Project Manual
Project Number: 15-054

Alsip, Hazelgreen & Oak Lawn Elementary School District 126

New Storage Facility
4600 West 123rd Street
(Lane Elementary School)
Alsip, Illinois 60803

For

The Board of Education
Alsip, Hazelgreen & Oak Lawn School District 126
11900 S. Kostner Avenue
Alsip, Illinois 60803

Issued for Bid: May 16, 2016

TRIA ARCHITECTURE
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

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ADVERTISEMENT FOR BIDS

ADVERTISEMENT FOR BIDS

1.1 BID INFORMATION

A. Sealed bids will be received by the Board of Education, Alsip, Hazelgreen and Oak Lawn Elementary School District 126, on May 26, 2016 at 2:00 p.m. prevailing time for the New Storage Facility. Bids will be opened at the Alsip, Hazelgreen and Oak Lawn Elementary School District 126 District Office, 11900 S. Kostner Avenue, Alsip, Illinois 60803.

B. A Pre-Bid Conference will be held on May 20, 2016, 2:00 p.m. at Lane Elementary School, 4600 West 123rd Street, Alsip, Illinois 60803. All Bidders are encouraged to attend and sign in at the meeting which will also be attended by the Owner, Architect and Engineer.

C. Anticipated Award of Contract date: June 9, 2016

D. Anticipated Start of Construction: June 10, 2016

E. Anticipated Substantial Completion date: November 30, 2016

F. Lump sum bid proposals will be received for this project at the scheduled time of receipt bids and will be publicly opened at that time.

G. Bid security in the form of a bid bond, certified check or cash 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 Board of Education, Alsip, Hazelgreen and Oak Lawn Elementary School District 126.

H. Bids shall be submitted on or before the specified closing time in an opaque sealed envelope addressed to: Mr. Steve Gress, Assistant Superintendent for Finance and Operations.

I. The Board of Education reserves the right to reject any or all bids or parts thereof, or waive any irregularities or informalities, and to make the award in the best interest of the District.

J. All bidders must comply with applicable Illinois Law requiring the payment of prevailing wages by all Contractors working on public works. Bidder must comply with the Illinois Statutory requirements regarding labor, including Equal Employment Opportunity Laws.

K. 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: Gill Reprographics, Inc. (GRI), 17W715 Butterfield Road, Suite B, Oak Brook Terrace, IL 60181, (630) 652-0800, www.gillrepro.com.

L. The Architect for the above referenced project is Tria Architecture, Inc., (630) 455-4500.

The Board of Education
Alsip, Hazelgreen and Oak Lawn Elementary School District 126
11910 S. Kostner Avenue
Alsip, Illinois 60803

END OF SECTION

SECTION 00100

INSTRUCTIONS TO BIDDERS

PART 1 – GENERAL

1.1 PROPOSAL

A. The Board of Education, Alsip, Hazelgreen and Oak Lawn Elementary School District 126, will receive sealed bids for the New Storage Facility.

B. To receive full consideration bids must contain the following documents properly completed and signed:
   1. Bid Form.
   2. Bid Bond.
   3. Certificate of Compliance with Illinois Drug-Free Workplace Act.
   4. Certificate of Compliance with Illinois Human Rights Act.
   5. Bidder Eligibility Certification and Non-Collusion Affidavit.
   6. 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. Steve Gress, Assistant Superintendent for Finance and Operations.
      a. Mark the envelope SEALED BID FOR:
         1) Project Name.
         2) Bidder.
   4. Bids will be received until 2:00 p.m. prevailing time, on May 26, 2016 for all specified work at the Alsip, Hazelgreen & Oak Lawn Elementary School District 126 District Office at 11900 S. Kostner Avenue, Alsip, Illinois 60803.
   5. Bids received after this time will not be accepted.
   6. Erasures or written memorandum on the Bid Form are prohibited. Include additional explanations, statements, or qualifications in a separate sheet attached to the Bid Form.
   7. The Base Bid shall appear only where called for in the Bid Form and shall not appear elsewhere in the proposal. Any Alternate prices (other than those set forth in the Bid Form) shall be listed on the Substitution Sheet.
   8. Fill in all blank spaces for the bid items with prices, or if not applicable, the words "No Bid."

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

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

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

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

F. 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 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.

B. Prime 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, upon deposit of a check in the amount of $100.00 made payable to the Owner. Deposit is refundable if a bid is submitted and if drawings are returned in good condition by June 23, 2016, 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 Pre-Bid Conference will be held on May 20, 2016, 2:00 p.m. at Lane Elementary School, 4600 West 123rd Street, Alsip, Illinois 60803. It is recommended that all Bidders attend and participate in the conference which will also be attended by the Owner, the Architect, and the Engineer. The Architect will transmit to prospective bidders of record any Addenda the Architect considers necessary in response to questions arising at the conference.

1.6 POST-BID QUALIFICATION

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

1.7 BID WITHDRAWAL

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

1.8 INTERPRETATION OF BIDDING DOCUMENTS

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

1.9 NON-SPECIFIED ITEMS

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

B. Substitutions:
   1. Substitutions for the items specified may be made by the Contractor only by submitting proposed substitutions on the Substitution Sheet provided.
   2. Requests received after bid opening will not be considered except for the following conditions:
      a. Product discontinued.
      b. Insufficient quantity. Except the following will not establish cause for substitution:
         1) Failure to award subcontract in sufficient time, or failure to place orders for products so as to ensure delivery without delaying work.
      c. Delays beyond control, such as strikes, lockouts, storms, fires, or acts of God, which may preclude the procurement and delivery of products for purposes of the Project.

C. No consideration will be given to substitutions after the Contractor submits the Schedule of Values.

1.10 METHOD OF AWARD

A. If the Owner should award a Contract, the Owner will award it to the lowest responsible bonafide Bidder with full consideration given to Contractor's Completion Schedule.

B. In determining the lowest responsible bona fide Bidder and in awarding a contract, the Owner may take into consideration skill, facilities, capacity, experience, ability, responsibility, previous work, financial standing of bidder, amount of work being carried on by bidder, quality and efficiency of construction equipment proposed to be furnished, period of time within which proposed equipment is furnished and delivered, and necessity of prompt and efficient completion of work herein described.

1.11 PROPOSAL REQUIREMENTS

A. Bidder's proposals shall be expressly based on the following items:
   1. Instructions to Bidders.
   2. Bid Proposal Form.
   3. General Conditions.
   4. Plans and Specifications.
   5. Addenda

B. Any Contract resulting from the Bidding Documents will incorporate the terms and provisions of said documents. It is intended that these Bidding Documents shall prevail over conflicting terms and conditions of Contractor's proposal. Bidder's printed terms and conditions are NOT considered as exceptions to the Contract.

1.12 BID SECURITY

A. Accompany bids with a Bid Bond, Certified Check or Bank Draft for an amount of 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.

1. Make Bid Security payable to: Board of Education, Alsip, Hazelgreen and Oak Lawn Elementary School District 126.

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. Certificate of Compliance with Illinois Drug-Free Workplace Act.
   2. Certificate of Compliance with Illinois Human Rights Act.
   3. Bidder Eligibility Certification and Non-Collusion Affidavit.
   4. Fully completed AIA Document A305.

1.15 POWER OF ATTORNEY

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

1.16 EMPLOYMENT AND LABOR PROVISIONS

A. In the employment and use of labor, the Contractor and his subcontractors shall conform to the Illinois Statutory requirements regarding labor and wages. See Document 00820 - Prevailing Wage Requirements.

B. Vendors/Contractors must conform to all federal, state, local and OSHA Regulations now in effect.

C. The Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex or national origin.

END OF SECTION

SECTION 00300

BID FORM

THE PROJECT AND THE PARTIES

1.1 NAME OF BIDDER: _____

1.1 TO: MR. STEVE GRESS,
ASSISTANT SUPERINTENDENT FOR FINANCE AND OPERATIONS
ALSIP, HAZELGREEN AND OAK LAWN ELEMENTARY SCHOOL DISTRICT 126
11910 S. KOSTNER AVENUE
ALSIP, ILLINOIS 60803

A. We as contractor having familiarized ourselves with local conditions affecting the work and with the proposed Contact 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 New Storage Facility, 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: **Fire Protection Sprinkler System**

   DEDUCTED from the Lump Sum $_____.

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

1. Unit Price No. 1: Division 7-Installation of roof system skylight;
   $_____Per (1) Skylight Unit.

D. Accompanying this proposal is a Bid Security payable to the Board of Education, Alsip, Hazelgreen and Oak Lawn Elementary School District 126, 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.

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

F. Time of Completion: If awarded the Contract, the bidder agrees to complete all Construction Work and achieve Substantial Completion by November 30, 2016, 5:00 p.m. NOTE: Substantial Completion for this project refers to all work being a minimum of 99% complete. Final Completion for this project refers to all scheduled work, punch-list and closeout items being 100% complete.

G. The space below 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. Desired Substantial Completion Date: November 30, 2016, 5:00 p.m.
2. Contractor's Desired Substantial Completion Date: _____.

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

BREAKDOWN:

Division 01: General Requirements – Allowance No. 1: $ _____

Division 01: General Requirements – Allowance No. 2: $ _____

Division 01: General Requirements – O&P: $ _____

Division 01: General Requirements – Remaining Items: $ _____

Division 02: Sitework: $ _____

Subcontractor (Legal Name, Address): _____

_____

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 08: Doors and Windows: $ _____

Subcontractor (Legal Name, Address): _____

_____

Division 09: Finishes: $ _____

Subcontractor (Legal Name, Address): _____

SECTION 00300

BID FORM

_____

Division 10: Specialties: $_____

Subcontractor (Legal Name, Address): _____

_____

Division 11: Equipment: $_____

Subcontractor (Legal Name, Address): _____

_____

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): _____

_____

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: _____

By: _____ Date: _____
(Signature)

_____
(Printed/Typed Name and Title)

Where the Bidder is a corporation, add Attest

_____(SEAL)
Secretary (signature) Date

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

END OF BID FORM

SECTION 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 Obligee, hereinafter called Obligee, in the sum of _____ Dollars ($_____), for the payment of which sum well and truly to be made, the said Principal and the said Surety, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

B. WHEREAS, the Principal has submitted a bid for: New Storage Facility.

C. NOW, THEREFORE, if the Obligee shall accept the bid of the Principal and the Principal shall enter into a Contract with the Obligee in accordance with the terms of such bid, and give such bond or bonds as may be specified in the bidding or Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; or in the event of the failure of the Principal to enter such Contract and give such bond or bonds, if the Principal shall pay to the Obligee the difference not to exceed the penalty hereof between the amount specified in said bid and such larger amount for which the Obligee may in good faith contract with another party to perform the Work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect.

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

Signed and sealed this _____ day of _____.

_____
(Principal) (SEAL)

_____ _____
(Witness) (Title)

_____
(Surety) (SEAL)

_____ _____
(Witness) (Title)

SECTION 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 SPECIFED PROPOSED ADD DEDUCT

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

NAME OF BIDDER: _____

DATE: _____.

END OF SECTION

SECTION 00485

CERTIFICATE OF COMPLIANCE WITH
ILLINOIS DRUG-FREE WORKPLACE ACT

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

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

B. Firm Name: _____

C. By: _____
(Authorized Agent of Contractor)

SECTION 00486

SUBSTANCE ABUSE PREVENTION POLICY

1.1 SUBSTANCE ABUSE PREVENTION POLICY

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

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

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

SECTION 00486

SUBSTANCE ABUSE PREVENTION POLICY

_____
(Date)

Mr. Steve Gress, Assistant Superintendent for Finance and Operations
Alsip, Hazelgreen and Oak Lawn Elementary School District 126
11900 S. Kostner Avenue
Alsip, Illinois 60803

Re: Substance Abuse Prevention Program

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

[complete either A or B below]

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

_____
Contractor/Subcontractor (type or print)

_____
Name of Authorized Representative (type or print)

_____
Title of Authorized Representative (type or print)

Date: _____ _____
Signature of Authorized Representative

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

_____
Contractor/Subcontractor (type or print)

_____
Name of Authorized Representative (type or print)

_____
Title of Authorized Representative (type or print)

Date: _____ _____
Signature of Authorized Representative

SECTION 00487

CERTIFICATE OF COMPLIANCE WITH ILLINOIS HUMAN RIGHTS ACT

1.1 CERTIFICATE OF COMPLIANCE WITH ILLINOIS HUMAN RIGHTS ACT INFORMATION

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

B. Firm Name: _____

C. By: _____
(Authorized Agent of Contractor)

SECTION 00495

BIDDER ELIGIBILITY CERTIFICATION AND NON-COLLUSION AFFIDAVIT

1.1 BIDDER ELIGIBILITY CERTIFICATION AND NON-COLLUSION AFFIDAVIT INFORMATION

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

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

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

Firm Name: _____

By: _____
(Authorized Agent of Contractor)

_____
(Title)

Subscribe and sworn to before me

this _____ day of _____.

_____
(Notary Public)

SECTION 00496

FAIR EMPLOYMENT PRACTICES AFFIDAVIT OF COMPLIANCE

1.1 FAIR EMPLOYMENT PRACTICES AFFIDAVIT OF COMPLIANCE

A. THIS AFFIDAVIT MUST BE EXECUTED AND SUBMITTED WITH THE SIGNED CONTRACT FORM. NO CONTRACTS WILL BE ACCEPTED BY THE BOARD OF TRUSTEES OF THE ALSIP, HAZELGREEN AND OAK LAWN ELEMENTARY SCHOOL DISTRICT 126 UNLESS SAID AFFADIVIT IS SUBMITTED CONCURRENTLY WITH THE CONTRACT.

_____
(Name)

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

_____
(Title)

of _____
(Name of Company)

and that he/she has the authority to make the following affidavit that he/she has knowledge of the Alsip, Hazelgreen and Oak Lawn Elementary School District 126 Bid Specifications and Documents relating to Fair Employment Practices and knows and understands the contents thereof: that he/she certifies hereby that is the policy of

_____
(Name of Company)

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

_____
(Signature)

SUBSCRIBED and sworn to before me

this _____ day of _____

_____
(Notary Public)

SECTION 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)

«_»
«_»

THE OWNER:
(Name, legal status and address)

«Board of Education
- Alsip, Hazelgreen, and Oak Lawn Elementary School District 126»«_»
«11900 South Kostner Avenue
Alsip, Illinois 60803
»

THE ARCHITECT:
(Name, legal status and address)

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

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

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

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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)~~ 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 CONTRACT

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

§ 1.1.3 THE WORK

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

§ 1.1.4 THE PROJECT

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

§ 1.1.5 THE DRAWINGS

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams. Figured dimensions shall be followed in preference to measurements by scale. All dimensions shall be checked against field measurements of existing conditions to be taken by the Contractor.

§ 1.1.6 THE SPECIFICATIONS

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

§ 1.1.7 INSTRUMENTS OF SERVICE

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

§ 1.1.8 INITIAL DECISION MAKER

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2 and certify termination of the Agreement under Section 14.2.2.

§ 1.1.9 The term "Contractor" as used herein shall refer to the Contractor or Construction Manager at Risk.

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the ~~Contractor.~~ Contractor and items reasonably inferable therefrom. The Contract Documents are complementary, and what is required by one shall be as binding as if required by ~~all; 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 Contractor shall seek a clarification in writing from the Architect. In the event that the Architect does not respond within fourteen (14) days, the more stringent or higher quality or greater quantity requirements shall apply.

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

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

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

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

§ 1.3 CAPITALIZATION

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

§ 1.4 INTERPRETATION

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement. The descriptive headings of this Agreement are inserted for convenience only and shall not control or affect the meaning or construction of any provisions following them.

§ 1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and 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 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.~~Permits and fees shall be obtained and paid for by the Contractor under the Contract Documents. The Contractor shall be responsible to obtain all temporary permits including, but not limited to, demolition and canopy permits required to execute the Work

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

concerning these conditions will not relieve the Contractor from any obligations with respect to the Contract Documents.

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

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, 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.~~ Documents. The Contractor shall not be liable to the Owner or Architect for damage resulting from errors, inconsistencies, or omissions in the Contract Documents unless the Contractor recognized or should have recognized such error, inconsistency, or omission, and failed to report it to the Architect, in which case the Contractor shall not be entitled to an increase in the Contract Sum or Contract Time and the Contractor shall bear all attributable costs for correction. The Contractor agrees to release and hold harmless the Owner for errors, inconsistencies or omissions in the Contract Document which should have been discovered by the Contractor.

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

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall 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 replacement of the Work and economic losses which proximately result from the breach of this duty. The Contractor shall be responsible to the Owner for the acts and omissions of the Contractor's employees, ~~Subcontractors~~ 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 the Project who shall perform all office functions including checking, approving and coordinating shop drawings and approving purchasing and disbursement pay-out requests and correspondence, and responding to Owner inquiries.

§ 3.4 LABOR AND MATERIALS

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for 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 Agreement has been executed, the Owner and the Architect will consider a formal request for the substitution of products in place of those specified only under the conditions set forth in Section 7.5.

§ 3.5 WARRANTY

~~The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.~~§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new, unless otherwise required or permitted by the Contract Documents and that the Work will be free from faults and defects and in conformance with the Contract Documents. The warranty will not be affected by the specification of any product or procedure, unless the Contractor objects promptly to such product or procedure and advises the Architect of possible substitute products or procedures which will not affect the warranty. This warranty shall not be restricted by the limitations of any manufacturer's warranty. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective in the Owner's sole discretion. Inability or refusal of the Subcontractor or supplier responsible for the defective work to correct such work shall not excuse the Contractor from performing under the warranty. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 Unless a specific guarantee is required in a particular division of the Specifications that is longer in duration than one (1) year from the date of Final Completion, the Work shall be guaranteed by the Contractor against 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).

§ 3.6 TAXES

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

§ 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, except the Owner will obtain approvals from the Illinois State Board of Education and zoning authorities. A local building permit is not required; however, licenses, bonds and utility or engineering permits may be required.

§ 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 or believes that portions of the Contract Documents are at variance with applicable laws, statutes, ordinances, building codes, and rules and regulations, the Contractor shall promptly notify the Architect and Owner in writing for clarification by the Architect. If the Contractor performs Work knowing it to be contrary to any applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the 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 superintendent fluent in the English language and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the

Contractor. Important communications by the superintendent shall be confirmed in writing. Other communications by the superintendent shall be similarly confirmed on written request in each case. Failure of the superintendent to 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.~~ If the Owner has any objection to the proposed superintendent, the Owner shall notify the Contractor in writing within seven (7) days of its objection, and the Contractor shall propose a replacement.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's ~~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 the Project and must be at the Project site at all times that Work is being performed at the site, whether the Work is performed by the Contractor's own forces or by any subcontractors. The superintendent must be at theProject site from the first day of on-site activities until a minimum of thirty (30) days after the date of Substantial Completion until all punch list items have been completed. Failure by the Contractor to provide full-time on-site supervision shall constitute grounds for termination of the Contract Documents by the Owner with seven days written notice.

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§ 3.10.1 The Contractor, promptly after being awarded the ~~Contract,~~ Project, 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 itsConstruction Schedule for the Work of the Contractor. Such Construction Schedule shall not exceed the completion dates, delivery dates or time limits required in the Contract Documents. The Construction Schedule shall be revised by the Contractor at appropriate intervals as required by the conditions of the Work and Project, ~~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.~~and shall provide for expeditious execution of the Work and shall be submitted to the Owner and Architect for review and approval.

§ 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 approved Construction Schedule and allows the Architect reasonable time, as indicated in the Contract Documents, to review submittals. Neither the Contractor's preparation of the Submittal Schedule nor the Architect's receipt or review shall modify the Contractor's responsibility to make required submittals or to do so in a timely manner to provide for review in accordance with Section 4.2.7 as modified herein.

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

§ 3.10.4 At the time of each Application for Payment, the Contractor shall provide to the Owner and the Architect an update on the Project schedule and a written status report, which includes a description of the progress of the Work and

if progress is behind schedule, the Contractor's plan to recover the Work to meet the approved Construction Schedule. The report shall also include a summary of the Contractor's meetings with subcontractors.

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

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

§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

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

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

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

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

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

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

§ 3.11.2.1 From the record drawings 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~~ When professional certification or performance criteria of materials, systems or equipment is required by the Contract Documents, the Contractor shall provide the person or party providing the certification with full information of the relevant performance requirements and on the conditions under which the materials, systems, or equipment will be expected to operate at the Project site. The certification shall be based on performance under the operating conditions at the Project site. The Architect shall be entitled to rely ~~upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor 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 Sork.

§ 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 as required by the Contract Documents and in compliance with all applicable laws, rules regulations and codes.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and 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 by or alleged to be caused by an act or omission of Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts ~~they may be liable, regardless of whether or not such claim, damage, loss or expense~~ any of them may be liable in the performance of the Agreement, regardless of whether or not it is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or ~~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 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.

§ 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 agrees to indemnify, defend, save and hold harmless the following indemnitees: The Architect and The Districttheir respective 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 Agreement, as a result of any act or omission of either the Contractor or any Subcontractor, or any of their employees or agents. The Contractor and its Subcontractor shall name the District, the Architect and their respective board members, officers, directors, agents and employees, individually and collectively, as additional insureds on their commercial general liability, automobile liability and excess/umbrella coverage which insurance shall be primary coverage as respects the additional insureds.. The Contractor and Subcontractor/s shall furnish Owner with copies of such policies prior to beginning any Work.

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

§ 3.18.4 In the event that the Contractor or its Subcontractors are requested but refuse to honor the indemnity obligations hereunder or to provide a defense, then the party indemnifying shall, in addition to all other obligations, pay the cost of bringing any such action, including attorneys' fees, time expended by the party being indemnified and

their employees in the defense of any litigation covered by this indemnity provision at their usual rates, including costs and expenses, to the party requesting indemnity.

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

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

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

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

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

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

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

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

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

§ 4.2 ADMINISTRATION OF THE CONTRACT

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

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

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Any Work rejected by the Architect shall be reported promptly to the Owner in writing. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.5.2 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 shall make submittals to the Architect in a manner to allow for the Architect's reasonable prompt review and to allow for timely ordering of components of the Work to affect ~~no delay in the Work.~~

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may 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. The Owner's acceptance shall not be unreasonably withheld. Additionally, the Architect shall review all warranties and related documents and provide a recommendation to the Owner as to whether the warranties comply with the Contract Documents.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The 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 award of the Project, not later than twenty-one (21) days after Notice of Award of the Project, the Contractor shall furnish to the Owner through the Architect the names of persons or entities proposed as manufacturers for each of the products identified in the General Requirements and, where applicable, the name of the installing Subcontractor.

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

§ 5.2.3 If the Owner or Architect has ~~reasonable~~ objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no ~~reasonable objection. 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 Project to the Contractor, any savings on changes to subcontract 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 subcontract to less than the quoted price of the subcontractor upon which the Contractor's fixed bid price or Contract Sum was based. Further, if a manufacturer or supplier of any machinery or equipment, including, but not limited to, heating and air conditioning units or systems, changes specifications or offers incentives, discounts or lower prices after award of the Contract to the Contractor, those savings will inure to the benefit of the Owner and not the Contractor, subcontractor, manufacturer or supplier.

§ 5.3 SUBCONTRACTUAL RELATIONS

By appropriate ~~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 its Subcontractors and shall carry insurance which covers the Contractor for liability arising from its Subcontractors and shall ensure that its Subcontractors are carrying insurance to protect the Subcontractors as well as the Owner, Architect and Architect's consultants .

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

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

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

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor 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 schedule showing the original schedule and impact of the proposed change justifying the requested extension of time. The Owner may at its option refuse the extension of time and have the Contractor perform the Work within the original schedule provided all reasonable costs for completing the Work including overtime and acceleration costs are included in the Change Order.

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

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

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

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

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

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

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

.5 Costs to which overhead, profit, and general conditions is to be applied shall be determined in accordance with Sub-Sections 7.3.7.1 through 7.3.7.5.

