return/exhaust fans interlocked with the system sensing fire or smoke. DDC program shall also show fire in unit alarm at time of shut down.
2. Air supply units 15,000 CFM and over shall require smoke and/or heat detectors on both supply and return.
3. Points List:
  - a. Fire Shut Down Status

## **SECTION 17600**

### **SEQUENCE OF OPERATION**

#### **D. Pool Area Pressure Control**

1. Controls, controllers and relays shall be mounted in hinge control boxes installed in the Mezzanine Mechanical Room at an accessible height for servicing. Verify location with Architects, Engineers and Owner.
2. The BAS control will tie the return fan into the BAS thru the connections on the frequency drive furnished by the BAS contractor to the electrical contractor for his mounting and wiring.
3. The BAS contractor shall monitor the pressure within the Pool Room and control return fan (REF-1) to maintain a negative .05 inches pressure in relation to the corridor space. Additional pressure sensor to be installed in adjacent corridor.

**END OF SECTION**