.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 of the Work by $10,000 or more, or the time of completion by 30 days or more, will require written documentation by the Owner that the changes:

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

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

.3 are in the best interest of the 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 additive Change Orders.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

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

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

§ 7.4 MINOR CHANGES IN THE WORK

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

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, 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 its application for payment as outlined in Section 9.3 on the first of the month, and the Owner will make payment in accordance with the Local Government Prompt Payment Act upon Applications properly certified by the Architect. . Each partial payment request shall be made monthly and Contractor shall request payment of ninety percent (90%) of the portion of the Contract Sum properly allocable to labor, materials and equipment incorporated in the work less the aggregate of previous payments in each case. 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 Contract Documents 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 and compliance with the Illinois Mechanic's Lien law. Each payment request shall include executed waivers of lien in conformity with information set forth on a properly completed Contractor's Affidavit. 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 Date for each Phase of the Work. This responsibility includes all work of the Contractor and that of its Subcontractors and suppliers. The Contractor acknowledges that the Owner will suffer significant financial loss, and there will be disruption to the School District Community, 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 School District Community would not be susceptible to precise calculation. To protect the Owner against said loss and disruption to the School District community and not as a penalty, the Owner and the Contractor hereby agree that the Contractor and the Contractor's Surety, if any, shall be liable for and shall pay to the Owner, Liquidated Damages of Five Hundred Dollars ($500) for each calendar day of delay per each School Campus, per Phase in Substantial Completion. Substantial Completion for the Project refers to all scheduled work being a minimum 99% complete.

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

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. The 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 Contract 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, state and local 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 an 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,~~ Coverages 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. Commercial General Liability Insurance
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. Personal Injury:
$1,000,000 Aggregate
d Products and Completed Operations to be maintained for two year after final payment:
$1,000,000 Aggregate
e. Property Damage Liability Insurance shall provide X, C and U coverages.
f. Broad Form Property Damage Coverage shall include Completed Operations.

4. 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.~~operations and as further set forth in this Agreement.

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

§ 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.

§ 11.3 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.

§ 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 Replacement 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 loses 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 Illinois 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 Performance Bond agreeing to pay not less than the prevailing wage for work to be performed in accordance with the Contract and the laws of the State of Illinois, and agreeing to pay all sums of money due for labor, materials, apparatus, fixtures or machinery and transportation with respect thereto, as in said Payment Bond provided, each dated the same day as the Agreement, in the forms prescribed by the Owner and each in an amount equal to the Contract Sum with a corporate Surety or Sureties acceptable to the Owner authorized to do business in the State of Illinois. These Bonds shall be maintained by the Contractor and shall remain in full force and effect until final acceptance of the work by the Owner or sixty (60) days following the date of Final Payment, whichever occurs later. The Contractor shall agree and shall cause the Surety to agree to be bound by each and every provision of the Contract Documents.

§ 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.

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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 Illinois.

§ 13.2 SUCCESSORS AND ASSIGNS

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make 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 of supplement thereto in effect on the date of the Instruments of Service, except as limited to type, class or grade, or modified in such reference by a given date. The standards related to, except as modified in the Specifications, shall have full force and effect as though printed in the Specifications.

§ 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.

§ 13.8 REGULATIONS

§ 13.8.1 The Contractor and/or Subcontractor warrant/s that it is familiar with and it shall comply with Federal, State and local laws, statutes, ordinances, rules and regulations, 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 Agreement. 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 shall comply with the non-discrimination federal, state and local laws, including without limitation:

§ 13.8.2.1 Equal Employment Opportunities Act, American with Disabilities Act and Human Rights Act. The Contractor acknowledges that this Contract is subject to and governed by the rules and regulations of the Illinois Human Rights Act (the "Human Rights Act"), including the mandatory provisions that each contractor have in place written sexual harassment policies that shall include, at minimum, the following information: (i) the illegality of sexual harassment; (ii) the definition of sexual harassment under state law; (iii) a description of sexual harassment, utilizing examples; (iv) the vendor's internal complaint process including penalties; (v) the legal recourse, investigation and complaint process available through the Department and the Commission; and (vii) protection against retaliation as provided by Section 6-101 of said Act and that it has a written sexual harassment policy in place in full compliance with Section 105(A)(4) of the Human Rights Act, 775 ILCS 5/2-105(A)(4). The Contractor agrees to fully comply with the requirements of the Illinois Human Rights Act, 775 ILCS 5/1-101 et seq., including but not limited to, the provision of sexual harassment policies and procedures pursuant to Section 2-105 of the Act. The Contractor further agrees to comply with all federal Equal Employment Opportunity Laws, including, but not limited

to, the Americans with Disabilities Act, 42 U.S.C. Section 12101 et seq., and rules and regulations promulgated thereunder. The provisions of Section 14.2 are included in this Amendment pursuant to the requirements of the regulations of the Illinois Department of Human Rights, Title 44, Part 750, of the Illinois Administrative Code, and Contractor shall be required to comply with these provisions only if and to the extent they are applicable under the law.

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

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

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

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

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

§ 13.8.2.2.5 That it will include verbatim or by reference the provisions of this clause in every subcontract it awards under which any portion of the Contract obligations are undertaken or assumed, so that such provisions will be binding upon such subcontractor. In the same manner as with other provisions of this Contract, the Contractor will be liable for compliance with applicable provisions of this clause by such subcontractors; and further it will promptly notify the contracting agency and the Department in the event any subcontractor fails or refuses to comply therewith. In addition, the Contractor will not utilize any subcontractor declared by the Illinois Human Rights Commission to be ineligible for Contractors or subcontracts with the State of Illinois or any of its political subdivisions or municipal corporation.

§ 13.8.3 Illinois Department of Labor Requirements and Prevailing Wage Act.

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

§ 13.8.3.2 To the extent that there are any violations of the Prevailing Wage Act and any demands are made upon the Owner, Contractor or Architect by the Illinois Department of Labor or by any employee of the Contractor or a Subcontractor performing work on the project, the Contractor or the particular Subcontractor and Contractor shall be responsible for indemnifying and holding the Owner, Contractor and Architect free and harmless from all costs incurred, directly or indirectly, by the Owner, Contractor or Architect in responding to and complying with demands made by the Department of Labor, or an aggrieved employee and such amounts may be withheld from the payments to

be made on the project. It is the intention that the Owner, Contractor and Architect shall suffer no time loss or other additional expenses in complying with any inquiry made with regard to this Act.

~~§ 13.7 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.~~

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

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

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

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

§ 13.8.5Public Construction Contract Act. Contractor agrees to comply with and that this Agreement is subject to and governed by the Illinois Construction Contract Act (30 ILCS 557/1).

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

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

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

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

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

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

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

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

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

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

§ 13.8.15 No Smoking. In accordance with the state (105 ILCS 5/10-20.5b) and federal law and Board of Education Policy, smoking is prohibited on all School District 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 Illinois 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 105 ILCS 5/10-21.9; that said persons are not listed on said Registry; and said persons have no criminal convictions for the offenses listed under 105 ILCS 5/10-21.9;

(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 105 ILCS 5/10-21.9.

In the event the Contractor fails to comply with the provisions of this paragraph and 105 ILCS 5/10-21.9, 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.~~the 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.

SECTION 00820

PREVAILING WAGE REQUIREMENTS

PART 1 – GENERAL

1.1 REQUIREMENTS

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

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

1.2 ACT AND ORDINANCES

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

1. A copy of Illinois Department of Labor Prevailing Wages for Cook County effective – July 2015 is included herein.
2. Refer to the Illinois Department of Labor’s web site for changes in the “prevailing rate of wage” throughout the duration of the project. All Contractors and Subcontractors rendering services under this contract must comply with all the requirements of the Illinois Prevailing Wage Act, including, but not limited to, all wage notice and recordkeeping duties.

END OF SECTION

Cook County Prevailing Wage for July 2015

(See explanation of column headings at bottom of wages)

Trade Name	RG	TYP	C	Base	FRMAN	M-F>8	OSA	OSH	H/W	Pensn	Vac	Trng
ASBESTOS ABT-GEN		ALL		39.400	39.950	1.5	1.5	2.0	13.98	11.28	0.000	0.500
ASBESTOS ABT-MEC		BLD		36.340	38.840	1.5	1.5	2.0	11.47	10.96	0.000	0.720
BOILERMAKER		BLD		47.070	51.300	2.0	2.0	2.0	6.970	18.13	0.000	0.400
BRICK MASON		BLD		43.780	48.160	1.5	1.5	2.0	10.05	14.43	0.000	1.030
CARPENTER		ALL		44.350	46.350	1.5	1.5	2.0	11.79	16.39	0.000	0.630
CEMENT MASON		ALL		43.750	45.750	2.0	1.5	2.0	13.05	14.45	0.000	0.480
CERAMIC TILE FNSHER		BLD		36.810	0.000	1.5	1.5	2.0	10.55	9.230	0.000	0.770
COMM. ELECT.		BLD		40.000	42.800	1.5	1.5	2.0	8.670	12.57	1.100	0.750
ELECTRIC PWR EQMT OP		ALL		46.100	51.100	1.5	1.5	2.0	10.76	14.87	0.000	0.460
ELECTRIC PWR GRNDMAN		ALL		37.050	52.500	1.5	2.0	2.0	8.630	12.28	0.000	0.370
ELECTRIC PWR LINEMAN		ALL		47.500	52.500	1.5	2.0	1.5	11.06	15.75	0.000	0.480
ELECTRICIAN		ALL		45.000	48.000	1.5	1.5	2.0	13.83	15.27	0.000	1.000
ELEVATOR CONSTRUCTOR		BLD		50.800	57.150	2.0	2.0	2.0	13.57	14.21	4.060	0.600
FENCE ERECTOR		ALL		37.340	39.340	1.5	1.5	2.0	13.05	12.06	0.000	0.300
GLAZIER		BLD		40.500	42.000	1.5	2.0	2.0	13.14	16.99	0.000	0.940
HT/FROST INSULATOR		BLD		48.450	50.950	1.5	1.5	2.0	11.47	12.16	0.000	0.720
IRON WORKER		ALL		44.200	46.200	2.0	2.0	2.0	13.65	21.14	0.000	0.350
LABORER		ALL		39.200	39.950	1.5	1.5	2.0	13.98	10.72	0.000	0.500
LATHER		ALL		44.350	46.350	1.5	1.5	2.0	13.29	16.39	0.000	0.630
MACHINIST		BLD		45.350	47.850	1.5	1.5	2.0	7.260	8.950	1.850	0.000
MARBLE FINISHERS		ALL		32.400	34.320	1.5	1.5	2.0	10.05	13.75	0.000	0.620
MARBLE MASON		BLD		43.030	47.330	1.5	1.5	2.0	10.05	14.10	0.000	0.780
MATERIAL TESTER I		ALL		29.200	0.000	1.5	1.5	2.0	13.98	10.72	0.000	0.500
MATERIALS TESTER II		ALL		34.200	0.000	1.5	1.5	2.0	13.98	10.72	0.000	0.000
MILLWRIGHT		ALL		44.350	46.350	1.5	1.5	2.0	13.29	16.39	0.000	0.630
OPERATING ENGINEER		BLD	1	48.100	52.100	2.0	2.0	2.0	17.55	12.65	1.900	1.250
OPERATING ENGINEER		BLD	2	46.800	52.100	2.0	2.0	2.0	17.55	12.65	1.900	1.250
OPERATING ENGINEER		BLD	3	44.250	52.100	2.0	2.0	2.0	17.55	12.65	1.900	1.250
OPERATING ENGINEER		BLD	4	42.500	52.100	2.0	2.0	2.0	17.55	12.65	1.900	1.250
OPERATING ENGINEER		BLD	5	51.850	52.100	2.0	2.0	2.0	17.55	12.65	1.900	1.250
OPERATING ENGINEER		BLD	6	49.100	52.100	2.0	2.0	2.0	17.55	12.65	1.900	1.250
OPERATING ENGINEER		BLD	7	51.100	52.100	2.0	2.0	2.0	17.55	12.65	1.900	1.250
OPERATING ENGINEER		FLT	1	53.600	53.600	1.5	1.5	2.0	17.10	11.80	1.900	1.250
OPERATING ENGINEER		FLT	2	52.100	53.600	1.5	1.5	2.0	17.10	11.05	1.900	1.250
OPERATING ENGINEER		FLT	3	46.400	53.600	1.5	1.5	2.0	17.10	11.80	1.900	1.250
OPERATING ENGINEER		FLT	4	38.550	53.600	1.5	1.5	2.0	17.10	11.80	1.900	1.250
OPERATING ENGINEER		FLT	5	55.100	53.600	1.5	1.5	2.0	17.10	11.80	1.900	1.250
OPERATING ENGINEER		FLT	6	35.000	35.000	1.5	1.5	2.0	16.60	11.05	1.900	1.250
OPERATING ENGINEER		HWY	1	46.300	50.300	1.5	1.5	2.0	17.55	12.65	1.900	1.250
OPERATING ENGINEER		HWY	2	45.750	50.300	1.5	1.5	2.0	17.55	12.65	1.900	1.250
OPERATING ENGINEER		HWY	3	43.700	50.300	1.5	1.5	2.0	17.55	12.65	1.900	1.250
OPERATING ENGINEER		HWY	4	42.300	50.300	1.5	1.5	2.0	17.55	12.65	1.900	1.250
OPERATING ENGINEER		HWY	5	41.100	50.300	1.5	1.5	2.0	17.55	12.65	1.900	1.250
OPERATING ENGINEER		HWY	6	49.300	50.300	1.5	1.5	2.0	17.55	12.65	1.900	1.250
OPERATING ENGINEER		HWY	7	47.300	50.300	1.5	1.5	2.0	17.55	12.65	1.900	1.250
ORNAMNTL IRON WORKER		ALL		45.000	47.500	0.0	0.0	0.0	0.000	0.000	0.000	0.650
PAINTER		ALL		41.750	46.500	1.5	1.5	1.5	11.50	11.10	0.000	0.770
PAINTER SIGNS		BLD		33.920	38.090	1.5	1.5	1.5	2.600	2.710	0.000	0.000
PILEDRIVER		ALL		44.350	46.350	1.5	1.5	2.0	13.29	16.39	0.000	0.630
PIPEFITTER		BLD		46.000	49.000	1.5	1.5	2.0	9.000	15.85	0.000	1.780
PLASTERER		BLD		43.430	46.040	1.5	1.5	2.0	13.05	14.43	0.000	1.020
PLUMBER		BLD		46.650	48.650	1.5	1.5	2.0	13.18	11.46	0.000	0.880
ROOFER		BLD		41.000	44.000	1.5	1.5	2.0	8.280	10.54	0.000	0.530
SHEETMETAL WORKER		BLD		42.230	45.610	1.5	1.5	2.0	10.53	20.68	0.000	0.720
SIGN HANGER		BLD		31.310	33.810	1.5	1.5	2.0	4.850	3.280	0.000	0.000
SPRINKLER FITTER		BLD		49.200	51.200	1.5	1.5	2.0	11.75	9.650	0.000	0.550

STEEL ERECTOR		ALL		42.070	44.070	2.0	2.0	2.0	13.45	19.59	0.000	0.350
STONE MASON		BLD		43.780	48.160	1.5	1.5	2.0	10.05	14.43	0.000	1.030
SURVEY WORKER		ALL		37.000	37.750	1.5	1.5	2.0	12.97	9.930	0.000	0.500
TERRAZZO FINISHER		BLD		38.040	0.000	1.5	1.5	2.0	10.55	11.22	0.000	0.720
TERRAZZO MASON		BLD		41.880	44.880	1.5	1.5	2.0	10.55	12.51	0.000	0.940
TILE MASON		BLD		43.840	47.840	1.5	1.5	2.0	10.55	11.40	0.000	0.990
TRAFFIC SAFETY WRKR		HWY		32.750	34.350	1.5	1.5	2.0	6.550	6.450	0.000	0.500
TRUCK DRIVER	E	ALL	1	35.480	35.680	1.5	1.5	2.0	8.350	10.50	0.000	0.150
TRUCK DRIVER	E	ALL	2	34.100	34.500	1.5	1.5	2.0	8.150	8.500	0.000	0.150
TRUCK DRIVER	E	ALL	3	34.300	34.500	1.5	1.5	2.0	8.150	8.500	0.000	0.150
TRUCK DRIVER	E	ALL	4	34.500	34.500	1.5	1.5	2.0	8.150	8.500	0.000	0.150
TRUCK DRIVER	W	ALL	1	35.600	35.800	1.5	1.5	1.5	8.250	9.140	0.000	0.150
TRUCK DRIVER	W	ALL	2	32.700	33.100	1.5	1.5	2.0	6.500	4.350	0.000	0.000
TRUCK DRIVER	W	ALL	3	32.900	33.100	1.5	1.5	2.0	6.500	4.350	0.000	0.000
TRUCK DRIVER	W	ALL	4	33.100	33.100	1.5	1.5	2.0	6.500	4.350	0.000	0.000
TUCKPOINTER		BLD		43.800	44.800	1.5	1.5	2.0	8.280	13.49	0.000	0.670

Legend: RG (Region)
TYP (Trade Type - All,Highway,Building,Floating,Oil & Chip,Rivers)
C (Class)
Base (Base Wage Rate)
FRMAN (Foreman Rate)
M-F>8 (OT required for any hour greater than 8 worked each day, Mon through Fri.
OSA (Overtime (OT) is required for every hour worked on Saturday)
OSH (Overtime is required for every hour worked on Sunday and Holidays)
H/W (Health & Welfare Insurance)
Pensn (Pension)
Vac (Vacation)
Trng (Training)

Explanations

COOK COUNTY

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

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

EXPLANATION OF CLASSES

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

CERAMIC TILE FINISHER

The grouting, cleaning, and polishing of all classes of tile, whether for interior or exterior purposes, all burned, glazed or unglazed products; all composition materials, granite tiles, warning detectable tiles, cement tiles, epoxy composite materials, pavers, glass, mosaics, fiberglass, and all substitute materials, for tile made in tile-like units; all mixtures in tile like form of cement, metals, and other materials that are for and intended for use as a finished floor surface, stair treads, promenade roofs, walks, walls, ceilings, swimming pools, and all other places where tile is to form a finished interior or exterior. The mixing of all setting mortars including but not limited to

thin-set mortars, epoxies, wall mud, and any other sand and cement mixtures or adhesives when used in the preparation, installation, repair, or maintenance of tile and/or similar materials. The handling and unloading of all sand, cement, lime, tile, fixtures, equipment, adhesives, or any other materials to be used in the preparation, installation, repair, or maintenance of tile and/or similar materials. Ceramic Tile Finishers shall fill all joints and voids regardless of method on all tile work, particularly and especially after installation of said tile work. Application of any and all protective coverings to all types of tile installations including, but not be limited to, all soap compounds, paper products, tapes, and all polyethylene coverings, plywood, masonite, cardboard, and any new type of products that may be used to protect tile installations, Blastrac equipment, and all floor scarifying equipment used in preparing floors to receive tile. The clean up and removal of all waste and materials. All demolition of existing tile floors and walls to be re-tiled.

COMMUNICATIONS ELECTRICIAN

Installation, operation, inspection, maintenance, repair and service of radio, television, recording, voice sound vision production and reproduction, telephone and telephone interconnect, facsimile, data apparatus, coaxial, fibre optic and wireless equipment, appliances and systems used for the transmission and reception of signals of any nature, business, domestic, commercial, education, entertainment, and residential purposes, including but not limited to, communication and telephone, electronic and sound equipment, fibre optic and data communication systems, and the performance of any task directly related to such installation or service whether at new or existing sites, such tasks to include the placing of wire and cable and electrical power conduit or other raceway work within the equipment room and pulling wire and/or cable through conduit and the installation of any incidental conduit, such that the employees covered hereby can complete any job in full.

MARBLE FINISHER

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

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

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

OPERATING ENGINEER - BUILDING

Class 1. Asphalt Plant; Asphalt Spreader; Autograde; Backhoes with Caisson Attachment; Batch Plant; Benoto (requires Two Engineers); Boiler and Throttle Valve; Caisson Rigs; Central Redi-Mix Plant; Combination Back Hoe Front End-loader Machine; Compressor and Throttle Valve; Concrete Breaker (Truck Mounted); Concrete Conveyor; Concrete Conveyor

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

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

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

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

Class 5. Assistant Craft Foreman.

Class 6. Gradall.

Class 7. Mechanics; Welders.

OPERATING ENGINEERS - HIGHWAY CONSTRUCTION

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

Class 2. Batch Plant; Bituminous Mixer; Boiler and Throttle Valve; Bulldozers; Car Loader Trailing Conveyors; Combination Backhoe Front Endloader Machine (Less than 1 cu. yd.

Backhoe Bucket or over or with attachments); Compressor and Throttle Valve; Compressor, Common Receiver (3); Concrete Breaker or Hydro Hammer; Concrete Grinding Machine; Concrete Mixer or Paver 7S Series to and including 27 cu. ft.; Concrete Spreader; Concrete Curing Machine, Burlap Machine, Belting Machine and Sealing Machine; Concrete Wheel Saw; Conveyor Muck Cars (Haglund or Similar Type); Drills, All; Finishing Machine - Concrete; Highlift Shovels or Front Endloader; Hoist - Sewer Dragging Machine; Hydraulic Boom Trucks (All Attachments); Hydro-Blaster; Hydro Excavating (excluding hose work); Laser Screed; All Locomotives, Dinky; Off-Road Hauling Units (including articulating) Non Self-Loading Ejection Dump; Pump Cretes: Squeeze Cretes - Screw Type Pumps, Gypsum Bulker and Pump; Roller, Asphalt; Rotary Snow Plows; Rototiller, Seaman, etc., self-propelled; Self-Propelled Compactor; Spreader - Chip - Stone, etc.; Scraper - Single/Twin Engine/Push and Pull; Scraper - Prime Mover in Tandem (Regardless of Size); Tractors pulling attachments, Sheeps Foot, Disc, Compactor, etc.; Tug Boats.

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

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

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

Class 6. Field Mechanics and Field Welders

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

OPERATING ENGINEER - FLOATING

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

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

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

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

Class 5. Friction or Lattice Boom Cranes.

Class 6. ROV Pilot, ROV Tender

SURVEY WORKER - Operated survey equipment including data collectors, G.P.S. and robotic instruments, as well as conventional levels and transits.

TERRAZZO FINISHER

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

TRAFFIC SAFETY

Work associated with barricades, horses and drums used to reduce lane usage on highway work, the installation and removal of temporary lane markings, and the installation and removal of temporary road signs.

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

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

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

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

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

Other Classifications of Work:

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

LANDSCAPING

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

MATERIAL TESTER & MATERIAL TESTER/INSPECTOR I AND II

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

SECTION 01100

SUMMARY

PART 1 – GENERAL

1.1 PROJECT

A. Project Name: New District Storage Building.
B. Owner's Name: Board of Education, Alsip, Hazelgreen and Oak Lawn Elementary School District 126.
C. The Project consists of the construction of a new storage facility, constructed using a pre-fabricated steel building and structure, partial height exterior masonry block wall around the perimeter of the building, concrete slab and foundations, and all related items.

1.2 CONTRACT DESCRIPTION

A. Work covered by Contract Documents: Refer to Article 1.1, Part C. above.
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 per occurrence deductible.
D. Contracts
   1. The Owner will award a single construction contract for all work specified in the Contract Documents.
   2. Upon award of the construction contract, the owner will issue a Letter of Intent to award a Construction Contract to the approved contractor. This Letter of Intent shall serve as a notice to proceed with the project according to the terms and conditions set forth in the Contract Documents, until the work under Contract Documents is completed. . The contractor shall commence all construction services as specified in the contract documents upon receipt of the Letter of Intent.

1.3 DUTIES OF CONTRACTOR

A. The contractor shall be responsible for providing and paying for:
   1. Labor, materials and equipment.
   2. Tools, construction equipment and machinery.
   3. Temporary water, heat and other utilities required for construction.
   4. Other facilities and services necessary for proper execution and completion of work.
B. The contractor shall be responsible for paying and securing all permits, governmental fees and licenses other than primary building permit necessary for the proper execution and completion of the Project.
C. The contractor shall comply with all codes, ordinances, rules, regulations, orders and other legal requirements of the public authorities which govern the performance of the work under the Contract Documents.
D. The contractor shall coordinate and have completed all inspections required by public authorities relating to the performance of the work under the Contract Documents including, but not limited to:
   1. Illinois Department of Public Health (IDPH) for all rough-in and final inspections of plumbing and food service work, as required.
   2. All inspections required in Section 01400 to be performed by a Testing and Inspection Agency.

E. The contactor shall have duty to promptly submit written notice to the Architect of any known or observed variances of the Contract Documents from legal requirements that may govern the work. Upon notice to the Architect, appropriate modifications will be made to the Contract Documents to account for the legal requirements. In the event the contractor fails to provide notice of any variances, he shall assume responsibility for any work known to be contrary to those legal requirements.
   1. The contractor shall enforce strict discipline and maintain good order among employees and subcontractors. Contractor shall not employ unfit person of those not skilled in the assigned task
F. The contractor acknowledges that the Project is exempt from all State and Local use taxes. It shall be the duty of the contractor to: 1) obtain a sales tax exemption certificate number from the Owner; 2) place exemption certificate number on invoices for materials incorporated in work; 3) furnish copies of invoices to Owner upon request 4) file a notarized statement that all purchases made under exemption certificate were entitled to be exempt with Owner upon completion of work; and 5) pay any penalties assessed for the improper use of exemption certificate number.

1.4 OWNER OCCUPANCY

A. The date of Substantial Completion shall be no later than November 30, 2016, 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 December 15, 2016, 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. No time restrictions will be implemented. However, at any time, the Owner may choose to restrict work hours if the Owner/District feels the contractor is causing disruption to the learning environment, etc.

1.6 WORK LIMITATIONS

A. All spaces around where work will be done may be occupied by Owner's personnel. Contractor shall limit the scope of its work during times of owner occupancy to prevent disturbing Owner.
B. Contractor shall schedule work in such a manner as to not disrupt mechanical or electrical systems for the existing adjacent buildings during times of Owner occupancy.
C. Contractor shall give Owner a minimum of three (3) days' notice before commencing work in Owner occupied area.

1.7 CONTRACTOR USE OF SITE AND PREMISES

A. Contractor shall confine work at the Project site as permitted by: 1) Law; 2) Permits; 3) the Contract Documents; 4) As instructed by Owner or Owner's representative; and 5) As required for Owner's use of adjacent facilities.
B. Confer with Owner's representative and obtain full knowledge of all Project site rules and

regulations affecting work.

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

1.8 SUBSTANCE ABUSE PREVENTION POLICY

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

1.9 WORK SEQUENCE

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

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 01270 - Unit Prices: Monetary values of unit prices, payment and modification procedures relating to unit prices.
C. 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.
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 retaintage 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 number and date, and line item by number and description.

1.5 CERTIFIED PAYROLL FOR PUBLIC WORKS PROJECTS

A. Effective August 10, 2005 the Public Act 94-0515 amended the Prevailing Wage Act., all contractors and their subcontractors who are engaged in public works projects must provide a certified monthly payroll report either in person, by mail or electrically for the Owner's records.

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

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

D. The Contractor and each subcontractor shall submit monthly, in person, by mail, or electronically a certified payroll to the District. The certified payroll shall consist of a complete copy of the records. The certified payroll shall be accompanied by a statement signed by the contractor or subcontractor which avers that:
   1. such records are true and accurate;
   2. the hourly rate paid to each worker is not less than the general prevailing rate of hourly wages required; and
   3. the contractor or subcontractor is aware that filing a certified payroll that he or she knows to be false is a class B misdemeanor.

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

1.6 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 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.

1.7 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.

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

SECTION 01210

ALLOWANCES

1.7 INSPECTION AND TESTING ALLOWANCES

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

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

PART 2 – PRODUCTS – NOT USED

PART 3 – EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

3.3 SCHEDULE OF ALLOWANCES

A. Allowance No. 1: Cash Allowance: Include a cash allowance of $4,000.00 for use according to Owner's instructions.

B. Allowance No. 2: Testing and Inspection Allowance: Include the sum of $2,500.00 for payment of inspecting and testing services specified in Section 01400.

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 30 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: Fire Protection Sprinkler System

State the amount to be DEDUCTED from the lump sum base bid if the Fire Protection Sprinkler system is omitted from the project scope of work.

PART 2 – PRODUCTS – NOT USED

PART 3 – EXECUTION – NOT USED

END OF SECTION

SECTION 01270

UNIT PRICES

PART 1 – GENERAL

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

1.2 RELATED SECTIONS
A. Unit prices listed on Bid Form

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

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

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

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

SECTION 01270

UNIT PRICES

1.7 PAYMENT

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

B. Payment will not be made for any of the following:
   1. Products wasted or disposed of in a manner that is not acceptable.
   2. Products determined as unacceptable before or after placement.
   3. Products not completely unloaded from the transporting vehicle.
   4. Products placed beyond the lines and levels of the required Work.
   5. Products remaining on hand after completion of the Work.
   6. Loading, hauling, and disposing of rejected Products.

1.8 DEFECT ASSESSMENT

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

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

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

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

1.9 SCHEDULE OF UNIT PRICES

A. Contractor shall include unit prices in Bid Form for specified item.

B. Unit Price No. 1:
   1. Division 7-Installation of roof system skylight; Per (1) Skylight Unit.
      a. Base bid does not include any skylights being installed. The District may choose to elect to have up to (12) skylights installed in the roof system. If the District chooses to install any skylight units, the base bid price will be modified using the project standard change order process.

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.

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.

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.

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 on the first day of each month and as follows:
   1. Site clearing.
   2. Excavations.
   3. Foundations.
   4. Structural framing.
   5. Enclosure of building.
   6. Final completion.
C. 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.

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 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
    2) Architect's consultant(s)
    3) Subcontractor
    4) Sub-subcontractor.
    5) Supplier.
    6) Manufacturer.
    7) Separate detailer when pertinent.
d. Identification of product or material.
e. Relation to adjacent structure or material.
f. Field dimensions, clearly identified as such.
g. Specification section and page number.
h. Specified standards, such as ASTM number or Federal Specification.
i. A blank space, 4" x 6" for Architect's stamp.
j. Identification of previously approved deviation(s) from Contract Documents.
k. Identification of color selections required and color selection charts.

7. All shop drawing submittals received by the Architect which do not bear the contractor's approval stamp and initials or signatures will be returned, without review, to the contractor, for resubmittal.
8. All shop drawing submittals which do not contain a reproducible transparency set of the submittal will be returned without review, to the contractor, for resubmittal.

M. Resubmission Requirements
1. Shop Drawings:
    a. Definition: Shop Drawings are original drawings prepared by Contractor, subcontractor, sub-subcontractor, supplier or distributor, which illustrates some portion of the work, showing fabrication, layout, setting or erection details.
    b. Revise initial drawings as directed and resubmit in accordance with submittal procedures.
    c. Indicate on drawings all changes which have been made in addition to those requested by Architect.
    d. Clearly indicate by revision number and date, each resubmittal of each shop drawing.
    e. When revised for resubmission, identify all changes made since previous submission.
    f. Shop drawings which incorporate, in part or in whole, direct reproductions of the contract documents, will NOT be accepted and will be returned without review.
2. Product data and samples: Submit new data and samples as specified for initial submittal.
3. Make all resubmittals within 10 business days after date of Architect's previous review.

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

O. Contractor Responsibilities
1. Review shop drawings, product data and samples prior to submission to the next level of authority.
2. Verify:
    a. Field dimensions and drawing dimensions.

b. Field construction criteria.
c. Catalog numbers and similar data.
d. Compliance of items submitted with Contract Documents.
e. Dimensions and elevations requirements necessary to properly install product.

3. Coordinate each submittal with requirements of:
   a. The Work.
   b. The Contract Documents.
   c. The work of other subcontractors.
4. Contractor's responsibility for errors and omissions in submittals is not relieved by Architect/Engineer's review of submittals.
5. Notify Architect in writing prior to submission and specifically on the submittal, of proposed deviations in submittals from contract requirements.
6. Contractor's responsibility for notifying Architect of deviations and for correcting deviations not properly identified in submittals is not relieved by Architect's review of improperly documented submittals.
7. Do not begin any work which requires submittals without having Architect's stamp and initials or signature indicating review.
8. After Architect's review, make response required by Architect's stamp and distribute copies. Indicate by transmittal that copy of approved data has been distributed.
9. Subcontractors:
   a. Subcontractors send their submittals to the Contractor.
   b. Contractor reviews and initials submittals for compliance with scope, coordination and integration with the work of all other subcontractors.
   c. Contractor transmits his reviewed copies of subcontractor's submittals to Architect.
   d. Contractor retains copy of submittals after review by Architect and distributes copies to submitting subcontractor and to other subcontractors for coordination and integration.
   e. Contractor: Enforce resubmission requirements.

P. Architect's Duties
1. Review submittals within 10 business days.
2. Review for compliance to design concept of project.
3. Review all requests for proposed deviations. Obtain Owner's concurrence and respond to Contractor's request.
4. Review of separate item does not constitute review of an assembly in which item functions.
5. Affix stamp, date, and initials or signature certifying to review of submittal, and with instructions for contractor response.
6. Return submittals to Contractor for response or distribution.
7. Select product colors upon receipt of all shop drawings and submittals requiring color selections.

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

END OF SECTION

SECTION 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.

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.

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. Testing and Inspection Agencies.
G. 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 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

1.5 TESTING AND INSPECTION AGENCIES

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

PART 2 – PRODUCTS – NOT USED

PART 3 – EXECUTION

3.1 CONTRACTOR CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
B. Comply with manufacturers' instructions, including each step in sequence.
C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
E. Have Work performed by persons qualified to produce required and specified quality.
F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

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

3.2 MOCK-UPS

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

3.3 TOLERANCES

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

3.4 TESTING AND INSPECTION

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

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

3.5 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.
B. Submit qualifications of observer to Architect 30 days in advance of required observations.
   1. Observer subject to approval of Architect.
   2. Observer subject to approval of Owner.
C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturer's written instructions.

3.6 DEFECT ASSESSMENT

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

END OF SECTION

SECTION 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

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 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.

4. Manufactured and fabricated products:
   a. Design, fabricate and assemble in accord with best engineering and shop practices.
   b. Manufacture like parts of duplicate units to standard sizes and gages, to be interchangeable.
   c. Two or more items of the same kind shall be identical from the same manufacturer.
   d. All parts of systems shall be from the same manufacturer to the greatest extent practicable.
   e. Adhere to equipment capacities, sizes and dimensions shown or specified unless variations are specifically approved by Change Order.

2.2 PRODUCT OPTIONS

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

2.3 SPARE PARTS AND MAINTENANCE PRODUCTS

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

PART 3 – EXECUTION

3.1 SUBSTITUTION PROCEDURES

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

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

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

I. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

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

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

3.2 OWNER-SUPPLIED PRODUCTS

A. See Section 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.

5. Arrange for manufacturer's warranties, inspections, and service.

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

3.3 TRANSPORTATION AND HANDLING

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

3.4 STORAGE AND PROTECTION

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

requirements of all subcontractors. Do not inhibit use of:

1. Fire exits.
2. Fire lanes.
3. Parking.
4. Work of other contractors.
5. Owner.

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

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

END OF SECTION

SECTION 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. Surveying for laying out the work.
E. Cleaning and protection.
F. Starting of systems and equipment.
G. Demonstration and instruction of Owner personnel.
H. Closeout procedures, except payment procedures.

1.2 RELATED SECTIONS

A. Section 01300 - Administrative Requirements: Submittals procedures.
B. Section 01400 - Quality Requirements: Testing and inspection procedures.
C. Section 01780 - Closeout Submittals: Project record documents, operation and maintenance data, warranties and bonds.
D. Section 07840 - Firestopping.
E. Section 15900 - 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.

3. Submittals specified for substitutions.

F. Submit written notice to Architect, designating time work will be uncovered, to provide for observation.

G. Payment for Costs:
   1. Costs caused by ill-timed or defective work, or work not conforming to Contract Documents, including costs for additional services of Architect - party responsible for ill timed, rejected or non-conforming work.
   2. Work done by change order, other than defective or non-conforming work - Owner.

1.4 GRADES, LINES AND LEVELS

A. Contractor lay out all of the work under this contract.
   1. Establish all working lines, levels, elevations and measurements.

B. Owner will furnish:
   1. A certified topographic survey of existing site, giving all grades and lines of streets, alleys, pavements and adjoining property, rights-of-way, encroachments, boundaries and contours of building site.
   2. Locations, dimensions and data pertaining to existing:
      a. Buildings.
      b. Underground obstructions.
      c. Trees and landscaping.
      d. Other improvements.
   3. Information as to available service and utility lines, both public and private.

C. Location of survey's baseline control points.
   1. Benchmark and temporary benchmark location and elevation of each.

D. Quality Assurance
   1. All layout work which establishes site layout dimensions or elevations or exterior building dimensions, angles or grade floor elevations shall be done by a qualified engineer or surveyor.
   2. Qualifications of Contractor's Engineer/Surveyor:
      a. Experienced in layout work of similar complexity.
      b. Licensed by State of Illinois.

E. Submittals. Architect may at any time require written verification of grades, lines and levels by a licensed surveyor as work progresses.

F. Laying Out The Work
   1. Prior to the beginning of the actual work, perform the following:
      a. Each subcontractor shall lay out their portion of the work.
      b. Establish all required bench marks and reference lines.
      c. Verify all building dimensions.
      d. Verify conformance of all actual general dimensions with those indicated on the Architect's plan.
      e. Notify the Architect immediately if any conflict whatsoever exists.

G. Survey Upon Completion
   1. Upon completion, Owner may provide a survey performed by a licensed surveyor indicating the location of the Work of this Contract and including the following data:
      a. Building location and dimensions of all walls.
      b. Elevations of finished floor at all exterior exits.
      c. Spot elevations, storm, sanitary and watermain manholes, and all invert elevations.
      d. Spot elevations of corners of all new pavement and on a 50' grid within paved areas.
   2. All areas found to be non-conforming to the Contract Documents shall be corrected by the responsible Contractor.

1.5 QUALIFICATIONS

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

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

1.6 PROJECT CONDITIONS

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

1.7 COORDINATION

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

PART 2 – PRODUCTS

2.1 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
B. Type and Quality of Existing Products: Determine by inspecting and testing products where

necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 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 LAYING OUT THE WORK

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

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

3.5 GENERAL INSTALLATION REQUIREMENTS

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

3.6 CUTTING AND PATCHING

A. Execute cutting and patching including excavation and fill to complete the work, to uncover work in order to install improperly sequenced work, to remove and replace defective or non-conforming work, to remove samples of installed work for testing when requested, to provide openings in the work for penetration of mechanical and electrical work, to execute patching to complement adjacent work, and to fit products together to integrate with other work.
B. Execute work by methods to avoid damage to other work, and which will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
C. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
D. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
E. Restore work with new products in accordance with requirements of Contract Documents.
F. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
G. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 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.

3.7 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

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

3.8 PROTECTION OF INSTALLED WORK

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

3.9 STARTING SYSTEMS

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

3.10 DEMONSTRATION AND INSTRUCTION

A. Demonstrate operation and maintenance of products to Owner's personnel two weeks prior to date of Substantial Completion.
B. Demonstrate start-up, operation, control, adjustment, 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 District Administrative Office.
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, adjusting and balancing will be part of the mechanical contract.
   2. The mechanical subcontractor will perform services specified in Division 15.
   3. Reports will be submitted by the Mechanical subcontractor to the Architect indicating observation and results of test and indicating compliance or non-compliance with the specified requirements and with the requirements of the Contract Documents.

3.11 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.
B. Testing, adjusting, and balancing HVAC systems: See Section 15990 and 01400.

3.12 FINAL CLEANING

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

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

3.13 CLOSEOUT PROCEDURES

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

3.14 MAINTENANCE SERVICE

A. Furnish service and maintenance of components indicated in specification sections for one year from date of Final Completion (date of issuance of the final payment to the Contractor).
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.

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 District to the general contractor, all warranties should include the verbiage “…for a period of (X)

year(s) after the date The District 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 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.
   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.
        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 03100

CONCRETE FORMS AND ACCESSORIES

PART 1 – GENERAL

1.1 SECTION INCLUDES
A. Formwork for cast-in place concrete, with shoring, bracing and anchorage.
B. Openings for other work.
C. Form accessories.
D. Form stripping.

1.2 RELATED DECTIONS
A. Division 3 - Concrete Reinforcement.
B. Division 3 - Cast-In-Place Concrete.
C. Section 04816 - Masonry Veneer: Spacing for veneer anchor reglets recessed in concrete.
D. Division 5 - Steel Deck.
E. Division 5 - Metal Fabrications: Supply of metal fabrications for placement by this section.

1.3 REFERENCES
A. Unless otherwise noted the most current issue of the reference shall be used.
B. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
C. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International.
D. ACI 318 - Building Code Requirements for Reinforced Concrete and Commentary; American Concrete Institute International.
E. ACI 347R - Guide to Formwork for Concrete; American Concrete Institute International.
F. ASME A17.1 - Safety Code for Elevators and Escalators; The American Society of Mechanical Engineers.
G. PS 1 - Construction and Industrial Plywood; National Institute of Standards and Technology (Department of Commerce).

1.4 DESIGN REQUIREMENTS
A. Design, engineer and construct formwork, shoring and bracing to conform to design and code requirements; resultant concrete to conform to required shape, line and dimension.

1.5 SUBMITTALS
A. See Section 01300 - Administrative Requirements for submittal procedures.
B. Product Data: Provide data on void form materials and installation requirements.
C. Shop Drawings: Indicate pertinent dimensions, materials, bracing, and arrangement of joints and ties.
D. Provide data on form liner installation and provide min. 6" x 6" sample.

1.6 QUALITY ASSURANCE
A. Perform work of this section in accordance with ACI 347R, ACI 301, and ACI 318. Maintain one copy of standards on project site.
B. Design formwork under direct supervision of a Professional Structural Engineer experienced in design of concrete formwork and licensed in the State in which the Project is located.

1.7 REGULATORY REQUIREMENTS
A. Conform to applicable code for design, fabrication, erection and removal of formwork.

1.8 DELIVERY, STORAGE, AND PROTECTION
A. Section 01600 - Product Requirements: Transport, handle, store and protect products.
B. Deliver void forms and installation instructions in manufacturer's packaging.
C. Store void forms off ground in ventilated and protected manner to prevent deterioration from moisture.

PART 2 – PRODUCTS

2.1 SECTION INCLUDES

A. Standard Structural Concrete Formwork is at the Contractor's discretion, but must meet minimum requirements specified below.

2.2 WOOD FORM MATERIALS

A. Typical Forms: Plyform, Class I, exterior minimum thickness 3/4" inch; in accordance with American Plywood Association Standards.
B. Keyways: 2 inch lumber.

2.3 PREFABRICATED FORMS

A. Manufacturers:
   1. American Polysteel Forms, Albuquerque, NM 87107
   2. Amico Stay-Form, Birmingham, IL 35208
   3. Molded Fiber Glass Concrete Forms Co., Union City, PA 16438.
   4. Sonoco Products Co., Hartsville, SC
   5. Symons Corp., Des Plaines, IL 60017
   6. Substitutions: See Section 01600 - Product requirements.
B. Preformed Steel Forms: Minimum 16 gage matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
C. Preformed Plastic Forms: Thermoplastic polystyrene form liner, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
D. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.
E. Pan Type: Steel, of size and profile indicated.
F. Void Forms: Moisture resistant treated paper faces, biodegradable, structurally sufficient to support weight of wet concrete mix until initial set.

2.4 FORMWORK ACCESSORIES

A. Form Ties: Removable or Snap-off type, galvanized metal, adjustable length, 1 inch back break dimension, free of defects that could leave holes larger than 1 inch in concrete surface; form ties designed to resist lateral pressure of fresh concrete on forms.
B. Form Release Agent: Colorless mineral oil that will not stain concrete, absorb moisture, impair natural bonding of concrete finish coatings, or affect color characteristics of concrete finish coatings.
C. Form Liners: Units of face designs, texture arrangement, and configuration indicated. Furnish with manufacturer's recommended liquid release agent that will not bond, stain or adversely affect concrete surfaces and will not impair subsequent surface treatments of concrete.
D. Rustication Strips: Metal, rigid plastic, or dressed wood with sides beveled and back kerfed; nonstaining.
E. Corners: Chamfered, wood strip or rigid plastic type; 3/4x 3/4 inch minimum size; maximum possible lengths.
F. Dovetail Anchor Slot: Galvanized steel, 22 gauge thick, foam filled, release tape sealed slots, anchors for securing to concrete formwork.
G. Flashing Reglets: Galvanized steel, 22 gauge thick, longest possible lengths, with alignment splines for joints, foam filled, release tape sealed slots, anchors for securing to concrete formwork.
H. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.
I. Waterstops: Polyvinyl chloride, minimum 1,750 psi tensile strength, minimum 50 degrees F to plus 175 degrees F working temperature range, 4 inch wide, maximum possible lengths, ribbed profile, preformed corner sections, heat welded jointing.

PART 3 – EXECUTION

3.1 EXAMINATION
A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.2 EARTH FORMS
A. Earth forms are not permitted.

3.3 ERECTION – FORMWORK
A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301, ACI 347 and ACI 318.
B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
D. Align joints and make watertight. Keep form joints to a minimum.
E. Obtain approval before framing openings in structural members that are not indicated on drawings.
F. Provide chamfer strips on external corners of beams, joists, and columns.
G. Install void forms in accordance with manufacturer's recommendations. Protect forms from moisture or crushing.
H. Coordinate this section with other sections of work that require attachment of components to formwork.
I. If formwork is placed after reinforcement, resulting in insufficient concrete cover over reinforcement, request instructions from Architect before proceeding.

3.4 APPLICATION – FORM RELEASE AGENT
A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.5 INSERTS, EMBEDDED PARTS, AND OPENINGS
A. Provide formed openings where required for items to be embedded in or passing through concrete work.
B. Locate and set in place items that will be cast directly into concrete.
C. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other work.
D. Position recessed anchor slots for brick veneer masonry anchors to spacing and intervals specified in Section 04816.
E. Install accessories in accordance with manufacturer's instructions, so they are straight, level, and plumb. Ensure items are not disturbed during concrete placement.
F. Install PVC waterstops in accordance with manufacturer's instructions, so they are continuous without displacing reinforcement. Heat seal joints so they are watertight.
G. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
H. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.6 FORM CLEANING
A. Clean forms as erection proceeds, to remove foreign matter within forms.

B. Clean formed cavities of debris prior to placing concrete.
   1. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
   2. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.7 FORMWORK TOLERANCES

A. Construct formwork to maintain tolerances required by ACI 117-90 and ACI 301. Where conflicts occur, the more stringent requirement shall apply.
B. Construct and align formwork for elevator hoistway in accordance with ASME A17.1.
C. Camber slabs and beams in accordance with ACI 301.

3.8 FIELD QUALITY CONTROL

A. An independent Testing Agency will perform field quality control tests, as specified in Section 01400.
B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and to verify that supports, fastenings, wedges, ties, and items are secure.
C. Do not reuse wood formwork more than 4 times for concrete surfaces to be exposed to view. Do not patch formwork.
D. When forms are reused, clean surfaces, remove laitance, and tighten to close joints. Align and secure joints to avoid offsets.

3.9 FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
C. Store removed forms to prevent damage to form materials or to fresh concrete. Discard damaged forms.
D. Wall Forms:
   1. If curing compound is not used, leave the forms in place for 7 days and keep continuously wet.
   2. If curing compound is used, remove forms 24 hours after concrete has been placed providing concrete has developed sufficient strength to sustain its own weight. Do not use curing compound on vertical concrete surfaces that will be painted or otherwise finished.
   3. During cold weather concreting, leave forms in place for 7 days in addition to placement of other cold weather protection.

END OF SECTION

SECTION 04065

MORTAR AND MASONRY GROUT

PART 1 – GENERAL

1.1 SECTION INCLUDES
A. Mortar for masonry.
B. Grout for masonry.
C. Integral Water Repellent for masonry mortar.

1.2 RELATED SECTIONS
A. Section 01400 - Quality Requirements: Testing laboratory services.
B. Section 04810 - Unit Masonry Assemblies: Installation of mortar and grout.
C. Section 08110 - Steel Doors and Frames: Grouting steel door frames installed in masonry.
D. Section 08110 - Steel doors and Frames: Grouting steel door frames.

1.3 REFERENCES
A. Unless otherwise noted the most current issue of the reference shall be used
B. ACI 530/ASCE 5/TMS 402 - Building Code Requirements For Masonry Structures; American Concrete Institute International
C. ACI 5301/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; 2000
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. ASTM C1072 - Standard Test Methods for Measurement of Masonry Flexural Bond Strength
M. National Concrete Masonry Association (NCMA): NCMA TEK 08-02A Removal of Stains from Concrete Masonry
N. National Concrete Masonry Association (NCMA): NCMA TEK 08-04A Cleaning Concrete Masonry
O. 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.
B. Cold Weather Requirements: Comply with recommendations of ACI 530.1
C. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.
D. Hot Weather Requirements: Comply with recommendations of ACI 530.1

PART 2 – PRODUCTS

2.1 MATERIALS

A. Masonry Cement: ASTM C 91, Type S.
   1. Colored Mortar: Premixed cement as required to match Architect's sample.
B. Portland Cement: ASTM C 150, Type I – Normal, or Type II - Moderate; standard gray color.
C. Blended Cement: ASTM C 595, Type IP or i(PM) for type I or II cement..
D. Packaged Dry Mortar: ASTM C 387, using gray color cement.
E. Hydrated Lime: ASTM C 207, Type S or M.
F. Mortar Aggregate: ASTM C 144, standard masonry type.
G. Grout Aggregate: ASTM C 404.
H. Pigments for Colored Mortar: Iron or chromium oxides with demonstrated stability and colorfastness. Do not use carbon black.
   1. ASTM C 979: Pigment shall not exceed 10% of the weight of portland cement.
   2. Colors: As required to match Architect's color samples.
   3. Acceptable products:
      a. Soloman Colors: www.solomoncolors.com
      b. Davis Colors: www.concretestains.com
      c. Color Solutions, Inc.: www.dynamiccolorsolutions.com
      d. Prism Pigments: www.prismpigments.com
      e. Western Lime and Cement Co.
   4. Substitutions: See Section 01600 - Product Requirements.
I. Water: Clean and potable.
J. Accelerating Admixture: Not Permitted.
K. Moisture-Resistant Admixture: Rain Bloc GP by ACM Chemestries 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. Glass unit masonry: Type N or S.
   8. 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. Pointing Mortar For Glass Unit Masonry: ASTM C 270, Prehydrated Type M, using the Property Specification.
   1. Maximum 2 percent ammonium stearate or calcium stearate per cement weight.
   2. Beach sand aggregate.
D. Mortar for Stone: ASTM C 270, Property Specification.
   1. Setting mortar:
      a. Granite: Type S mortar.
      b. Limestone: Type N mortar.
      c. Marble: Type S mortar.
      d. Travertine: Type S mortar.
      e. Quartz-based stone: Type N mortar.
      f. Slate: Type S mortar.
   2. Pointing mortar:
      a. Granite: Type S mortar.
      b. Limestone: Type N mortar.
      c. Marble: Type N mortar.
      d. Travertine: Type N mortar.
      e. Quartz-based stone: Type N mortar.
      f. Slate: Type N mortar.
E. Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio.

2.3 MORTAR MIXING

A. Thoroughly mix mortar ingredients using mechanical batch mixer, in accordance with ASTM C 270 and in quantities needed for immediate use.
B. Maintain sand uniformly damp immediately before the mixing process.
C. Add mortar color in accordance with manufacturer's instructions. Provide uniformity of mix and coloration.
D. Do not use anti-freeze compounds to lower the freezing point of mortar. Do not use set accelerators unless approved in writing by The Brick Institute of America (BIA), National Concrete Masonry Association (NCMA), ASTM C 270, the Architect of Record and the Engineer of Record. The use of admixtures does not relax cold weather protection requirements.
E. If water is lost by evaporation, re-temper only within two hours of mixing.
F. Use mortar within two hours after mixing at temperatures of 90 degrees F, or two-and-one-half hours at temperatures under 40 degrees F.

2.4 GROUT MIXES

A. Bond Beams and Lintels: 3,000 psi strength at 28 days; 8-10 inches slump; provide grout in accordance with ASTM C 476. Use or fine grout in accordance with ACI 530 and 530.1.
B. Engineered Masonry: Unless otherwise noted provide grout with 3,000 psi strength at 28 days; 7-8 inches slump; mix in accordance with ASTM C 476.
   1. Coarse grout for spaces with smallest horizontal dimension greater than 2 inches.

2.5 GROUT MIXING

A. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C 476
B. Add admixtures in accordance with manufacturer's instructions; mix uniformly.
C. Do not use anti-freeze compounds to lower the freezing point of grout. Do not use set accelerators unless approved in writing by The Brick Institute of America (BIA), National Concrete Masonry Association (NCMA), ASTM C 270, the Architect of Record and the Engineer of Record. The use of admixtures does not relax cold weather protection requirements.

2.6 PRECONSTRUCTION TESTING

A. Testing will be conducted by an independent test agency, in accordance with provisions of Section 01400.
B. Mortar Mixes: Test mortars pre-batched by weight in accordance with ASTM C 270 or ASTM C 780 recommendations for preconstruction testing for compressive strength, consistency, mortar aggregate ratio, water content, air content and splitting tensile strength.
   1. Test results will be used to establish optimum mortar proportions and establish quality control values for construction testing.
C. Grout Mixes: Test grout batches in accordance with ASTM C 1019 procedures for compressive strength and slump.
   1. Test results will be used to establish optimum grout proportions and establish quality control values for construction testing.

PART 3 – EXECUTION

3.1 PREPARATION

A. Apply bonding agent to existing smooth finish concrete surfaces.
   1. Plug clean-out holes for masonry with brick or masonry units to match adjacent surfaces. Brace masonry for wet grout pressure.
B. Request inspection of spaces to be grouted.

3.2 INSTALLATION

A. Install mortar and grout to requirements of Section 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.
D. Do not displace reinforcement while placing grout.
E. Remove excess mortar from grout spaces.

3.3 GROUTING

A. Use either high-lift or low-lift grouting techniques, at Contractor's option, in accordance with ACI 530.1.
B. Consolidate grout with a mechanical vibrator on any grout pours greater than 12 inches in height; and in accordance with ACI 530.1. Grout pours 12 inches or less in height shall be mechanically vibrated or puddled. Do not over consolidate.
C. When grouting is stopped for 1 hour or longer, stop the grout pour 1 1/2 inches below the top of the masonry to create a shear key.
D. Pour grout only after reinforcing is in place. Prevent displacement of bars as grout is poured.
E. Place grout for each pour continuously and consolidate immediately; do not interrupt pours for more than 1-1/2 hours.
F. Place grout for spanning elements in single, continuous pour.

3.4 FIELD QUALITY CONTROL

A. An independent testing agency will perform field tests, in accordance with provisions of Section 01400.
   1. Tests and evaluation listed in this Article will be performed during construction for each 5000 square feet of wall area or fraction thereof.
B. Test and evaluate mortar in accordance with ASTM C 780 procedures.
   1. Test with same frequency as specified for masonry units.
C. Test and evaluate grout in accordance with ASTM C 1019 procedures.
   1. Test with same frequency as specified for masonry units.
D. Prism Tests: Test masonry and mortar panels for compressive strength in accordance with ASTM C 1388, and for flexural bond strength in accordance with ASTM C 1072 or ASTM E 518; perform

tests and evaluate results as specified in individual masonry sections
1. Prepare set of prisms for testing at 7 days and 1 set for testing at 28 day

END OF SECTION

SECTION 04720

ARCHITECTURAL CAST STONE

PART 1 – GENERAL

1.1 SECTION INCLUDES
A. Architectural cast stone.
B. Units required are indicated on the drawings as “cast stone”.

1.2 RELATED SECTIONS
A. Section 04810 - Unit Masonry Assemblies: Installation of cast stone in conjunction with masonry.
B. Section 07900 - Joint Sealers: Materials and execution methods for sealing soft joints in cast stone work.

1.3 REFERENCES
A. Unless otherwise noted the most current issue of the reference shall be used.
B. ACI 318 - Building Code Requirements for Reinforced Concrete.
C. ASTM A 185 - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
D. ASTM A 615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
E. ASTM C 33 – Standard Specification for Concrete Aggregates.
F. ASTM C 150 – Standard Specification for Portland Cement.
G. ASTM C 270 – Standard Specification for Mortar for Unit Masonry.
H. ASTM C 494/C 494M - Standard Specification for Chemical Admixtures for Concrete.
I. ASTM C 642 – Standard Test Method for Density, Absorption, and Voids in Hardened Concrete.
J. ASTM C 979 - Standard Specification for Pigments for Integrally Colored Concrete.
K. ASTM C 1364 – Standard Specification for Architectural Cast Stone.

1.4 SUBMITTALS
A. See Section 01300 - Administrative Requirements, for submittal procedures.
B. Manufacturer's Qualification Data: Documentation showing compliance with specified requirements.
C. Product Data: Test results of cast stone components made previously by the manufacturer.
   1. Include one copy of ASTM C 1364 for Architect’s use.
D. Shop Drawings: Include building elevations and plans showing the exact location of each cast stone piece. Drawings shall show the exposed faces, sections, dimensions, arrangement of joints, anchoring methods, type of anchors, and piece numbers and location of anchors, section cuts, joint, and finish details.
   1. Manufacturer is responsible for design of all connections.
E. Verification Samples: Pieces of actual cast stone components not less than 12 inches square, illustrating range of color and texture to be anticipated in components furnished for the project.
F. Provide Mortar Color Selection Samples.

1.5 QUALITY ASSURANCE
A. Design anchors and supports under direct supervision of a Professional Structural Engineer, registered in the State in which the Project is located.
   1. Design anchors to resist positive and negative wind pressures and other loads as required by applicable code.
   2. Design anchor attachment to stone with a factor of safety of 5:1.
   3. Design each individual anchor with a factor of safety in the vertical dead-load-bearing direction of 4:1 and in the horizontal lateral-load-bearing direction of 2:1.
B. Manufacturer Qualifications: A current producer member of the Cast Stone Institute with a minimum of 5 years of experience in producing cast stone of the types required for project and:
   1. Adequate plant capacity to furnish quality, sizes, and quantity of cast stone required without delaying progress of the work.
   2. Products previously produced by plant and exposed to weather that exhibit satisfactory appearance.
C. Mock-Up: Provide full size cast stone components for installation in mock-up of exterior wall.

1. Approved mock-up will become standard for appearance and workmanship.
2. Mock-up may not remain as part of the completed work.
3. Remove mock-up not incorporated into the work and dispose of debris.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver cast stone components secured to shipping pallets and protected from damage and discoloration. Protect corners from damage.
B. Number each piece individually to match shop drawings and schedule.
C. Store cast stone components and installation materials in accordance with manufacturer's instructions.
D. Store cast stone components on pallets with nonstaining, waterproof covers. Ventilate under covers to prevent condensation. Prevent contact with dirt.
E. Protect cast stone components during handling and installation to prevent chipping, cracking, or other damage.
F. Store mortar materials where contamination can be avoided.
G. Schedule and coordinate production and delivery of cast stone components with unit masonry work to optimize on-site inventory and to avoid delaying the work.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Architectural Cast Stone:
   1. Northfield Block, Mundelein, IL Contact: Steve Hunt: (847) 816-9000
   2. Any current producer member of the Cast Stone Institute.

2.2 ARCHITECTURAL CAST STONE

A. Cast Stone: Architectural concrete product manufactured to simulate appearance of natural limestone, complying with ASTM C 1364.
   1. Compressive Strength: As specified in ASTM C 1364; calculate strength of pieces to be field cut at 80 percent of uncut piece.
   2. Freeze-Thaw Resistance: Demonstrated by laboratory testing in accordance with ASTM C 1364.
   3. Absorption: ASTM C 1195 or ASTM C 642: 6 % maximum for products at 28 days.
   4. Surface Texture: Medium grained texture, with no bugholes, air voids, or other surface blemishes visible from distance of 20 feet.
   5. Color: To be selected by Architect from manufacturer’s full color range.
   6. Remove cement film from exposed surfaces before packaging for shipment.
B. Shapes: Provide shapes indicated on drawings.
   1. Variation from Any Dimension, Including Bow, Camber, and Twist: Maximum of plus/minus 1/8 inch or length divided by 360, whichever is greater, but not more than 1/4 inch.
   2. Unless otherwise indicated on drawings, provide:
      a. Wash or slope of 1:12 on exterior horizontal surfaces.
      b. Drips on projecting components, wherever possible.
      c. Raised fillets at back of sills and at ends to be built in.
C. Reinforcement: Provide reinforcement as required to withstand handling and structural stresses; comply with ACI 318.

2.3 MATERIALS

A. Portland Cement: ASTM C 150.
   1. For Units: Type I, white or gray as required to match Architect 's sample.
   2. For Mortar: Type I or II, except Type III may be used in cold weather.
B. Coarse Aggregate: ASTM C 33, except for gradation; granite, quartz, or limestone.
C. Fine Aggregate: ASTM C 33, except for gradation; natural or manufactured sands.
D. Pigments: ASTM C 979, inorganic iron oxides; do not use carbon black.

E. Admixtures: ASTM C 494/C 494M.
F. Water: Potable.
G. Reinforcing Bars: ASTM A 615/A 615M deformed bars, galvanized.
H. Steel Welded Wire Reinforcement: ASTM A 185, galvanized.
I. Embedded Anchors, Dowels, and Inserts: Type 304 stainless steel, of type and size as required for conditions.
J. Mortar: Portland cement-lime, ASTM C 270, Type N; do not use masonry cement.
K. Sealant: As specified in Section 07900.
L. Cleaner: General-purpose cleaner designed for removing mortar and grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces; approved for intended use by cast stone manufacturer and by cleaner manufacturer for use on cast stone and adjacent masonry materials.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine construction to receive cast stone components. Notify Architect if construction is not acceptable.
B. Do not begin installation until unacceptable conditions have been corrected.

3.2 INSTALLATION

A. Install cast stone components in conjunction with masonry, complying with requirements of Section 04810.
B. Mechanically anchor cast stone units indicated; set remainder in mortar.
C. Setting:
   1. Drench cast stone components with clear, running water immediately before installation.
   2. Set units in a full bed of mortar unless otherwise detailed.
   3. Fill vertical joints with mortar.
   4. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.
D. Joints: Make all joints 3/8 inch, except as otherwise detailed.
   1. Rake mortar joints 3/4 inch for pointing. Scrub face of each stone to remove excess mortar before it sets.
   2. Point joints with mortar in layers 3/8 inch thick and tool to a slight concave profile.
   3. Rake the following mortar joints for sealant. Scrub face of each stone to remove excess mortar before it sets.
      a. Head joints in top courses, including copings, parapets, cornices, sills, and steps.
      b. Joints in projecting units.
      c. Joints between rigidly anchored units, including soffits, panels, and column covers.
      d. Joints below lugged sills and stair treads.
      e. Joints below ledge and relieving angles.
      f. Joints labeled "expansion joint".
E. Sealant Joints: Install backer rods and sealants as specified in Section 07900.
   1. Prime cast stone in areas to receive sealant and backer rod; in accordance with sealant manufacturer's and cast stone manufacturer's recommendations.
F. Installation Tolerances:
   1. Variation from Plumb: Not more than 1/8 inch in 10 feet or 1/4 inch in 20 feet or more.
   2. Variation from Level: Not more than 1/8 inch in 10 feet or 1/4 inch in 20 feet, or 3/8 inch maximum.
   3. Variation in Joint Width: Not more than 1/8 inch in 36 inches or 1/4 of nominal joint width, whichever is less.
   4. Variation in Plane Between Adjacent Surfaces (Lipping): Not more than 1/16 inch difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.

3.3 CLEANING AND PROTECTION

A. Repair chips and other surface damage noticeable when viewed in direct daylight at 10 feet.
   1. Repair with matching touchup material provided by the manufacturer and in accordance with manufacturer's instructions.
   2. Repair methods and results subject to Architect's approval.
B. Clean cast stone components as work progresses; remove mortar fins and smears before tooling joints.
C. Clean exposed cast stone after mortar is thoroughly set and cured.
   1. Wet surfaces with water before applying cleaner.
   2. Apply cleaner to cast stone in accordance with manufacturer’s instructions.
   3. Remove cleaner promptly by rinsing thoroughly with clear water.
   4. Do not use acidic cleaners.
D. Protect from splashing by mortar and other damage.

END OF SECTION

SECTION 04810

UNIT MASONRY ASSEMBLIES

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Insulated Concrete Masonry Units.
B. Reinforcement and Anchorage.
C. Flashings.
D. Accessories.

1.2 RELATED SECTIONS

A. Section 03200 - Concrete Reinforcement: Reinforcing steel for grouted masonry.
B. Section 04065 - Mortar and Masonry Grout.
C. Section 07620 - Sheet Metal Flashing and Trim: Rigid Through-wall masonry flashings.
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.

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. Inside, outside corners self-adhering rubberized flashing end dams and outside corners.
2. 2 inch x 6 inches wide x .015 inch thick stainless steel drip with hemmed edge.
3. 2 inch x 1-5/8 inch wide x .015 inch thick stainless steel drip with hemmed edge.
4. Sealant.
5. 12 inch long section of Termination bar.
6. Joint filler: full width x 6 inches long.
7. Preformed Control Joints: 6 inches long.
8. Weep/Cavity Vents: Manufacturer's full color range.
9. 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 MOCK-UP

A. Construct a masonry wall as a mock-up panel sized 6 feet long by 4 feet high, which includes an exterior wall corner, flashing end dams and lap joints, window sill condition, cavity insulation with adhesive, mortar and accessories, all typical accessories, control joints with sealant, and structural backup.
B. Locate where directed.
C. Rebuild mock-up or non-conforming work within mock-up to meet intent of all specified components at the direction of the Architect.
D. Mock up will be used as the standard of quality for all masonry installation on the project.
E. All work shall conform to the specifications and quality established in the mock-up panel.
F. Mock-up may not remain as part of the finished work.

1.7 PRE-INSTALLATION MEETING

A. Convene minimum one week before starting work of this section.
B. Construct Mock-up wall prior to pre-installation meeting.
C. Attendance:
1. Contractor
2. Mason contractor.
3. Mason foreman.
4. Architect.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.
B. Handle and store ceramic glazed masonry units and pre-faced concrete block units in protective cartons or trays. Do not remove from protective packaging until ready for installation.
C. Stack masonry units, anchors, ties and miscellaneous accessories on wood pallets or blocking above ground and protect from exposure to weather at all times.
D. Cover brick, all masonry units and all reinforcing and accessories with covers that permit air circulation and prevent moisture infiltration.
E. Any materials not protected at all times will be marked rejected and shall be removed from the site by the contractor within 24 hours. All transportation and replacement costs and delays in the schedule will be the sole responsibility of the contractor and at no additional cost to the owner.
F. Clean all materials of dirt, mud, ice, rust, or other foreign substances immediately prior to using.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Cold Weather Requirements: Comply with ACI 530.1.
B. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.
C. Do not build on frozen work.
D. Remove and replace all masonry work damaged by freezing.
E. Hot Weather Requirements: Comply with ACI 530.1.
F. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

PART 2 – PRODUCTS

2.1 INSULATED CONCRETE MASONRY UNITS

A. Manufacturers:
   1. Basis of Design: InsulTech: Northfield, an Oldcastle Company; One Hunt Court, Mundelein, IL 60060, Contact: Steve Hunt: (847) 816-9000
   2. Or Architect Approved Equal.
B. Insulated Concrete Masonry Units: Pre-assembled structural concrete masonry units composed of an inner component concrete masonry shell that is continuously thermally broken from the outer concrete shell. The thermal break is expanded polystyrene (EPS) closed cell insulation. The insulation EPS is held firmly between the two concrete block shells by dove tail slots and internal stainless steel metal anchors molded into the EPS inserts, creating a cohesive and tightly fitting single unit.
   1. Size (Width) and R-Value: Manufactured to the following dimensions:
      a. 12 ¼ inches wide x 7 5/8 -inches high x 15 5/8 -inches long; thermal-resistance value (R-Value): **R-15.2.**
   2. Molded-Polystyrene Insulation: Rigid, cellular thermal insulation formed by the expansion of polystyrene-resin beads or granules in a closed mold to comply with ASTM C 578, Type I.
      a. Provide specially shaped insulation designed for installing in face shells of insulated masonry units and providing continuous thermal barrier across head joints, including corner units.
      b. Provide an adhesive applied to EPS insert which serves as a continuous air barrier.
      c. Provide compliant closed cell gasket material to provide air tightness and continuous insulation across the bed joints.
C. Decorative Insulated Concrete Masonry Units: Comply with requirements for insulated concrete masonry units and the following:

1. Pattern and Texture
   a. Standard pattern, normal weight integrally colored smooth finish.
2. Scoring
   a. Scored vertically so units laid in running bond appear as square units laid in stacked bond, standard finish.
   b. Triple scored vertically so units laid in running bond appear as vertical units laid in stack bond (soldier courses), standard finish.
3. Color: As selected by Architect from manufacturer's full range.

D. Special Shapes: Provide special shapes as follows:
1. Provide shapes including right and left corner and L corner units, jambs, half-size shapes, solid bottom bond beams, and other special conditions manufactured as pre-assembled units with EPS, complying with above requirements, and match exposed finish of insulated concrete masonry units.
2. Provide square-edged units for outside corners.
3. Provide separate 8" unit matching exposed finish to be installed at base of wall, above doors and windows, and other areas where flashing is required.
4. Provide exterior face shell pre-assembled with 3" EPS with inside face shaved flush to be installed at base of wall, above doors and windows, and other areas where flashing is required.

E. Integral Water Repellent: Provide units made with integral water repellent for weather exposed units and where indicated.
1. Integral Water Repellent: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested according to ASTM E 514 as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive, with test period extended to 24 hours, shall show no visible water or leaks on the back of test specimen.
2. Products: Subject to compliance with requirements, provide one of the following:
   a. ACM Chemistries; RainBloc.
   b. Or Approved Equal

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.
2. Heckmann Building Products, Inc: www.heckmannbuildingprods.com.
3. Hohmann & Barnard, Inc: www.h-b.com.
4. Masonry Reinforcing Corporation of America: 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. Exterior Single Wythe Joint Reinforcement: Ladder type; ASTM A 82 steel wire, hot dip galvanized after fabrication to ASTM A 153/A 153M, Class B; 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. Flexible Anchors: 2-piece anchors that permit differential movement between masonry and building frame, sized to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from masonry face.
1. Concrete frame: Dovetail anchors of bent steel strap, nominal 1 inch width x 0.06 in thick, with trapezoidal wire ties 0.1875 inch thick, hot dip galvanized to ASTM A 153/A 153M, Class B.
2. Steel frame: Crimped wire anchors for welding to frame, minimum 0.25 inch thick, with triangular wire ties 0.1875 inch thick, hot dip galvanized to ASTM A 153/A 153M, Class B.

F. 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.
G. 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 FLASHINGS

A. Metal Flashing and receivers: As specified in Section 07620.
B. Flexible Flashing and accessories:
   1. Acceptable Products and Manufacturers (Obtain all flashing materials and accessories from a single manufacturer):
      a. Illinois Products Corp: IPCO Flashing; www.illinoisproducts.com.
      b. Dur-O-Wal, Inc.: Dur-O-Barrier-44 Wall Flashing; www.dur-o-wal.com.
      c. Grace Construction Products: Perm-A-Barrier Wall Flashing; www.na.graceconstruction.com
      d. Hyload Inc.; www.hyload.com
      e. Substitutions not permitted.
   2. Wall Flashing: Consisting of minimum 26 mils of self-adhering rubberized asphalt waterproofing laminated to a 4 mil high density, cross-laminated polyethylene film. Provide a release paper to protect rubberized asphalt surface prior to installation.
   3. Flashing End Dams: Preformed unit consisting of minimum 36 mils of self-adhering rubberized asphalt waterproofing laminated to a 4-mil high density, cross-laminated polyethylene film with 8-inch high legs (16 inch high legs if mortar net is used). Provide a release paper to protect rubberized asphalt surface prior to installation.
   4. Inside and Outside Flashing Corners: Preformed unit consisting of minimum 36 mils of self-adhering rubberized asphalt waterproofing laminated to a 4-mil high density, cross laminated polyethylene film with 8-inch high legs (16 inch high legs if mortar net is used). Provide a release paper to protect rubberized asphalt prior to installation.
   5. Level Change: Preformed unit consisting of minimum 36 mils of self-adhering rubberized asphalt waterproofing laminated to a 4-mil high density, cross laminated polyethylene film with 8-inch high legs (16 inch high legs if mortar net is used). Provide a release paper to protect rubberized asphalt prior to installation.
   6. Flashing Primer / Substrate cleaner: Liquid; brush or roller applied; by same manufacturer as flashing.
   7. Metal Drip Edge: 2-inch wide x 0.015-inch thick stainless steel strip with preformed drip and hemmed edge (1/4-inch drip at 45 degree angle) for all supported conditions.
   8. Metal Drip edge preformed corners for 2-inch wide drip: same material as drip edge and as provided by drip edge manufacturer.
   9. Metal Drip Edge: 6-inch wide x 0.015-inch thick stainless steel strip with preformed drip and hemmed edge (1/4-inch drip at 45 degree angle) for wherever flashing is unsupported across air space.
   10. Metal Drip edge preformed corners for 6-inch wide drip: same material as drip edge and as provided by drip edge manufacturer.
   11. Sealant for bedding drip edge: One component gun grade polyurethane sealant as specified in 07900.

12. Sealant for flashing edges corners and seams: mastic sealant as recommended by flashing Manufacturer and Compatible with flashing material.
13. Termination Bar 1/8 inches x 1 inch stainless steel with sealant ledge and predrilled pilot holes at 12 inches o.c
    a. Expansion anchors for termination bar: Material compatible with termination bar that will not cause galvanic action.

C. Embedded Flashing Materials
1. Embedded Flashing for Single Wythe Masonry: Provide embedded flashing fabricated from high density polyethylene molded into a 0.0625 inch thick flashing pan with 0.312 inch perimeter flanges.
    a. Size: Provide size recommended by manufacturer for block size to be flashed.
    b. Flashing Bridging Units: Provide matching bridging units for connecting embedded flashing units to form continuous flashing
    c. Weep Spout: 0.062 inch thick and concave weep spout with a 0.20 inch x 0.64 inch opening and drip edge extending 1 inch from the outer flange.
2. Manufacturer/Products: Mortar Net USA, Ltd., Blok-Flash System or Architect approved equal.

2.5 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.
    b. Dur-O-Wal Inc.;www.dur-o-wal.com.
    c. Heckmann Building Products, Inc; www.heckmannbuildingprods.com.
    d. Hohmann & Barnard, Inc; www.h-b.com.
    e. Substitutions: See Section 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.
    b. Dur-O-Wal Inc.;www.dur-o-wal.com.
    c. Heckmann Building Products, Inc; www.heckmannbuildingprods.com.
    d. Hohmann & Barnard, Inc; www.h-b.com.
    e. Substitutions: See Section 01600 - Product Requirements.

E. Weep/Cavity/Cell Vents: Molded PVC grilles, insect resistant.
1. Manufacturers:
    a. Illinois Products Corp.; www.illinoisproducts.com.
    b. Dur-O-Wal Inc.;www.dur-o-wal.com.
    c. Heckmann Building Products, Inc; www.heckmannbuildingprods.com.
    d. Hohmann & Barnard, Inc; www.h-b.com.
    e. Substitutions: See Section 01600 - Product Requirements.

F. Cavity Drip/Insulation Retaining Ring: Molded PVC grilles, insect resistant. PVC clip-type retainer for rigid board insulation; attaches to loop wires on horizontal joint reinforcement
1. Manufacturers:
    a. Illinois Products Corp.; www.illinoisproducts.com.
    b. Dur-O-Wal Inc.;www.dur-o-wal.com.
    c. Heckmann Building Products, Inc; www.heckmannbuildingprods.com.
    d. Hohmann & Barnard, Inc; www.h-b.com.
    e. Substitutions: See Section 01600 - Product Requirements.

G. Cleaning Solution: Proprietary Acidic Cleaner: Manufacturer's standard strength cleaner

designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned. Light Duty Concrete Cleaner, manufactured by ProSoCo or approved equal.

H. Beam and Column Isolation Wrap: Contractor choice of closed cell Expanded Polyethylene, closed cell Neoprene or closed cell PVC. Minimum of ½ inch thick, continuous wrap provided in largest sheets available.
   1. Expanded Polyethylene:
      a. Structure: Closed cell
      b. Density: 1.5
      c. Compression Deflection (Force to compress 75% of original) (PSI at 25%): 6
      d. Water Absorption (% by Volume): 0.5
      e. Applicable Standard: ASTM D 1056 / D 624 / C 272
   2. Neoprene:
      a. Structure: Closed cell
      b. Density: 8 to 12
      c. Compression Deflection (Force to compress 75% of original)(PSI at 25%):2-5
      d. Applicable Standard: ASTM D 1056
   3. PVC:
      a. Structure: Closed cell
      b. Density: 3 to 5
      c. Compression Deflection (Force to compress 75% of original)(PSI at 25%): 12.5
      d. Applicable Standard: ASTM D 1667

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive masonry.
B. Verify that related items provided under other sections are properly sized and located.
C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.2 PREPARATION

A. Wetting of Brick: Wet brick prior to laying if the initial rate of absorption exceeds 30 g/30 sq. in. (g/194 sq. cm) per minute when tested per ASTM C 67. Allow units to absorb the water so they are damp but not wet at the time of laying.
B. Determine any adjustments in mortar mix to accommodate brick absorption and weather conditions necessary to produce appropriate bond to brick and to insure water-resistive wall construction.
C. Install and coordinate placement of metal anchors supplied for securing materials of other sections type, size, finish and spacing as indicated in the drawings and as required by ACI 530.
D. Determine requirements for temporary bracing of walls which require bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.
E. Consult and coordinate masonry work with other crafts to avoid future cutting and patching.
F. Provide column isolation wrap at all intersections of steel and masonry unless otherwise noted.

3.3 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.
B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
C. Concrete Masonry Units:
   1. Bond: Running.

2. Coursing: One unit and one mortar joint to equal 8 inches.
3. Mortar Joints: Concave at all locations unless otherwise noted.

3.4 PLACING AND BONDING

A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
B. Provide cleanouts minimum 8 inches long and 1 brick high, 24 inches on center in the course immediately above any flashing.
C. Lay hollow masonry units with full face shell bedding on head and bed joints.
D. Lay first course of all masonry above steel and concrete surfaces in full bed of mortar.
E. Lay all concrete masonry units dry.
F. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
G. Remove excess mortar as work progresses.
H. Interlock intersections and external corners, except for units laid in stack bond.
I. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
J. Do not use broken, chipped or cracked units where exposed to view.
K. Where necessary to stop off a horizontal run of masonry, rack back one-half block length or one half brick length in each course. Toothing is not permitted,
L. Where fresh masonry joints partially or totally set masonry, clean exposed surface of set material and remove loose mortar and foreign material prior to laying fresh masonry.
M. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
N. Fill mortar joints flush where wall tile or resilient base is scheduled. All other joints shall be tooled as scheduled above in coursing.
O. Isolate interior masonry partitions from vertical structural framing members and exterior walls with open one-half inch joint with joint filler. Maintain continuous joint reinforcement through installation.
P. Isolate masonry partitions from vertical structural framing members with a control joint.
Q. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible filler.
R. Extend and anchor all masonry walls to underside of floors, beams or roof structure, unless otherwise indicated.
S. Brick up solid wherever beams bear on masonry, except where otherwise indicated.
T. Provide soft joints at all dissimilar materials. Rake back mortar at dissimilar materials to provide sufficient width to depth ratio for soft joint. Provide backer rod or bond breaker tape and sealant as specified in Section 07900 - Joint Sealers

3.5 CLEANOUTS

A. Provide cleanouts in exterior masonry wythes in every course immediately above through wall flashings.
   1. Cleanouts are to occur every third brick horizontally for exterior brick wythes.
   2. Cleanouts are to occur every second block horizontally for exterior CMU wythes.

3.6 WEEPS (CELL VENTS)

A. Install weeps in cavity walls at 24 inches on center horizontally immediately above through-wall flashings for brick.
B. Install weeps in cavity walls at 32 inches on center horizontally immediately above through-wall flashings for CMU.
C. Install cell vents at head joints per manufacturer recommendations.

3.7 REINFORCEMENT AND ANCHORAGE – GENERAL

A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.
B. Place masonry joint reinforcement in first and second horizontal joints above and below

openings. Extend minimum 16 inches each side of opening.

C. Place continuous joint reinforcement in first and second joint below top of walls.
D. Lap joint reinforcement ends minimum 6 inches.
E. Reinforce stack bonded unit joint corners and intersections with strap anchors 16 inches on center.
F. For exterior multiple wythe systems, reinforce stack bonded brick and concrete masonry units of any configuration with an additional layer of horizontal reinforcing within the outer wythe. Install at 16 inches on center vertically and alternate with cross wythe reinforcing.
G. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Unless otherwise indicated on drawings or closer spacing is indicated under specific wall type, space anchors at maximum of 36 inches horizontally and 24 inches vertically.

3.8 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.

3.9 MASONRY FLASHINGS

A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
    1. Extend flashings full width at such interruptions and at least 4 inches into adjacent masonry and turn up at least 8 inches to form watertight pan at non-masonry construction. Turn flashing up 16 inches where mortar net is used.
    2. Provide prefabricated end dams at the extremities of all flashings at, above and below all openings except at changes in foundation or brick ledge level.
    3. Provide prefabricated flashing corners and elevation changes at all corners and changes in elevation where flashing is shown or required by this Specification.
    4. Provide stainless steel drip edge for all flashing and extend 1/4-inch beyond the vertical face of the masonry and lap 2 inches at flashing joints. Crimp or hem all exposed edges of drip edge to eliminate sharp edge prior to installation.
    5. Install all rigid flashing receivers as specified in Section 07620.
    6. Remove or cover protrusions or sharp edges that could puncture flashings.
B. Installation of Flexible Flashing:
    1. Extend flashing a minimum of 8 inches vertically and return into mortar joint for full width of face shell.
    2. Clean surface of the wall which is to receive the adhesive side of the flexible flashing material. Maintain surface free of dust, dirt, protrusions, and all foreign materials that would impair the bonding of the flexible flashing to the masonry. Allow surface of the wall to dry. Apply the specified flashing primer to all contact surfaces to receive wall flashing. Ensure that flashing material adheres directly to the surface of the wall and the drip edge and is free of void pockets.
    3. Install metal drip edge with a gun-grade sealant on the edges of the masonry foundation wall or structural steel. Extend the bent portion of the drip 1/4-inch beyond the face of the masonry. Maintain straight even length projections.
    4. Install flashing boots and end dams by removing the release paper and setting the items in place. Field trim ends as required to work with face wythe materials.
    5. Install the flashing over the metal drip edge and recess 1/4-inch from the vertical face of the masonry wall. Overlap the flashing segments and any flashing boots and end dams a minimum of 4 inches and install in a manner to direct the flow of water to the exterior and

weepholes. Place a bead of sealant along the edge of all overlaps.

6. Do not apply flexible flashing materials when the ambient temperature is below 25 degrees F. Do not allow flexible flashing materials to be exposed to direct sunlight for more than 30 days.
7. Provide wide drip edge flashing wherever membrane flashing is unsupported across air space.
8. Where counter-flashing receiver is required per drawings, install material provided by others.
9. Provide termination bar with continuous sealant cap wherever top of flashing is not anchored in mortar joint. Provide a bead of sealant along the underside top edge of the flashing to ensure it does not start to peel away from the backup wall.
10. Protect flashing from UV exposure: Provide Manufacturer approved protection for all flashing that may be exposed to UV radiation for a period of 30 days or more. For materials that have been exposed to UV radiation for more than 30 days, provide Manufacturer's written inspection report and approval that the materials in place will perform as intended. All materials not passing this inspection shall be removed and replaced at no additional cost to the Owner.
11. Seal lapped ends and penetrations of flashing a minimum of 6 inches and seal watertight with mastic before covering with mortar.
12. Extend flexible flashings to within 1/4 inch of exterior face of masonry

3.10 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.

3.11 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.

3.12 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.

3.13 BUILT-IN WORK

A. As work progresses, install built-in metal door frames, glazed frames, window frames, and anchor bolts and other items to be built into the work and furnished under other sections. Frame installing contractor shall coat inside of frames to be installed in masonry or to be grouted, with bituminous coating prior to installation as noted. Apply wet to 18.0 mils (450 microns) in one or two coats. Total dry film thickness of not less than 12 mils (300 microns) or in excess of 30 mils.
B. Install built-in items plumb, level, and true to line.
C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame jamb voids solid with grout.
   1. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.
D. Grout all spaces around built-in items solid
E. Do not build into masonry construction organic materials that are subject to deterioration.

3.14 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.

3.15 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.

3.16 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01400.

3.17 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.

3.18 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 06114

WOOD BLOCKING AND CURBING

PART 1 – GENERAL

1.1 SECTION INCLUDES
A. Roof nailers and curbs.
B. Blocking in wall and roof openings.
C. Preservative treatment of wood.
D. Concealed wood blocking for support of toilet accessories and all wall mounted items.

1.2 RELATED SECTIONS
A. Section 07620: Sheet metal flashing and trim.
B. Section 09260: Gypsum Board Assemblies.

1.3 REFERENCES
A. Unless noted 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, Suppl. VII (1996) & VIII (1997).
I. WWPA G-5 - Western Lumber Grading Rules; Western Wood Products Association.

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

1.5 QUALITY ASSURANCE
A. Lumber: Comply with PS 20 and approved grading rules and inspection agencies.
   1. Acceptable Lumber Inspection Agencies: RIS, SPIB, WCLB, and WWPA.
   2. Lumber of other species or grades, or graded by other agencies, is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.
B. Plywood: Comply with PS 1.

PART 2 – PRODUCTS

2.1 DIMENSION LUMBER
A. Grading Agency: Western Wood Products Association (WWPA).
B. Sizes: Nominal sizes as indicated on drawings, S4S. Wood blocking for all wall mounted items shall be 2 x 6 inch nominal unless otherwise noted.
C. Moisture Content: S-dry or MC19.
D. Miscellaneous Blocking, Furring, and Nailers:
   1. Structural grade 1200fb Douglas Fir as defined in Section 06100.

2.2 CONSTRUCTION PANELS
A. Plywood Sheathing: PS 1, Grade C-D, Exposure I. Panels shall be treated as listed in the Factory Wood Treatment article of this section and as listed in the schedule.
B. All other panels as listed in Section 06100.

2.3 ACCESSORIES

A. Fasteners and Anchors:
   1. Fasteners: Hot-dipped galvanized steel for high humidity and treated wood locations, unfinished steel elsewhere.
   2. Anchors: Expansion shield and lag bolt type for anchorage to solid masonry or concrete. Anchor bolt for anchorage into cavity walls.

2.4 FACTORY WOOD TREATMENT

A. Wood preservative pressure treatment: ACQ Type D preservative; retention level .25
   1. Kiln dry after treatment to maximum moisture content of 19 percent.
   2. Treat wood in contact with roofing, flashing, or waterproofing.
   3. Treat wood in contact with masonry or concrete.
   4. Treat wood less than 18 inches above grade.
B. Fire Retardant Treatment: AWPA Treatment C20, Interior Type, Class A, Low Hygroscopic, Chemically treated and pressure impregnated; capable of providing a maximum flame spread/smoke development rating of 25 / 450.

PART 3 – EXECUTION

3.1 PREPARATION

A. Examine all surfaces to receive parts of the work specified herein. Application or installation of materials constitutes acceptance of the substrate.
B. Verify all dimensions of in-place and subsequent construction and that it accurately fit this part of the work to other construction.
C. Protect lumber and keep under cover both in transit and at job site. Protect from dampness.

3.2 FRAMING

A. Set members level and plumb, in correct position.
B. Place horizontal members with crown side up.
C. Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members.
D. Coordinate curb installation with installation of decking and support of deck openings.
E. All wood blocking that is installed is to be temporarily protected form moisture utilizing 15 lb. roofing felt.
F. All wood blocking joints to be mitered @ 45 degrees, staggered, and screw fastened together.
G. Provide miscellaneous members as indicated or as required to support finishes, fixtures, specialty items, and trim.

3.3 INSTALLATION OF CONSTRUCTION PANELS

A. Sheathing: Secure with long dimension perpendicular to framing members, with ends over firm bearing and staggered, using screws.

3.4 SCHEDULES

A. Roof Blocking: S/P/F species, 19 percent maximum moisture content, pressure preservative treatment. Roof edge and roof related wood blocking.
B. Treated plywood: Roof edge and roof related conditions.
C. Miscellaneous wood blocking exterior: S/P/F species, 19 percent maximum moisture content, pressure preservative treatment.
D. Miscellaneous wood blocking interior: Provide wood blocking for support of toilet and bath accessories, wall cabinets, wood trim, and all other wall mounted items. Utilize material as listed in this section and in section 06100. Wood blocking for wall mounted items shall be minimum of 2 x 6 inch nominal dimensional lumber. Fasten wood blocking with minimum 2 screws each side into framing. Where conflicts occur, the more astringent requirement shall prevail.

END OF SECTION

SECTION 07212

BOARD AND BATT INSULATION

PART 1 – GENERAL

1.1 SECTION INCLUDES
A. Board insulation and integral vapor retarder at cavity wall construction and perimeter foundation wall.
B. Protection Board insulation for sheet water proofing applications.
C. Batt insulation and vapor retarder in exterior wall, ceiling, and roof construction.
D. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

1.2 RELATED SECTIONS
A. Section 03300 - Cast in Place Concrete: perimeter insulation.
B. Section 09260 - Gypsum Board Assemblies: Acoustic insulation.

1.3 REFERENCES
A. Unless otherwise noted the most current issue of the reference shall be used.
B. ASTM C578 - Preformed, Cellular Polystyrene Thermal Insulation.
C. ASTM C 665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
D. ASTM D 2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics
E. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials
F. ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials

1.4 SYSTEM DESCRIPTION
A. Materials of This Section: Provide continuity of thermal barrier at building enclosure.
B. Materials of This Section: Provide thermal protection to vapor retarder in conjunction with vapor retarder materials in Section 07260.

1.5 SUBMITTALS
A. See Section 01300 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data on product characteristics, performance criteria, and product limitations, ASTM Test Compliance and data.
   1. Provide product data on all materials and accessories comprising a complete installation including but not limited to all adhesives, clips and other accessories.
C. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.
D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.6 ENVIRONMENTAL REQUIREMENTS
A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

1.7 SEQUENCING
A. Sequence work to ensure fireproofing, firestop, vapor retarder, air barrier, and other related materials are in place before beginning work of this section.
B. Protection Board for Waterproofing: Provide complete installation of all waterproofing membrane, drainage and all related accessories. Allow Architect access to waterproofing for review prior to installing protection board or backfilling. Complete any remedial work as directed by Architect.

1.8 COORDINATION
A. Coordinate work under provisions of Section 01300
B. Coordinate the work with Section 07260 for installation of vapor retarder.

PART 2 – PRODUCTS

2.1 BOARD INSULATION MATERIALS

A. Extruded Polystyrene Board Insulation: Extruded polystyrene board with natural skin surfaces; with the following characteristics relative to application:
   1. Cavity wall applications; ASTM C 578 type IV.
      a. Board Size: 48 x 96 inch with 16 inch perforations for horizontal reinforcing applications.
      b. Board Thickness: 1-1/2 inches.
      c. Board Edges: Square.
      d. Thermal Resistance of 1 inch thickness at 25 degrees F: 5.6 minimum.
      e. Compressive Resistance: Min. 50 psi.
      f. Board Density: 1.6 lb/cu ft.
      g. Water Absorption, maximum: 0.3 percent, volume.
   2. Foundation or below grade applications; ASTM C 578 type VI.
      a. Board Size: 24 x 96 inch.
      b. Board Thickness: 2 inches.
      c. Board Edges: Square.
      d. Thermal Resistance of 1 inch thickness at 25 degrees F: 5.6 minimum.
      e. Compressive Resistance: 60 psi.
      f. Board Density: 1.8 lb/cu ft.
      g. Water Absorption, maximum: 0.3 percent, volume.
   3. Protection Board for Sheet Waterproofing below grade applications; ASTM C 578 type VI.
      a. Board Size: 48 x 96 inch or 24 x 96 inch.
      b. Board Thickness: 1/2 inches minimum.
      c. Board Edges: Square.
      d. Thermal Resistance of 1 inch thickness at 25 degrees F: 5.6 minimum.
      e. Compressive Resistance: 40 psi minimum for thickness stated.
      f. Board Density: 1.8 lb/cu ft.
      g. Water Absorption, maximum: 0.3 percent, volume.
   4. Manufacturers:
      a. Dow Chemical Co: www.dow.com.
      b. Owens Corning Corp: www.owenscorning.com.
      c. Pactiv Building Products formerly Tenneco Building Product 2907 Log Cabin Drive Smyrna, Georgia 30080-7013 800-241-4402 .
      d. Substitutions: See Section 01600 - Product Requirements.

B. Metal Building Interior Finish:
   1. Basis of Design- DOW Thermax Advantages Exposed insulation board, heavy duty with white acrylic-coated aluminum sheet on one side; R=6.5 at 1”
   2. Or approved equal

2.2 MANUFACTURERS - ADHESIVES

A. As manufactured and recommended by insulation manufacturer.
B. Chem Rex, Inc., "Contact Brand PL300 Foam Board Adhesive."
C. Dacar Products, In., "Foamgrab PS."
D. Substitutions: Not permitted.

2.3 BATT INSULATION MATERIALS

A. Batt Insulation: ASTM C 665; preformed glass fiber batt; friction fit, conforming to the following:
   1. Manufacturers:
      a. CertainTeed Corporation: www.certainteed.com.
      b. Johns Manville Corporation: www.jm.com.
      c. Owens Corning Corp: www.owenscorning.com.
   2. Substitutions: See Section 01600 - Product Requirements.

2.4 ACCESSORIES

A. Sheet Vapor Retarder Type 1: Black polyethylene film for above grade application, 10 mil mil

thick.

B. Tape: Bright aluminum self-adhering type, mesh reinforced and 2 inch wide.
C. Insulation Fasteners: Impaling clip of unfinished steel with washer retainer and clips, to be adhered to surface to receive board insulation, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify site conditions under provisions of Section 01300.
B. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation and adhesive.
C. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.2 BOARD INSTALLATION AT FOUNDATION PERIMETER

A. Adhere a 6-inch wide strip of polyethylene sheet over construction, control, and expansion joints with double beads of adhesive each side of joint.
B. Apply adhesive to back of boards:
   1. Three continuous beads per board length.
   2. Full bed 1/8 inch thick.
C. Install boards horizontally on foundation perimeter.
D. Place boards to maximize adhesive contact.
E. Install in running bond pattern.
F. Stagger side joints.
G. Butt edges and ends tightly to adjacent boards and to protrusions.
H. Extend boards over control and expansion joints, un-bonded to foundation 8 inches on one side of joint.
I. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
J. All Boards to extend a minimum of 24” below outside grade.

3.3 PROTECTION OF UNFINISHED WORK

A. Do not permit work to be damaged prior to covering insulation.

3.4 BATT INSTALLATION

A. Install insulation and vapor retarder in accordance with manufacturer's instructions.
B. Install in exterior wall and roof spaces without gaps or voids. Do not compress insulation.
C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.
E. Install with factory applied vapor retarder membrane facing warm side of building spaces. Lap ends and side flanges of membrane over framing members.
F. Staple facing flanges in place at maximum 6 inches on center.
G. Tape seal butt ends, lapped flanges, and tears or cuts in membrane.
H. At metal framing, place vapor retarder on warm side of insulation; lap and seal sheet retarder joints over member face.
I. Tape seal tears or cuts in vapor retarder.
J. Extend vapor retarder tightly to full perimeter of adjacent window and door frames and other items interrupting the plane of the membrane. Tape seal in place.

3.5 PROTECTION OF FINISHED WORK

A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

SECTION 07620

SHEET METAL FLASHING AND TRIM

PART 1 – GENERAL

1.1 SECTION INCLUDES
A. Copings, flashings, counter-flashings, gutters, downspouts, fabricated sheet metal items, and fabricated sheet metal items, and through wall rigid flashings.
B. Reglets and accessories.

1.2 RELATED SECTIONS
A. Section 04810 - Unit Masonry Assemblies: Rigid Through-wall flashings in masonry.
B. Section 06114 - Wood Blocking and Curbing
C. Section 07900 - Joint Sealers.

1.3 REFERENCES
A. Unless noted otherwise the most current issue of the reference shall be used.
B. ASTM A 666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
C. ASTM B 370 - Standard Specification for Copper Sheet and Strip for Building Construction
D. ASTM D 226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
E. SMACNA (ASMM) - Architectural Sheet Metal Manual; Sheet Metal and Air Conditioning Contractors' National Association

1.4 DESIGN REQUIREMENTS
A. Sheet Metal Flashings: Comply with the criteria of SMACNA "Architectural Sheet Metal Manual." and Copper Development Association "Copper in Architecture - Handbook."]

1.5 SUBMITTALS
A. See Section 01300 - Administrative Requirements, for submittal procedures.
B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
C. Samples: Submit two full size samples, 12" inches long illustrating typical coping material and finish. Include continuous cleats, backer plates, cover plates and/or drive cleats.

1.6 SUBMITTALS AT PROJECT CLOSEOUT
A. Section 01700 - Execution Requirements Procedures for submittals.
B. Warranty: Submit manufacturer's 20 year material warranty. Ensure forms have been completed in Owner's name and registered with manufacturer.
C. Warranty: Submit contractor's two year workmanship warranty.

1.7 QUALITY ASSURANCE
A. Perform work in accordance with SMACNA Architectural Sheet Metal Manual requirements and standard details, except as otherwise indicated.
B. Maintain one copy of each document on site.
C. Fabricator and Installer Qualifications: Company specializing in sheet metal work with five years of documented experience.

1.8 PRE-INSTALLATION CONFERENCE
A. See Section 01300 - Administrative Requirements for additional requirements.
B. Convene one week before starting work of this section.

1.9 DELIVERY, STORAGE, AND HANDLING
A. Section 01600 - Product Requirements: Transport, handle, store, and protect.
B. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
   1. When material is stored on the roof it must be placed on ½" minimum plywood on 1" rigid insulation. Ends of plywood shall exceed end of sheet metal goods by 2'-0".

C. All field cutting of sheet metal performed over new roofing shall be permitted only where the new roof is protected by ½" minimum plywood on 1" rigid insulation.
D. Prevent contact with materials which may cause discoloration or staining.

1.10 PROJECT CONDITIONS

A. Project Coordination: Section 01300 - Administrative Requirements.
B. Coordinate with the work of Section 04810 for installing recessed flashing reglets and rigid through wall flashings.

1.11 WARRANTY

A. Section 01780 - Closeout Submittals
B. Sheet Metal Contractor to issue guarantee of workmanship to correct defective work within a two year period after Date of Substantial Completion. Defective work includes failure of water-tightness or seals and oil canning due to rupture restricted expansion/contractors or faulty workmanship.
C. Material warranty from the sheet metal manufacturer for a period of 20 years against deterioration of color, chalking and film integrity.

PART 2 – PRODUCTS

2.1 SHEET MATERIALS

A. Pre-Finished Galvanized Steel: ASTM A 653/A 653M, with G90/Z275 zinc coating; minimum 0.02 inch 24 gauge core steel, shop pre-coated with PVDF coating; color as selected by Architect from Manufacturer's standard range.
   1. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system; color as scheduled.
B. Pre-Finished Aluminum Sheet: ASTM B 209 (ASTM B 209M), H005 alloy, H12 or H14 temper;.063 inch thick; plain finish shop pre coated with PVDF coating of color as selected by Architect from Manufacturer's standard range.
C. Stainless Steel: ASTM A 666 Type 304, soft temper, 0.015 inch thick; smooth No. 4 finish.
D. Copper: ASTM B370, cold rolled 20 oz/sq ft thick; natural finish.
E. Lead Coated Copper: ASTM B 101, 24 (7320) ounce-weight of bare copper, HOO (cold-rolled) temper.

2.2 ACCESSORIES

A. Fasteners: Same material and finish as flashing metal, with soft neoprene washers.
B. Underlayment: ASTM D 226, organic roofing felt, Type I ("No. 15").
C. Slip Sheet: Rosin sized building paper.
D. Primer: Zinc Molybdate type.
E. Protective Backing Paint: Zinc molybdate alkyd.
F. Sealant: Polyurethane type, manufactured by:
   1. Tremco: Dymeric
   2. Sonnoborn: NPI.

2.3 FABRICATION - GENERAL

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
B. Fabricate cleats of same material as sheet, minimum 3 inches wide, interlocking with sheet a minimum of 1/2 inch.
   1. Drill pilot holes at 4" o.c. for attachment to wood.
   2. Drill pilot holes at 6" o.c. for attachment to masonry or concrete.
C. All fastener locations will have predrilled pilot holes:
   1. Nails - 1/4" diameter @ 4" o.c.
   2. Screw Fasteners - 5/16" diameter @ 1'-0" o.c.
D. Form pieces in longest possible lengths.

E. Hem exposed edges on underside 1/2 inch; miter and seam corners.
F. Form material with flat lock seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
G. Fabricate corners from one piece with minimum 24-inch long legs; welded for rigidity, seal with sealant and post finished to match adjacent finish..
H. Fabricate vertical faces with bottom edge formed outward 1/4 inch (6 mm) and hemmed to form drip.
I. Fabricate flashings to allow toe to extend 2 inches over roofing gravel. Return and brake edges.

2.4 GUTTER AND DOWNSPOUT FABRICATION

A. Gutters: Profile as indicated.
B. Downspouts: Rectangular profile, unless indicated otherwise.
C. Gutters and Downspouts: Size for rainfall intensity determined by a storm occurrence of 1 in 5 years in accordance with SMACNA Architectural Sheet Metal Manual.
   1. Fabricate gutters to profile and size specified in Design Requirements Article of this Section.
   2. Fabricate gutters to rectangular profile.
D. Accessories: Profiled to suit gutters and downspouts.
   1. Anchorage Devices: In accordance with SMACNA requirements.
   2. Gutter Supports: Brackets.
   3. Downspout Supports: Brackets.
E. Splash Pads: Precast concrete type, of size and profiles indicated; minimum 3000 psi at 28 days, with minimum 5 percent air entrainment.
F. Seal metal joints.

2.5 FACTORY FINISHING

A. PVDF coating: Multiple coat, thermally cured, fluoropolymer system conforming to AAMA 605.2.
B. Primer Coat: Finish concealed side of metal sheets with primer compatible with finish system, as recommended by finish system manufacturer.
   1. All metal materials to be delivered to the site with protective, strippable plastic film.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.
B. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
C. Verify roofing termination and base flashings are in place, sealed, and secure.
   1. Verify that surfaces to receive sheet metal are smooth and clean will not impinge upon the integrity of the sheet metal.
D. Verify that all wood blocking to receive sheet metal is properly installed, anchored without warps and covered with EPDM.
E. Do not start sheet metal work until conditions relevant to sheet metal work are acceptable. Commencing of work will indicate acceptance of condition.

3.2 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.
B. Install surface mounted reglets true to lines and levels. Seal top of reglets with sealant.
C. Lay out joints to be symmetrical about the building corners. May require more than one run be cut down to attain symmetry.
D. Paint dissimilar metals with bituminous paint to form a complete barrier.

3.3 INSTALLATION

A. Secure flashings in place using concealed fasteners as indicated.
   1. Apply plastic cement compound between metal flashings and felt flashings.
      a. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles. Install work watertight, without buckles, warps, fastening stresses or distortion. Allow for expansion and contraction.

B. Apply plastic cement compound between metal flashings and felt flashings.

C. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.

D. Seal metal joints watertight.

E. Continuous Cleats: Set in water cut-off mastic supplied by the Roofing Contractor or sealant, as indicated in the drawings. Secure to the surface with nail fasteners through 1/4-inch predrilled pilot holes at 4-inch on center.

F. Verify that height of roof base flashing and termination bar allows for installation of counter-flashing and sealant below weep holes and through-wall flashing.

G. Copings: Set continuous cleat in a full bed of water cut-off mastic supplied by the roofing contractor. Cover roof edge with rosin paper. Set the outside and inside corners. Secure with ¾" x ¼" Atlas HHA stainless steel Type A point screw fasteners with neoprene washers that are covered with sealant, following Architect's approval.
   1. Lay out coping joints symmetrical about the building corners. May require multiple cutting at 10'-0" lengths to achieve same. Install backer plates at joint locations. Nail through predrilled 1/4-inch pilot holes. Apply continuous sealant to backer plate vertical and horizontal surfaces as indicated in drawings.
   2. Run joints at +10'-0", except where the cut pieces are required for symmetry between existing corners.
   3. Secure coping to continuous cleat and pull coping over roof edge wood block. Cut 10'- 0" lengths to size to provide symmetrical placement between existing building corners.
   4. Verify coping is tight to wood blocking. Anchor with 1-¼" x ¼" Atlas HHA stainless steel screw fasteners, Type A points with neoprene washers. Cover with sealant, following Architect's approval.
   5. Install sealant to each side of joints.
   6. Install drive cleat.

H. Fascias:
   1. Set continuous cleat in full bed of [sealant] water cut-off mastic supplied by Roofing Contractor. Secure with nails at 4" on center through ¼" pre-drilled pilot holes.
   2. Set the outside and inside corners. Secure with nails at 4" o.c. through ¼" pre-drilled pilot holes.
   3. Lay out fascia joints symmetrical about corners. May require multiple cutting to achieve lengths of 10'-0".
   4. Install backer plates at joint locations in full bed of water cut-off mastic supplied by the roofing contractor. Nail through pre-drilled pilot holes. Install bond breaker tape down the center, as indicated on drawings.
   5. Apply continuous sealant to backer plate vertical and horizontal surfaces as indicated in drawings.
   6. Apply continuous sealant to top of backer plate.
   7. Running joints at +10'-0", except where the cut pieces are required for symmetry between the existing corners.
   8. Secure fascia to continuous cleat and nail at 4" o.c. through 1/4-inch pre-drilled pilot holes.

I. Counter-flashing:
   1. Overlap the base flashing a minimum of 3".
   2. Install continuous butyl caulk tape to vertical portion of the counter-flashing.
   3. Secure to the masonry with 1-¼" x 3/16" tapcons with climaseal corrosion resistive coating and neoprene washers at 1'-0" on center through 5/16" pre-drilled pilot holes. Cover with sealant following the Architect's approval.
   4. Lap counter-flashing pieces 3" with bead of sealant and between pieces.

5. Cover fastener heads with sealant after the Architect's approval.
6. Fill sealant reservoir with sealant to shed water.
7. Counter-flashing Corner Pieces: Install pieces per Steps 1 through 6 in 3.3.P.. above.

J. End Wall Flashings:
1. Set in full bed of water cut-off mastic.
2. Secure with screw fasteners through ¼" pre-drilled pilot holes as indicated on drawings.
3. Coordinate installation with roofing contractor.
4. Have the roofing contractor flash in vertical flange of end wall flashing.
5. Install coping, or standing seam siding, over the end wall flashing by:
6. Secure to end wall flashing vertical flange and pulling coping over the roof edge wood blocking, or, securing to the continuous clip and laying against mansard

K. Thru Wall Flashing: Coordinate with masonry contractor.

L. Miscellaneous Flashings: Install as indicated on drawings.
1. Coordinate with interfacing contractors.

3.4 CLEANING

A. Leave material clean and free of stains.
B. Remove all sheet metal debris from roof top daily.
C. Remove all sheet metal debris from site daily.

3.5 FIELD QUALITY CONTROL

A. See Section 01400 - Quality Requirements, for field inspection requirements.
B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

3.6 SCHEDULE

A. Copings: As indicated on Drawings.
B. Fascias: As indicated on Drawings.
C. Endwall flashings: As indicated on Drawings.
D. Through-Wall Flashing in Masonry:
1. Material: Stainless Steel.

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.

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. 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.
4. 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.
5. Framed Floors:
   a. UL Design No. F-C-1002, F-C-1010, F-C-1059, F Rating 1 & 2 hour.
6. Framed Walls:
   a. UL Design No. W-L-1001, W-L-1049, W-L-1054, F Rating 1 & 2 hour.
   b. UL Design No. W-L-1001, W-L-1172, F Rating 3 hour.

C. Firestopping at Metallic Pipe, Conduit, or Tubing Penetrations, of diameter 4 inches or less; for multiple penetrations: Any material meeting requirements.
1. Concrete Floors 5 inches in thickness or less:
   a. UL Design No. C-AJ-1092, C-AJ-1047, C-AJ-1140, F Rating 1 & 2 hour.
   b. UL Design No. C-AJ-1234, F Rating 3 hour.
2. Concrete Floors 5 inches in thickness or greater:
   a. UL Design No. C-AJ-1003, F Rating 1 & 2 hour.
3. Roof Slabs 5 inches in thickness or less:
   a. UL Design No. C-AJ-1092, C-AJ-1047, C-AJ-1140, F Rating 1 & 2 hour.
   b. UL Design No. C-AJ-1234, F Rating 3 hour.
4. Roof Slabs 5 inches in thickness or greater:
   a. UL Design No. C-AJ-1003, F Rating 1 & 2 hour.
5. Concrete/Masonry Walls 8 inches in thickness or less:
   a. UL Design No. C-AJ-1092, C-AJ-1047, C-AJ-1140, F Rating 1 & 2 hour.
   b. UL Design No. C-AJ-1234, F Rating 3 hour.
6. Concrete/Masonry Walls 8 inches in thickness or greater:
   a. UL Design No. C-AJ-1003, F Rating 1 & 2 hour.
7. Framed Floors:
   a. UL Design No. F-C-1065, F-C-1066, F Rating 1 & 2 hour.
8. Framed Walls:
   a. UL Design No. W-L-1001, W-L-1049, W-L-54, F Rating 1 & 2 hour.
   b. UL Design No. W-L-1001, W-L-1172, F Rating 3 & 4 hour.

D. Firestopping at Non-Metallic Pipe, Conduit, or Tubing Penetrations, of diameter 4 inches or less; for single penetrations: Any material meeting requirements.
1. Concrete Floors 5 inches in thickness or less:
   a. UL Design No. C-AJ-2143, C-AJ-2063, C-AJ-2271, F Rating 1 & 2 hour.
   b. UL Design No. C-AJ-2117, C-AJ-2038, C-AJ-2271, F Rating 3 hour.
2. Concrete Floors 5 inches in thickness or greater:
   a. UL Design No. C-AJ-2001, C-AJ-2002, F Rating 1 & 2 hour.

b. UL Design No. C-AJ-2001, C-AJ-2002, F Rating 3 & 4 hour.

3. Roof Slabs 5 inches in thickness or less:
   a. UL Design No. C-AJ-2143, C-AJ-2063, C-AJ-2271, F Rating 1 & 2 hour.
   b. UL Design No. C-AJ-2117, C-AJ-2038, C-AJ-2271, F Rating 3 hour.
4. Roof Slabs 5 inches in thickness or greater:
   a. UL Design No. C-AJ-2001, C-AJ-2002, F Rating 1 & 2 hour.
   b. UL Design No. C-AJ-2001, C-AJ-2002, F Rating 3 & 4 hour.
5. Concrete/Masonry Walls 8 inches in thickness or less:
   a. UL Design No. C-AJ-2143, C-AJ-2063, C-AJ-2271, F Rating 1 & 2 hour.
   b. UL Design No. C-AJ-2117, C-AJ-2038, C-AJ-2271, F Rating 3 hour.
6. Concrete/Masonry Walls 8 inches in thickness or greater:
   a. UL Design No. C-AJ-2001, C-AJ-2002, F Rating 1 & 2 hour.
   b. UL Design No. C-AJ-2001, C-AJ-2002, F Rating 3 & 4 hour.
7. Framed Floors:
   a. UL Design No. F-C-2024, F-C-2020, F-C-2025, F Rating 1 & 2 hour.
8. Framed Walls:
   a. UL Design No. W-L-2162, W-L-2047, W-L-2075, F Rating 1 & 2 hour.
   b. UL Design No. W-L-2162, W-L-2195, F Rating 3 hour.

E. Firestopping at Non-Metallic Pipe, Conduit, or Tubing Penetrations, of diameter 4 inches or less; for multiple penetrations: Any material meeting requirements.
   1. Concrete Floors 5 inches in thickness or less:
      a. UL Design No. C-AJ-2093, C-AL-2140, F Rating 1 & 2 hour.
      b. UL Design No. C-AJ-2092, F Rating 3 hour.
   2. Roof Slabs 5 inches in thickness or less:
      a. UL Design No. C-AJ-2093, C-AL-2140, F Rating 1 & 2 hour.
      b. UL Design No. C-AJ-2092, F Rating 3 hour.
   3. Concrete/Masonry Walls 8 inches in thickness or less:
      a. UL Design No. C-AJ-2093, C-AL-2140, F Rating 1 & 2 hour.
      b. UL Design No. C-AJ-2092, F Rating 3 hour.
   4. Framed Floors:
      a. UL Design No. F-C-2115, F-C-2129, F-C-2158, F Rating 1 & 2 hour.
   5. Framed Walls:
      a. UL Design No. C-AJ-2021, W-L-2032, F Rating 1 & 2 hour.

F. Firestopping at Cable Tray Penetrations: Any material meeting requirements.
   1. Concrete Floors 5 inches in thickness or less:
      a. UL Design No. C-AJ-4003, C-AJ-4020, C-AJ-4017, F Rating 1 & 2 hour.
      b. UL Design No. C-AJ-4003, C-AJ-4020, C-AJ-4017, F Rating 3 hour.
   2. Roof Slabs 5 inches in thickness or less:
      a. UL Design No. C-AJ-4003, C-AJ-4020, C-AJ-4017, F Rating 1 & 2 hour.
      b. UL Design No. C-AJ-4003, C-AJ-4020, C-AJ-4017, F Rating 3 hour.
   3. Concrete/Masonry Walls 8 inches in thickness or less:
      a. UL Design No. C-AJ-4003, C-AJ-4020, C-AJ-4017, F Rating 1 & 2 hour.
      b. UL Design No. C-AJ-4003, C-AJ-4020, C-AJ-4017, F Rating 3 hour.
   4. Framed Walls:
      a. UL Design No. W-L-4004, W-L-4005, W-L-4011, F Rating 1 & 2 hour.

G. Firestopping at Cable Penetrations, not in Conduit or Cable Tray: Any material meeting requirements.
   1. Concrete Floors 5 inches in thickness or less:
      a. UL Design No. C-AJ-3030, C-AJ-3133, C-AJ-3072, F Rating 1 & 2 hour.
      b. UL Design No. C-AJ-3030, C-AJ-3023, C-AJ-3072, F Rating 3 hour.
   2. Concrete Floors 5 inches in thickness or greater:
      a. UL Design No. C-BK-3001, C-BK-3002, F Rating 1 & 2 hour.
      b. UL Design No. C-BK-3001, C-BK-3002, F Rating 3 hour.
   3. Roof Slabs 5 inches in thickness or less:
      a. UL Design No. C-AJ-3030, C-AJ-3133, C-AJ-3072, F Rating 1 & 2 hour.

b. UL Design No. C-AJ-3030, C-AJ-3023, C-AJ-3072, F Rating 3 hour.

4. Roof Slabs 5 inches in thickness or greater:
   a. UL Design No. C-BK-3001, C-BK-3002, F Rating 1 & 2 hour.
   b. UL Design No. C-BK-3001, C-BK-3002, F Rating 3 hour.
5. Concrete/Masonry Walls 8 inches in thickness or less:
   a. UL Design No. C-AJ-3030, C-AJ-3133, C-AJ-3072, F Rating 1 & 2 hour.
   b. UL Design No. C-AJ-3030, C-AJ-3023, C-AJ-3072, F Rating 3 hour.
6. Concrete/Masonry Walls 8 inches in thickness or greater:
   a. UL Design No. C-BK-3001, C-BK-3002, F Rating 1 & 2 hour.
   b. UL Design No. C-BK-3001, C-BK-3002, F Rating 3 hour.
7. Framed Floors:
   a. UL Design No. F-C-3002, F-C-3045, F-C-3012, F Rating 1 & 2 hour.
8. Framed Walls:
   a. UL Design No. W-L-3110, W-L-3076, W-L-3065, F Rating 1 & 2 hour.
   b. UL Design No. W-L-3139, F Rating 3 hour.

H. Firestopping at Insulated Piping: Any material meeting requirements.
1. Concrete Floors 5 inches in thickness or less:
   a. UL Design No. C-AJ-5001, C-AJ-5058, C-AJ-5045, F Rating 1 & 2 hour.
   b. UL Design No. C-AJ-5001, C-AJ-5058, C-AJ-5061, F Rating 3 hour.
2. Concrete Floors 5 inches in thickness or greater:
   a. UL Design No. C-BK-5001, C-BK-5002, F Rating 1 & 2 hour.
   b. UL Design No. C-BK-5001, C-BK-5002, F Rating 3 hour.
3. Roof Slabs 5 inches in thickness or less:
   a. UL Design No. C-AJ-5001, C-AJ-5058, C-AJ-5045, F Rating 1 & 2 hour.
   b. UL Design No. C-AJ-5001, C-AJ-5058, C-AJ-5061, F Rating 3 hour.
4. Roof Slabs 5 inches in thickness or greater:
   a. UL Design No. C-BK-5001, C-BK-5002, F Rating 1 & 2 hour.
   b. UL Design No. C-BK-5001, C-BK-5002, F Rating 3 hour.
5. Concrete/Masonry Walls 8 inches in thickness or less:
   a. UL Design No. C-AJ-5001, C-AJ-5058, C-AJ-5045, F Rating 1 & 2 hour.
   b. UL Design No. C-AJ-5001, C-AJ-5058, C-AJ-5061, F Rating 3 hour.
6. Concrete/Masonry Walls 8 inches in thickness or greater:
   a. UL Design No. C-AJ-5001, C-AJ-5058, C-AJ-5045, F Rating 1 & 2 hour.
   b. UL Design No. C-AJ-5001, C-AJ-5058, C-AJ-5061, F Rating 3 hour.
7. Framed Floors:
   a. UL Design No. F-C-5038, F-C-5055, F-C-5029, F Rating 1 & 2 hour.
8. Framed Walls:
   a. UL Design No. W-L-5011, W-L-5014, W-L-5029, F Rating 1 & 2 hour.
   b. UL Design No. W-L-5101, W-L-5023, W-L-5085, F Rating 3 hour.

I. Firestopping at Miscellaneous Electrical Penetrants such as Busducts: Any material meeting requirements.
1. Concrete Floors 5 inches in thickness or less:
   a. UL Design No. C-AJ-6002, C-AJ-6003, C-AJ-6006, F Rating 1 & 2 hour.
   b. UL Design No. C-AJ-6002, C-AJ-6003, C-AJ-6006, F Rating 3 hour.
2. Roof Slabs 5 inches in thickness or less:
   a. UL Design No. C-AJ-6002, C-AJ-6003, C-AJ-6006, F Rating 1 & 2 hour.
   b. UL Design No. C-AJ-6002, C-AJ-6003, C-AJ-6006, F Rating 3 hour.
3. Concrete/Masonry Walls 8 inches in thickness or less:
   a. UL Design No. C-AJ-6002, C-AJ-6003, C-AJ-6006, F Rating 1 & 2 hour.
   b. UL Design No. C-AJ-6002, C-AJ-6003, C-AJ-6006, F Rating 3 hour.
4. Framed Walls:
   a. UL Design No. W-L-6002, W-L-6001, W-L-6004, F Rating 1 & 2 hour.

J. Firestopping at Miscellaneous Mechanical Penetrants such as Air Ducts: Any material meeting requirements.
1. Concrete Floors 5 inches in thickness or less:

a. UL Design No. C-AJ-7013, C-AJ-7047, F Rating 1 & 2 hour.
b. UL Design No. C-AJ-7003, C-AJ-7046, F Rating 3 hour.

2. Roof Slabs 5 inches in thickness or less:
   a. UL Design No. C-AJ-7013, C-AJ-7047, F Rating 1 & 2 hour.
   b. UL Design No. C-AJ-7003, C-AJ-7046, F Rating 3 hour.
3. Concrete/Masonry Walls 8 inches in thickness or less:
   a. UL Design No. C-AJ-7013, C-AJ-7047, F Rating 1 & 2 hour.
   b. UL Design No. C-AJ-7003, C-AJ-7046, F Rating 3 hour.
4. Framed Floors:
   a. UL Design No. F-C-7001, F-C-7002, F-C-7013, F Rating 1 & 2 hour.
5. Framed Walls:
   a. UL Design No. W-L-7041, W-L-7025, W-L-7040, F Rating 1 & 2 hour.

K. Firestopping at Groupings of penetrations including any combination of items above: Any material meeting requirements.
   1. Concrete Floors 5 inches in thickness or less:
      a. UL Design No. C-AJ-8001, C-AJ-8016, C-AJ-8041, F Rating 1 & 2 hour.
      b. UL Design No. C-AJ-8001, C-AJ-8016, C-AJ-8041, F Rating 3 hour.
   2. Roof Slabs 5 inches in thickness or less:
      a. UL Design No. C-AJ-8001, C-AJ-8016, C-AJ-8041, F Rating 1 & 2 hour.
      b. UL Design No. C-AJ-8001, C-AJ-8016, C-AJ-8041, F Rating 3 hour.
   3. Concrete/Masonry Walls 8 inches in thickness or less:
      a. UL Design No. C-AJ-8001, C-AJ-8016, C-AJ-8041, F Rating 1 & 2 hour.
      b. UL Design No. C-AJ-8001, C-AJ-8016, C-AJ-8041, F Rating 3 hour.
   4. Framed Walls:
      a. UL Design No. W-L-8013, W-L-8016, F Rating 1 & 2 hour.
      b. UL Design No. W-L-8014, W-L-8015, F Rating 3 hour.

L. 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.

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 RELATED SECTIONS
A. Section 08800 – Glazing: Glazing sealants and accessories.
B. Section 09260 – Gypsum Board Assemblies: Acoustic Sealant.
C.

1.3 REFERENCES
A. Unless noted otherwise the most current issue of the reference shall be used.
B. ASTM C 834 - Standard Specification for Latex Sealants.
C. ASTM C 919 - Standard Practice for Use of Sealants in Acoustical Applications
D. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants
E. ASTM C 1193 - Standard Guide for Use of Joint Sealants
F. ASTM D 1667 - Standard Specification for Flexible Cellular Materials--Vinyl Chloride Polymers and Copolymers (Closed-Cell Foam

1.4 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.

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

1.6 ENVIRONMENTAL REQUIREMENTS
A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.7 WARRANTY
A. See section 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 MANUFACTUERS
A. Silicone Sealants:
   1. Bostik Findley; www.bostikfindley-us.com.
   2. GE Plastics: www.geplastics.com.
   3. Pecora Corporation: www.pecora.com.
   4. Sonneborn, ChemRex, Inc; www.chemrex.com.
   5. Dow Corning: www.dowcorning.com
   6. Tremco, Inc: www.tremcosealants.com.
   7. Substitutions: See Section 01600 - Product Requirements.
B. Polyurethane Sealants:
   1. Bostik Findley; www.bostikfindley-us.com.
   2. Pecora Corporation: www.pecora.com.
   3. Sonneborn, ChemRex, Inc; www.chemrex.com.
   4. Tremco, Inc: www.tremcosealants.com.

5. Substitutions: See Section 01600 - Product Requirements.

C. Butyl Sealants:
1. Bostik Findley; www.bostikfindley-us.com.
2. Pecora Corporation: www.pecora.com.
3. TEC Specialty Products Inc.
4. Tremco, Inc: www.tremcosealants.com.
5. Substitutions: See Section 01600 - Product Requirements.

D. Preformed Compressible Foam Sealers:
1. Emseal Joint Systems, Ltd: www.emseal.com.
2. Sandell Manufacturing Company, Inc: www.sandellmfg.com.
3. Polytite Manufacturing Corporation: www.polytite.com.
4. Substitutions: See Section 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.

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 08110

STEEL DOORS AND FRAMES

PART 1 – GENERAL

1.1 SECTION INCLUDES
A. Non-fire-rated steel doors and frames.
B. Steel frames for wood doors.
C. Fire-rated steel doors and frames.

1.2 RELATED SECTIONS
A. Section 08710 - Door Hardware.
B. Section 08800 - Glazing: Glass for doors and borrowed lites.
C. Section 09900 - Paints and Coatings: Field painting.

1.3 REFERENCES
A. Unless noted otherwise the most current issue of the reference shall be used.
B. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code CouncilANSI A250.8 - SDI-100 Recommended Specifications for Standard Steel Doors and Frames
C. ANSI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames
D. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
E. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus
F. NAAMM HMMA 840 - Installation and Storage of Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers
G. NAAMM HMMA 860 - Guide Specifications for Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers.
H. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers
I. NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association
J. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association
K. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.

1.4 SUBMITTALS
A. See Section 01300 - Administrative Requirements for submittal procedures.
B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced grade standard.
C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and identifying location of different finishes, if any.
D. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE
A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum Five years documented experience.
B. Maintain at the project site a copy of all reference standards dealing with installation.

1.6 DELIVERY, STORAGE, AND PROTECTION
A. Store in accordance with NAAMM HMMA 840.
B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion.

PART 2 – PRODUCTS

2.1 MANUFACTUERS

A. Steel Doors and Frames:
   1. Ceco Door Products; www.cecodoor.com.
   2. Curries; www.curries.com.
   3. Kewanee Corp., Kewanee, IL.
   4. LaForce Inc.; www.laforceinc.com.
   5. Republic Builders Products; www.republicdoor.com.
   6. Steelcraft Manufacturing Co; www.steelcraft.com.
   7. Trussbilt; www.trussbilt.com.
   8. Substitutions: See Section 01600 - Product Requirements.

2.2 DOORS AND FRAMES

A. Requirements for All Doors and Frames:
   1. Door Top Closures: Flush with top of faces and edges.
   2. Door Edge Profile: Beveled on both edges.
   3. Door Texture: Smooth faces.
   4. .
   5. Hardware Preparation: In accordance with DHI A115 Series, with reinforcement welded in place, in addition to other requirements specified in door grade standard.
   6. Galvanizing for Units in Wet Areas: All components hot-dipped zinc-iron alloy-coated (galvannealed), Manufacturer's standard coating thickness.
   7. Finish: Factory primed, for field finishing.

B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with all the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.3 STEEL DOORS

A. Exterior Doors:
   1. Grade: NAAMM HMMA 861, physical performance Level A.
      a. Minimum Hardware Reinforcing:
         1) Butts: #7 gauge steel.
         2) Locks: #12 gauge steel.
         3) Surface Applied Hardware: #12 gauge steel.
   2. Core: Foamed in place polyurethane.
   3. Top Closures for Out swinging Doors: Flush with top of faces and edges.
   4. Texture: Smooth faces.
   5. Finish: Factory primed, for field finishing.
   6. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A 653/A 653M, with manufacturer's standard coating thickness.
   7. Weatherstripping: See Section 08710 - Hardware

B. Interior Doors, Non-Fire-Rated:
   1. Grade: NAAMM HMMA 860, physical performance Level A.
      a. Minimum Hardware Reinforcing: Same as specified for exterior doors.
   2. Core: Mineral rock wool, 6 lb. density or fiberglass.
   3. Thickness: 1-3/4 inches.
   4. Texture: Smooth faces.
   5. Finish: Factory primed, for field finishing.
   6. Minimum Reinforcing Size:
      a. Butts and Pivots: Full interior width at door by 10-inches long.
      b. Closers: Inverted channel, 6-inch sides by 18 inches long.
      c. Other Surface Applied Hardware: To template.

d. Locks: To template.

C. Drilling and tapping for surface applied hardware shall be done in the field.
D. Provide hardware reinforcing for closers on all doors.
E. Interior Doors, Fire-Rated:
1. Grade: NAAMM HMMA 861, physical performance Level A.
2. Fire Rating: As indicated on Door and Frame Schedule, with temperature rise ratings as required by code, tested in accordance with NFPA 252.
a. Provide units listed and labeled by UL.
b. Attach fire rating label to each fire rated unit.
3. Minimum Hardware Reinforcing: Same as specified for interior non-fire rated doors.
4. Texture: Smooth faces.
5. Finish: Factory primed, for field finishing.

2.4 STEEL FRAMES

A. General: Provide fully welded frames.
1. Comply with the requirements of grade specified for corresponding door, except:
a. Provide 16 gage frames, except provide #14 gauge galvanized for exterior doors.
2. Hardware Reinforcing:
a. Butts and Pivots: 1/4-inch thick.
b. Locks: # 12 gauge.
c. Surface Applied Hardware: #12 gauge.
d. Dust Covers: #20 gauge.
3. Frame Anchors: #14 gauge, corrugated "T" anchors.
a. Frames for Wood Doors: Comply with frame requirements specified in ANSI A250.8 for Level 1, 16 gage
4. Minimum Reinforcing Size:
a. Butts and Pivots: Full width of frame by 10-inches long.
b. Closers: Full width of frame by 18-inches long.
c. Locks: As required by template.
d. Other Surface Applied Hardware: As required by template.
5. Finish: Factory primed, for field finishing.
a. Frame installer shall coat the interior portion of all exterior frames with a bituminous coating after factory priming and prior to installation (both jambs).
6. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
7. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inches high to fill opening without cutting masonry units.
8. Frames Wider than 48 Inches: Reinforce with steel channel fitted tightly into frame head, flush with top.
9. Exterior Door Frames: Fully welded.
a. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A 653/A 653M, with manufacturer’s standard coating thickness.
b. Weatherstripping: See Section 08710 - Hardware
10. Interior Door Frames, Non-Fire-Rated: Fully welded type.
11. Interior Door Frames, Fire-Rated: Fully welded type.
a. Fire Rating: Same as door, labeled.
B. Mullions for Pairs of Doors: Fixed, of profile similar to jambs.
C. Frames for Interior Glazing or Borrowed Lights: Construction and face dimensions to match door frames, and as indicated on drawings.
D. Transom Bars: Fixed, of profile same as jamb and head.

2.5 ACCESSORY MATERIALS

A. Louvers: Roll formed steel with overlapping frame; factory-painted finish, color as selected; factory-installed.
1. In Fire-Rated Doors: UL-listed fusible link louver, same rating as door.

2. Style: Standard straight slat blade.

B. Glazing: As specified in Section 08800.

C. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.

D. Bitumastic coating for interior side of steel frames:

1. Installing contractor applied, ultra-high build, single-component coat tar for protecting steel substrates subject to aggressive conditions and below grade requirements complying with MIL-C-18480-B and Bureau of Reclamation CA50 specifications. Apply wet to 18.0 mils (450 microns) in one or two coats. Total dry film thickness of not less than 12 mils (300 microns) or in excess of 30 mils.
2. Frame installation contractor to provide bitumastic coating for all exterior door frames for frame prior to frame installation.

E. Grout for Frames: Portland cement grout of maximum 4-inch slump for hand troweling; thinner pumpable grout is prohibited unless approved in writing by Architect for areas only inaccessible to troweling during installation.

F. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.

G. Temporary Frame Spreaders: Provide for all factory- or shop-assembled frames.

2.6 FINISH MATERIALS

A. Primer: Rust-inhibiting, complying with ANSI A250.10, door manufacturer's standard.

B. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

3.2 PREPARATION

A. Frame installing contractor shall coat inside of frames to be installed in masonry or to be grouted, with bituminous coating prior to installation as noted. Apply wet to 18.0 mils (450 microns) in one or two coats. Total dry film thickness of not less than 12 mils (300 microns) or in excess of 30 mils.

3.3 INSTALLATION

A. Install in accordance with the requirements of the specified door grade standard and NAAMM HMMA 840.

B. In addition, install fire rated units in accordance with NFPA 80.

C. Coordinate frame anchor placement with wall construction.

D. Grout frames in solid masonry construction; brace frames so that pressure of grout before setting will not deform frames.

E. Coordinate installation of hardware.

F. Coordinate installation of glazing.

G. Whenever possible, leave frame spreaders intact until frames and masonry are set perfectly square and plumb and all anchors are securely attached. Grout all frames solid.

H. Coordinate installation of electrical connections to electrical hardware or security devices.

I. Grind, bondo, sand, prime and paint over grout holes, anchor heads and any imperfections in frame.

J. Touch up damaged factory finishes.

3.4 ERECTION TOLERANCES

A. Clearances between Door and Frame: As specified in ANSI A250.8.

B. Maximum Diagonal Distortion: 1/16 in measured with straight edge, corner to corner.

C. Do not erect members which are observed to be warped, bowed, deformed, or otherwise damaged or defaced to such an extent as to impair strength or appearance. Remove and replace members which have been damaged in the process of erection.

3.5 ADJUSTING

A. Adjust for smooth and balanced door movement.

3.6 SCHEDULE

A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION

SECTION 08255

FRP FLUSH DOOR SYSTEMS

PART 1 – GENERAL

1.1 SECTION INCLUDES
A. Fiberglass reinforced polyester (FRP) flush doors with aluminum frames.

1.2 RELATED SECTIONS
A. Section 08710 - Door Hardware.

1.3 REFERENCES
A. Unless noted otherwise the most current issue of the reference shall be used.
B. AAMA 1503-98 - Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.
C. ANSI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcings.
D. ASTM B 117 - Operating Salt Spray (Fog) Apparatus.
E. ASTM B 209 - Aluminum and Aluminum-Alloy Sheet and Plate.
F. ASTM B 221 - Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
G. ASTM D 256 - Determining the Pendulum Impact Resistance of Notched Specimens of Plastics.
H. ASTM D 543 - Evaluating the Resistance of Plastics to Chemical Reagents.
I. ASTM D 570 - Water Absorption of Plastics.
J. ASTM D 638 - Tensile Properties of Plastics.
K. ASTM D 790 - Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
L. ASTM D 1308 - Effect of Household Chemicals on Clear and Pigmented Organic Finishes
M. ASTM D 1621 - Compressive Properties of Rigid Cellular Plastics.
N. ASTM D 1623 - Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics.
O. ASTM D 2126 - Response of Rigid Cellular Plastics to Thermal and Humid Aging.
P. ASTM D 2583 - Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor.
Q. ASTM D 5420 – Impact Resistance of Flat Rigid Plastic Specimens by Means of a Falling Weight.
R. ASTM D 6670-01 - Standard Practice for Full-Scale Chamber Determination of Volatile Organic Emissions from Indoor Materials/Products.
S. ASTM E 84 - Surface Burning Characteristics of Building Materials.
T. ASTM E 90 - Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.
U. ASTM E 283 - Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
V. ASTM E 330 - Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
W. ASTM E 331 - Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
X. ASTM F 476 - Security of Swinging Door Assemblies.
Y. ASTM F 1642-04 – Standard Test Method for Glazing Systems Subject to Air blast Loading
Z. NWWDA T.M. 7-90 – Cycle Slam Test Method
AA. SFBC PA 201 - Impact Test Procedures.
BB. SFBC PA 203 - Criteria for Testing Products Subject to Cyclic Wind Pressure Loading.
CC. SFBC 3603.2 (b)(5) - Forced Entry Resistance Test.

1.4 PERFORMANCE REQUIREMENTS
A. General: Provide door assemblies that have been designed and fabricated to comply with specified performance requirements, as demonstrated by testing manufacturer's corresponding standard systems.
B. Air Infiltration: For a single door 3’-0” x 7’-0”, test specimen shall be tested in accordance with ASTM E 283 at pressure differential of 6.24 psf. Door shall not exceed 0.90 cfm per linear foot of perimeter crack.
C. Water Resistance: For a single door 3’-0” x 7’-0”, test specimen shall be tested in accordance

with ASTM E 331 at pressure differential of 7.50 psf. Door shall not have water leakage.

D. Swinging Door Cycle Test, Doors and Frames, ANSI A250.4: Minimum of 25,000,000 cycles.
E. Cycle Slam Test Method, NWWDA T.M. 7-90: Minimum 5,000,000 Cycles.
F. Sound Transmission, Exterior Doors, STC, ASTM E 90: Minimum of 25.
G. Thermal Transmission, Exterior Doors, U-Value, AAMA 1503-98: Maximum of 0.29 BTU/hr x sf x degrees F. Minimum of 55 CRF value.
   1. U-Value: 0.77.
H. Surface Burning Characteristics, FRP Doors and Panels, ASTM E 84:
   1. Flame Spread: Maximum of 200, Class C.
   2. Smoke Developed: Maximum of 450, Class C.
I. Surface Burning Characteristics, Class A Option On Interior Faces of FRP Exterior Panels and Both Faces of FRP Interior Panels, ASTM E 84:
   1. Flame Spread: Maximum of 25.
   2. Smoke Developed: Maximum of 450.
J. Impact Strength, FRP Doors and Panels, Nominal Value, ASTM D 256: 15.0 foot-pounds per inch of notch.
K. Tensile Strength, FRP Doors and Panels, Nominal Value, ASTM D 638: 14,000 psi.
L. Flexural Strength, FRP Doors and Panels, Nominal Value, ASTM D 790: 21,000 psi.
M. Water Absorption, FRP Doors and Panels, Nominal Value, ASTM D 570: 0.20 percent after 24 hours.
N. Indentation Hardness, FRP Doors and Panels, Nominal Value, ASTM D 2583: 55.
O. Gardner Impact Strength, FRP Doors and Panels, Nominal Value, ASTM D 5420: 120 in-lb.
P. Abrasion Resistance, Face Sheet, Taber Abrasion Test, 25 Cycles at 1,000 Gram Weight with CS-17 Wheel: Maximum of 0.029 average weight loss percentage.
Q. Stain Resistance, ASTM D 1308: Face sheet unaffected after exposure to red cabbage, tea, and tomato acid. Stain removed easily with mild abrasive or FRP cleaner when exposed to crayon and crankcase oil.
R. Chemical Resistance, ASTM D 543. Excellent rating.
   1. Acetic acid, Concentrated.
   2. Ammonium Hydroxide, Concentrated.
   3. Citric Acid, 10%.
   4. Formaldehyde.
   5. Hydrochloric Acid, 10%
   6. Sodium hypochlorite, 4 to 6 percent solution.
S. Compressive Strength, Foam Core, Nominal Value, ASTM D 1621: 79.9 psi.
T. Compressive Modulus, Foam Core, Nominal Value, ASTM D 1621: 370 psi
U. Tensile Adhesion, Foam Core, Nominal Value, ASTM D 1623: 45.3 psi
V. Thermal and Humid Aging, Foam Core, Nominal Value, 158 Degrees F and 100 Percent Humidity for 14 Days, ASTM D 2126: Minus 5.14 percent volume change.

1.5 SUBMITTALS

A. Product Data: Submit manufacturer's product data, including description of materials, components, fabrication, finishes, and installation.
B. Shop Drawings: Submit manufacturer's shop drawings, including elevations, sections, and details, indicating dimensions, tolerances, materials, fabrication, doors, panels, framing, hardware schedule, and finish.
C. Samples:
   1. Door: Submit manufacturer's sample of door showing face sheets, core, framing, and finish.
   2. Color: Submit manufacturer's samples of standard colors of doors and frames.
D. Test Reports: Submit certified test reports from qualified independent testing agency indicating doors comply with specified performance requirements.
E. Manufacturer's Project References: Submit list of successfully completed projects including project name and location, name of architect, and type and quantity of doors manufactured.
F. Maintenance Manual: Submit manufacturer's maintenance and cleaning instructions for doors, including maintenance and operating instructions for hardware.

G. Warranty: Submit manufacturer's standard warranty.

1.6 QUALITY ASSURANCE

A. Manufacturer's Qualifications:
   1. Continuously engaged in manufacturing of doors of similar type to that specified, with a minimum of 25 years successful experience.
   2. Door and frame components from same manufacturer.
   3. Evidence of a compliant documented quality management system.

1.7 DELIVERY, STORAGE, AND PROTECTION

A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying opening door mark and manufacturer.
B. Storage: Store materials in clean, dry area indoors in accordance with manufacturer's instructions.
C. Handling: Protect materials and finish from damage during handling and installation.

1.8 WARRANTY

A. Warrant doors, frames, and factory hardware against failure in materials and workmanship, including excessive deflection, faulty operation, defects in hardware installation, and deterioration of finish or construction in excess of normal weathering.
B. Warranty Period: Ten years starting on date of shipment. In addition, a limited lifetime (while the door is in its specified application in its original installation) warranty covering: failure of corner joinery, core deterioration, delamination or bubbling of door skin.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Special-Lite, Inc., www.special-lite.com
B. Simon Door Company, LLC; www.simondoor.com
C. Substitutions: See Section 01600 – Product Requirements

2.2 FRP FLUSH DOORS

A. Model: SL-17 Flush Doors with SpecLite3 fiberglass reinforced polyester (FRP) face sheets.
B. Door Opening Size: As indicated on the Drawings.
C. Construction:
   1. Door Thickness: 1-3/4 inches.
   2. Stiles and Rails: Aluminum extrusions made from prime-equivalent billet that is produced from 100% reprocessed 6063-T5 alloy recovered from industrial processes, minimum of 2-5/16-inch depth.
   3. Corners: Mitered.
   4. Provide joinery of 3/8-inch diameter full-width tie rods through extruded splines top and bottom integral to standard tubular shaped stiles and rails reinforced to accept hardware as specified.
   5. Securing Internal Door Extrusions: 3/16-inch angle blocks and locking hex nuts for joinery. Welds, glue, or other methods are not acceptable.
   6. Furnish extruded stiles and rails with integral reglets to accept face sheets. Lock face sheets into place to permit flush appearance.
   7. Rail caps or other face sheet capture methods are not acceptable.
   8. Extrude top and bottom rail legs for interlocking continuous weather bar.
   9. Meeting Stiles: Pile brush weatherseals. Extrude meeting stile to include integral pocket to accept pile brush weatherseals.
   10. Bottom of Door: Install bottom weather bar with nylon brush weatherstripping into extruded interlocking edge of bottom rail.
   11. Glue: Use of glue to bond sheet to core or extrusions is not acceptable.

D. Face Sheet:
   1. Material: FRP, 0.120-inch thickness, finish color throughout.
   2. Protective coating: Abuse-resistant engineered surface. Provide FRP with protective coating, or equal.
   3. Texture: To be selected by Architect from Manufacturer's Full Range.
   4. Color: To be selected by Architect.
   5. Adhesion: The use of glue to bond face sheet to foam core is prohibited.
E. Core:
   1. Material: Poured-in-place polyurethane foam.
   2. Density: Minimum of 5 pounds per cubic foot.
   3. R-Value: Minimum of 9.
F. Hardware:
   1. Premachine doors in accordance with templates from specified hardware manufacturers and hardware schedule.
   2. Factory install hardware.

2.3 MATERIALS

A. Aluminum Members:
   1. Aluminum extrusions made from prime-equivalent billet that is produced from 100% reprocessed 6063-T5 alloy recovered from industrial processes: ASTM B 221.
   2. Sheet and Plate: ASTM B 209.
   3. Alloy and Temper: As required by manufacturer for strength, corrosion resistance, application of required finish, and control of color.
B. Components: Door and frame components from same manufacturer.
C. Fasteners:
   1. Material: Aluminum, 18-8 stainless steel, or other noncorrosive metal.
   2. Compatibility: Compatible with items to be fastened.
   3. Exposed Fasteners: Screws with finish matching items to be fastened.

2.4 FABRICATION

A. Sizes and Profiles: Required sizes for door and frame units, and profile requirements shall be as indicated on the Drawings.
B. Coordination of Fabrication: Field measure before fabrication and show recorded measurements on shop drawings.
C. Assembly:
   1. Complete cutting, fitting, forming, drilling, and grinding of metal before assembly.
   2. Remove burrs from cut edges.
D. Welding: Welding of doors or frames is not acceptable.
E. Fit:
   1. Maintain continuity of line and accurate relation of planes and angles.
   2. Secure attachments and support at mechanical joints with hairline fit at contacting members.

2.5 ALUMINUM DOOR FRAMING SYSTEMS

A. Tubular Framing:
   1. Size and Type: As indicated on the Drawings.
   2. Materials: Aluminum extrusions made from prime-equivalent billet that is produced from 100% reprocessed 6063-T5 alloy recovered from industrial processes, 1/8-inch minimum wall thickness.
   3. Applied Door Stops: 0.625-inch high, with screws and weatherstripping. Door stop shall incorporate pressure gasketing for weathering seal. Counterpunch fastener holes in door stop to preserve full metal thickness under fastener head.
   4. Frame Members: Box type with 4 enclosed sides. Open-back framing is not acceptable.
   5. Caulking: Caulk joints before assembling frame members.
   6. Joints:
      a. Secure joints with fasteners.

b. Provide hairline butt joint appearance.
7. Field Fabrication: Field fabrication of framing using stick material is not acceptable.
8. Anchors:
   a. Anchors appropriate for wall conditions to anchor framing to wall materials.
   b. Door Jamb and Header Mounting Holes: Maximum of 24-inch centers.

PART 3 – EXECUTION

3.1 EXAMINATION
A. Examine areas to receive doors. Notify Architect of conditions that would adversely affect installation or subsequent use. Do not proceed with installation until unsatisfactory conditions are corrected.

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

3.3 INSTALLATION
A. Install doors in accordance with manufacturer's instructions.
B. Install doors plumb, level, square, true to line, and without warp or rack.
C. Anchor frames securely in place.
D. Separate aluminum from other metal surfaces with bituminous coatings or other means approved by Architect.
E. Install exterior doors to be weathertight in closed position.
F. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Architect.
G. Remove and replace damaged components that cannot be successfully repaired as determined by Architect.

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

3.5 CLEANING AND PROTECTION
A. Clean doors promptly after installation in accordance with manufacturer's instructions.
B. Do not use harsh cleaning materials or methods that would damage finish.
C. Protect installed doors to ensure that, except for normal weathering, doors will be without damage or deterioration at time of substantial completion.

END OF SECTION

SECTION 08310

ACCESS DOORS AND FRAMES

PART 1 – GENERAL

1.1 SECTION INCLUDES
A. Access doors and frames for walls.

1.2 RELATED SECTIONS
A. Section 04810 – Unit Masonry Assemblies.
B. Section 09260 – Gypsum Board Assemblies.
C. Section 09900 – Paints and Coatings.

1.3 REFERENCES
A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
B. NFPA 80 - Standard for Fire Doors and Other Opening Protectives.
C. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.
D. UL – Fire Resistance Directory.

1.4 DESIGN REQUIREMENTS
A. Fabricate floor access assemblies to support live load of 100 lb/sq ft with deflection not to exceed 1/180 of span.

1.5 SUBMITTALS
A. See Section 01300 - Administrative Requirements, for submittal procedures.
B. Product Data: For each type of access door and frame indicated, include construction details, fire ratings, materials, individual components and profiles, hardware and finishes.
C. Shop Drawings: Show fabrication and installation details of access doors and frames for each type of substrate. Include plans, elevations, sections, details, and attachments to other work.
D. Project Record Documents: Record actual locations of all access units.

1.6 QUALITY ASSURANCE
A. Source Limitations: Obtain each type of access door(s) and frame(s) through one source from a single manufacturer.
B. Size Variations: Obtain Architect's acceptance of manufacturer's standard-size units, which may vary slightly from sizes indicated.

PART 2 – PRODUCTS

2.1 MANUFACTURERS
A. Basis of Design: WB Doors – WB GP 100 Series Premium Access Door – size 36” wide by 36” tall.
B. Or Equal by one of the following manufacturers:
   1. Acudor Products Inc.; www.acudor.com.
   2. Babcock-Davis; www.babcockdavis.com.
   3. Bar-Co, Inc.; www.alfabinc.com/barco.html.
   4. Cendrex Inc.; www.cendrex.com.
   5. Dur-Red Products; www.dur-red.com.
   6. Elmdor/Stoneman; www.elmdorstoneman.com.
   7. J.L. Industries, Inc.; www.activarcpg.com/jl-industries.
   8. Karp Associates, Inc: www.karpinc.com.
   9. Larsen's Manufacturing Company; www.larsensmfg.com.
   10. MIFAB, Inc.; www.mifab.com.
   11. Milcor Inc: www.milcorinc.com.
   12. Nystrom, Inc.; www.nystrom.com.
   13. The Williams Bros. Corporation of America; www.wbdoors.com.
   14. Substitutions: See Section 01600 - Product Requirements.

2.2 ACCESS DOOR UNITS - WALLS

A. Flush Access Doors and Frames with Exposed Trim.
   1. Ceiling surfaces: Fabricated from steel sheet.
   2. Wall surfaces: Fabricated from stainless-steel sheet.
   3. Sizes; As noted on drawings.
   4. Door: Minimum 0.060-inch thick sheet metal, set flush with exposed face flange of frame.
   5. Frame: Minimum 0.060-inch thick sheet metal with 1-inch wide, surface-mounted trim.
   6. Hinges: Continuous piano.
   7. Lock: Mortise Cylinder 20-061 626 C Keyway with latches keyed to all zeros.

2.3 FABRICATION

A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.
   1. Exposed Flanges: As indicated.
   2. For trimless frames with drywall bead, provide edge trim for gypsum board securely attached to perimeter of frames.
   3. Provide mounting holes in frames for attachment of units to metal or wood framing.
   4. Provide mounting holes in frame for attachment of masonry anchors. Furnish adjustable metal masonry anchors.
D. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling.
E. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.
   1. For cylinder lock, furnish two keys per lock and key all locks alike.
   2. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.
F. Extruded Aluminum: After fabrication, apply manufacturer's standard protective coating on aluminum that will come in contact with concrete.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify that rough openings for door and frame are correctly sized and located.

3.2 INSTALLATION

A. Install units in accordance with manufacturer’s instructions.
B. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.
C. Install doors flush with adjacent finish surfaces or recessed to receive finish material.
D. Position units to provide convenient access to the concealed work requiring access.

3.3 ADJUSTING AND CLEANING

A. Adjust doors and hardware after installation for proper operation.
B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION

SECTION 08360

SECTIONAL DOORS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY
A. Section includes electrically operated sectional doors.
B. Related Sections:
   1. Division 05 Section "Metal Fabrications" for miscellaneous steel supports.
   2. Division 26 Sections for electrical service and connections for powered operators and accessories.

1.3 PERFORMANCE REQUIREMENTS
A. General Performance: Sectional doors shall meet performance requirements specified without failure due to defective manufacture, fabrication, installation, or other defects in construction and without requiring temporary installation of reinforcing components.
B. Structural Performance: Exterior sectional doors shall withstand the effects of gravity loads, and the following loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
C. Operation Cycles: Provide sectional door components and operators capable of operating for not less than number of cycles indicated for each door. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

1.4 SUBMITTALS
A. Product Data: For each type and size of sectional door and accessory. Include the following:
   1. Construction details, material descriptions, dimensions of individual components, profile door sections, and finishes.
   2. Rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.
   1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
   2. Wiring Diagrams: For power, signal, and control wiring.
C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.
   1. Include similar Samples of accessories involving color selection.
D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
   1. Flat Door Sections: 6 inches (150 mm) square.
   2. Summary of forces and loads on walls and jambs.
E. Qualification Data: For qualified Installer.
F. Maintenance Data: For sectional doors to include in maintenance manuals.
G. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE
A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.
B. Source Limitations: Obtain sectional doors from single source from single manufacturer.
   1. Obtain operators and controls from sectional door manufacturer.
C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Standard for Sectional Doors: Fabricate sectional doors to comply with DASMA 102 unless otherwise indicated.
E. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" and ICC/ANSI A117.1.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of sectional doors that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including, but not limited to, excessive deflection.
      b. Faulty operation of hardware.
      c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use; rust through.
      d. Delamination of exterior or interior facing materials.
   2. Warranty Period: Two years from date of Final Payment.
B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components that show evidence of deterioration of factory-applied finishes within specified warranty period.
   1. Warranty Period: 10 years from date of Final Payment.

PART 2 – PRODUCTS

2.1 STEEL DOOR SECTIONS

A. Exterior Section Faces and Frames: Fabricate from zinc-coated (galvanized), cold-rolled, commercial steel (CS) sheet, complying with ASTM A 653/A 653M, with indicated zinc coating and thickness.
   1. Fabricate section faces from single sheets to provide sections not more than 24 inches (610 mm) high and of indicated thickness. Roll horizontal meeting edges to a continuous, interlocking, keyed, rabbeted, shiplap, or tongue-in-groove weathertight seal, with a reinforcing flange return.
   2. For insulated doors, provide sections with continuous thermal-break construction, separating the exterior and interior faces of door.
B. Section Ends and Intermediate Stiles: Enclose open ends of sections with channel end stiles formed from galvanized-steel sheet not less than 0.064-inch- (1.63-mm-) nominal coated thickness and welded to door section. Provide intermediate stiles formed from not less than 0.064-inch- (1.63-mm-) thick galvanized-steel sheet, cut to door section profile, and welded in place. Space stiles not more than 48 inches (1219 mm) apart.
C. Reinforce bottom section with a continuous channel or angle conforming to bottom-section profile and allowing installation of astragal.
D. Reinforce sections with continuous horizontal and diagonal reinforcement, as required to stiffen door and for wind loading. Provide galvanized-steel bars, struts, trusses, or strip steel, formed to depth and bolted or welded in place. Ensure that reinforcement does not obstruct vision lites.
E. Provide reinforcement for hardware attachment.
F. Board Thermal Insulation: Insulate interior of steel sections with door manufacturer's standard CFC-free polystyrene or polyurethane board insulation, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84; or with glass-fiber-board insulation. Secure insulation to exterior face sheet. Enclose insulation completely within steel sections that incorporate the following interior facing material, with no exposed insulation:
   1. Interior Facing Material: Zinc-coated (galvanized), cold-rolled, commercial steel (CS) sheet, complying with ASTM A 653/A 653M, with indicated thickness.
   2. Interior Facing Material: Manufacturer's standard prefinished hardboard panel, 1/8 inch (3 mm) thick and complying with ANSI A135.5.

G. Fabricate sections so finished door assembly is rigid and aligned, with tight hairline joints and free of warp, twist, and deformation.

2.2 TRACKS, SUPPORTS, AND ACCESSORIES

A. Tracks: Manufacturer's standard, galvanized-steel track system of configuration indicated, sized for door size and weight, designed for lift type indicated and clearances shown on Drawings, and complying with ASTM A 653/A 653M for minimum G60 (Z180) zinc coating. Provide complete track assembly including brackets, bracing, and reinforcement for rigid support of ball-bearing roller guides for required door type and size. Slot vertical sections of track spaced 2 inches (51 mm) apart for door-drop safety device. Slope tracks at proper angle from vertical or design tracks to ensure tight closure at jambs when door unit is closed.

B. Track Reinforcement and Supports: Galvanized-steel track reinforcement and support members, complying with ASTM A 36/A 36M and ASTM A 123/A 123M. Secure, reinforce, and support tracks as required for door size and weight to provide strength and rigidity without sag, sway, and vibration during opening and closing of doors.
   1. Vertical Track Assembly: Track with continuous reinforcing angle attached to track and attached to wall with jamb brackets.
   2. Horizontal Track Assembly: Track with continuous reinforcing angle attached to track and supported at points from curve in track to end of track by laterally braced attachments to overhead structural members.

C. Weatherseals: Replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible vinyl, rubber, or neoprene fitted to bottom and top of sectional door unless otherwise indicated.

D. Windows: Manufacturer's standard window units of type and size indicated and in arrangement shown. Set glazing in vinyl, rubber, or neoprene glazing channel for metal-framed doors and elastic glazing compound for wood doors, as required. Provide removable stops of same material as door-section frames.
   1. Lock Cylinders: Provide cylinders standard with manufacturer and keyed to building keying system.
   2. Keys: Three for each cylinder.

2.3 HARDWARE

A. General: Provide heavy-duty, corrosion-resistant hardware, with hot-dip galvanized, stainless-steel, or other corrosion-resistant fasteners, to suit door type.

B. Hinges: Heavy-duty, galvanized-steel hinges of not less than 0.079-inch- (2.01-mm-) nominal coated thickness at each end stile and at each intermediate stile, according to manufacturer's written recommendations for door size. Attach hinges to door sections through stiles and rails with bolts and lock nuts or lock washers and nuts. Use rivets or self-tapping fasteners where access to nuts is not possible. Provide double-end hinges where required, for doors over 16 feet (4.88 m) wide unless otherwise recommended by door manufacturer.

C. Rollers: Heavy-duty rollers with steel ball-bearings in case-hardened steel races, mounted with varying projections to suit slope of track. Extend roller shaft through both hinges where double hinges are required. Provide 3-inch- (76-mm-) diameter roller tires for 3-inch- (76-mm-) wide track and 2-inch- (51-mm-) diameter roller tires for 2-inch- (51-mm-) wide track.

D. Push/Pull Handles: For push-up or emergency-operated doors, provide galvanized-steel lifting handles on each side of door.

2.4 LOCKING DEVICES

A. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on single-jamb side, operable from inside only.

B. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded deadbolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.
   1. Lock Cylinders: Provide cylinders standard with manufacturer and keyed to building keying system.
   2. Keys: Three for each cylinder.

C. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

2.5 COUNTERBALANCE MECHANISM

A. Torsion Spring: Counterbalance mechanism consisting of adjustable-tension torsion springs fabricated from steel-spring wire complying with ASTM A 229/A 229M, mounted on torsion shaft made of steel tube or solid steel. Provide springs designed for number of operation cycles indicated.
B. Cable Drums and Shaft for Doors: Cast-aluminum or gray-iron casting cable drums mounted on torsion shaft and grooved to receive door-lifting cables as door is raised. Mount counterbalance mechanism with manufacturer's standard ball-bearing brackets at each end of torsion shaft. Provide one additional midpoint bracket for shafts up to 16 feet (4.88 m) long and two additional brackets at one-third points to support shafts more than 16 feet (4.88 m) long unless closer spacing is recommended by door manufacturer.
C. Cables: Galvanized-steel lifting cables with cable safety factor of at least [5] [7] to 1.
D. Cable Safety Device: Include a spring-loaded steel or spring-loaded bronze cam mounted to bottom door roller assembly on each side and designed to automatically stop door if either lifting cable breaks.
E. Bracket: Provide anchor support bracket as required to connect stationary end of spring to the wall and to level the shaft and prevent sag.
F. Provide a spring bumper at each horizontal track to cushion door at end of opening operation.

2.6 ELECTRIC DOOR OPERATORS

A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and "operation cycles" requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.
   1. Comply with NFPA 70.
   2. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6; with NFPA 70, Class 2 control circuit, maximum 24-V ac or dc.
B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.
C. Door-Operator Type: Unit consisting of electric motor, gears, pulleys, belts, sprockets, chains, and controls needed to operate door and meet required usage classification.
   1. Jackshaft, Center Mounted: Jackshaft operator mounted on the inside front wall above door and connected to torsion shaft with an adjustable coupling or drive chain.
D. Electric Motors: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Division 11 Section "Common Motor Requirements for Equipment" unless otherwise indicated.
   1. Electrical Characteristics:
      a. Phase: Single phase
      b. Volts: 208V.
      c. Hertz: 60.
   2. Motor Type and Controller: Reversible motor and controller (disconnect switch) for motor exposure indicated.
   3. Motor Size: Minimum size as indicated. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. (203 mm/s) and not more than 12 in./sec. (305 mm/s), without exceeding nameplate ratings or service factor.
   4. Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
   5. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.
   6. Use adjustable motor-mounting bases for belt-driven operators.

E. Limit Switches: Equip each motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.
F. Obstruction Detection Device: Equip motorized door with indicated external automatic safety sensor capable of protecting full width of door opening. Activation of device immediately stops and reverses downward door travel.
   1. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.
      a. Self-Monitoring Type: Designed to interface with door operator control circuit to detect damage to or disconnection of sensor device. When self-monitoring feature is activated, door closes only with sustained pressure on close button.
   2. Sensor Edge: Automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor activates device. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.
      a. Self-Monitoring Type: Four-wire configured device designed to interface with door-operator control circuit to detect damage to or disconnection of sensor edge.
G. Remote-Control Station: Momentary-contact, three-button control station with push-button controls labeled "Open," "Close," and "Stop."
   1. Interior units, full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
   2. Exterior units, full-guarded, standard-duty, surface-mounted, weatherproof type, NEMA ICS 6, Type 4 enclosure, key operated.
H. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 25 lbf (111 N).
I. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
J. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.
K. Audible and Visual Signals: Audible alarm and visual indicator lights in compliance with regulatory requirements for accessibility.
L. Radio-Control System: Consisting of the following:
   1. Three-channel universal coaxial receiver to open, close, and stop door; two per operator.
   2. Multifunction remote control.
   3. Remote antenna and mounting kit.

2.7 DOOR ASSEMBLY

A. Steel Sectional Door: Sectional door formed with hinged sections.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide TC320 Series Manufactured by Raynor ; 1101 East River Rd. P. O. Box 448 ; Dixon, IL 61021-0448; Toll Free Tel: 800-4-RAYNOR; Tel: 815-288-1431; Web: www.raynor.com
B. or comparable product by one of the following:
   1. Amarr Garage Doors.
   2. Arm-R-Lite.
   3. C.H.I. Overhead Doors.
   4. Clopay Building Products; a Griffon company.
   5. Fimbel Architectural Door Specialties.
   6. General American Door Company.
   7. Haas Door; a Nofziger company.
   8. Martin Door Manufacturing.
   9. Overhead Door Corporation.
   10. Raynor.
   11. Rite-Hite Corporation.

12. Wayne-Dalton Corp.
13. Windsor Republic Doors.

C. Operation Cycles: Not less than 10,000
D. R-Value: 17.05.
E. Steel Sections: Zinc-coated (galvanized) steel sheet with G90 (Z275) zinc coating.
   1. Section Thickness: 2 7/8”inches (73 mm).
   2. Exterior-Face, Steel Sheet Thickness: 20 gauge steel.
      a. Surface: Flat.
   3. Insulation: Board/
   4. Interior Facing Material: 20 gauge steel.
F. Track Configuration: As indicated on Drawings.
G. Weatherseals: Fitted to bottom and top and around entire perimeter of door. Provide combination bottom weatherseal and sensor edge.
H. Windows: As indicated on Drawings; installed with insulated glazing of the following type:
   1. Insulating Glass: Manufacturer's standard.
I. Locking Devices: Equip door with locking device assembly.
   1. Locking Device Assembly: Exterior lock with five-pin tumbler cylinder, night latch and steel bar engaging track.
J. Counterbalance Type: Torsion spring
K. Electric Door Operator:
   1. Usage Classification: Standard duty, up to 60 cycles per hour
   2. Operator Type: Jackshaft, center mounted
   3. Motor Exposure: Interior, clean, and dry.
   4. Emergency Manual Operation: Chain type.
   5. Obstruction-Detection Device: Automatic photoelectric sensor.
   6. Remote-Control Station: Interior
   7. Other Equipment: Audible and visual signals, Radio-control system
L. Door Finish:
   1. Baked-Enamel or Powder-Coated Finish: Color and gloss as selected by Architect from manufacturer's full range
   2. Factory Prime Finish: Manufacturer's standard color.
   3. Finish of Interior Facing Material: Finish as selected by Architect from manufacturer's full range.

2.8 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.9 STEEL AND GALVANIZED-STEEL FINISHES

A. Factory Prime Finish: Manufacturer's standard primer, compatible with field-applied finish. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.
B. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.

B. Examine locations of electrical connections.
C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install sectional doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
B. Tracks:
   1. Fasten vertical track assembly to opening jambs and framing, spaced not more than 24 inches (610 mm) apart.
   2. Hang horizontal track assembly from structural overhead framing with angles or channel hangers attached to framing by welding or bolting, or both. Provide sway bracing, diagonal bracing, and reinforcement as required for rigid installation of track and door-operating equipment.
   3. Repair galvanized coating on tracks according to ASTM A 780.
C. Accessibility: Install sectional doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

3.3 STARTUP SERVICES

A. Engage a factory-authorized service representative to perform startup service.
   1. Complete installation and startup checks according to manufacturer's written instructions.
   2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.4 ADJUSTING

A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
B. Lubricate bearings and sliding parts as recommended by manufacturer.
C. Adjust doors and seals to provide weathertight fit around entire perimeter.
D. Align and adjust motors, pulleys, belts, sprockets, chains, and controls according to manufacturer's written instructions.
E. Touch-up Painting: Immediately after welding galvanized materials, clean welds and abraded galvanized surfaces and repair galvanizing to comply with ASTM A 780.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain sectional doors.

END OF SECTION

SECTION 08511

ALUMINUM WINDOWS

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Furnish and install thermally broken aluminum architectural windows complete with hardware and related components as shown on drawings and specified in this section.

1.2 RELATED WORK

A. Section 04720 – Architectural Cast Stone
B. Section 04810 – Unit Masonry Assemblies
C. Section 07900 – Joint Sealers
D. Section 08800 – Glazing

1.3 LABORATORY TESTING AND PERFORMANCE REQUIREMENTS

A. Test Units
   1. Air, water, and structural test unit shall conform to requirements set forth in AAMA/WDMA/CSA 101/I.S.2/A440 – 08 and manufacturer's standard locking/operating hardware and insulated glazing configuration.
   2. Thermal test unit sizes shall be 48" x 72". Unit shall consist of a fixed over project-out over project-in window.

B. Test Procedures and Performances
   1. Windows shall conform to all AAMA/WDMA/CSA 101/I.S.2/A440 – 08 requirements for the window type referenced in 1.01.B. In addition, the following specific performance requirements shall be met.
   2. Life Cycle Testing
      a. Test in accordance with AAMA 910. There shall be no damage to fasteners, hardware parts, support arms, activating mechanisms, or any other damage that would cause the window to be inoperable. Air infiltration and water resistance tests shall not exceed specified requirements.
   3. Air Infiltration Test
      a. With ventilators closed and locked, test unit in accordance with ASTM E 283 at a static air pressure difference of 6.24 psf (299 Pa).
      b. Air infiltration shall not exceed .10 cfm/SF (.50 l/s•m^2) of unit.
   4. Water Resistance Test
      a. With ventilators closed and locked, test unit in accordance with ASTM E 331/ASTM E 547 at a static air pressure difference of 12.0 psf (575 Pa).
      b. There shall be no uncontrolled water leakage.
   5. Uniform Load Deflection Test
      a. With ventilators closed and locked, test unit in accordance with ASTM E 330 at a static air pressure difference of 100.0 psf (4788 Pa), positive and negative pressure.
      b. No member shall deflect over L/175 of its span.
   6. Uniform Load Structural Test
      a. With ventilators closed and locked, test unit in accordance with ASTM E 330 at a static air pressure difference of 150.0 psf (7182 Pa), both positive and negative.
      b. At conclusion of test there shall be no glass breakage, permanent damage to fasteners, hardware parts, support arms or actuating mechanisms, nor any other damage that would cause the window to be inoperable.
   7. Forced Entry Resistance
      a. Windows shall be tested in accordance to ASTM F 588 or AAMA 1302.5 and meet the requirements of performance level 40.
   8. Condensation Resistance Test (CRF)
      a. Test unit in accordance with AAMA 1503.1.
      b. Condensation Resistance Factor (CRF) shall not be less than recommended by manufacturer.
   9. Condensation Resistance (CR)
      a. With ventilators closed and locked, test unit in accordance with NFRC 500-2010.
      b. Condensation Resistance (CR) shall not be less than recommended by manufacturer.

10. Thermal Transmittance Test (Conductive U-Factor)
    a. With ventilators closed and locked, test unit in accordance with NFRC 100-2010.
    b. Conductive thermal transmittance (U-Factor) shall not be more than recommended by manufacturer.

Glass Comparison Chart				
Glass	**C.O.G.[2] U-Factor**	**U-Factor[1]**	**Frame CRF[3]**	**CR[1]**
1**" IG**	0.47	0.64 BTU/hr•ft²•ºF (3.63 W/m²•K)	53	*
1**" IG**	0.29	0.54 BTU/hr•ft²•ºF (3.07 W/m²•K)	53	*
1**" IG**	0.24	0.50 BTU/hr•ft²•ºF (2.84 W/m²•K)	53	*

*Please consult EFCO Product Tech Support department for values.
[1]U-Factor and Condensation Resistance (CR) are based on a nominal size of 59" x 24" using NFRC-100, and 500 - 2010. [2]Intercept® Spacer. [3]Based on AAMA 1503.1

C. Project Wind Loads
    1. Wind pressure design values per governing building codes and/or as calculated from ANSI A58.1, but no less than 20.0psf (958 Pa).

1.4 QUALITY ASSURANCE

A. Provide test reports from AAMA accredited laboratories certifying the performance as specified in 1.5.
B. Test reports shall be accompanied by the window manufacturer's letter of certification, stating the tested window meets or exceeds the referenced criteria for the appropriate window type.

1.5 SUBMITTALS

A. Contractor shall submit shop drawings; finish samples, test reports, and warranties.
    1. Samples of materials as may be requested without cost to owner, i.e., metal, glass, fasteners, anchors, frame sections, mullion section, corner section, etc.
B. An NFRC Component Modeling Approach (CMA) generated label certificate shall be provided by the manufacturer. The label certificate shall be project specific and will contain the thermal performance ratings of the manufacturer's framing combined with the specified glass, and the glass spacer used in the fabrication of the glass, at NFRC standard test size as defined in table 4-3 in NFRC 100-2010.

1.6 WARRANTIES

A. Window Material:
    1. Provide written guarantee against defects in material and workmanship for 5 years from the date of substantial completion.
B. Finish
    1. Warranty period shall be for 3 years from the date of substantial completion.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: EFCO Corp, Monett, MO 65708
    1. Fixed units, Thermally Broken.
B. Wausau Metal Corp., Wausau, WI 54402
C. Kawneer Company, Inc.; www.kawneer.com.
D. United States Aluminum Corp.; www.usalum.com

E. TRACO
F. Graham
G. Substitutions: Refer to specification section 01600 Product Requirements.
H. Single Source Requirement - All products listed in Section 08511 shall be by the same manufacturer.

2.2 MATERIALS

A. Aluminum
   1. Extruded aluminum shall be 6063-T6 alloy and tempered.
B. Weather-Strip
   1. All weather-strip shall be Santoprene® or equal.
C. Glass – Refer to Section 08800.
D. Thermal Barrier
   1. All exterior aluminum shall be separated from interior aluminum by a rigid, structural thermal barrier. For purposes of this specification, a structural thermal barrier is defined as a system that shall transfer shear during bending and, therefore, promote composite action between the exterior and interior extrusions.
   2. The thermal barrier shall be thermal struts, consisting of glass reinforced polyamide nylon, mechanically crimped in raceways extruded in the exterior and interior extrusions.
   3. Poured and debridged urethane thermal barriers shall not be permitted.

2.3 FABRICATION

A. General
   1. All aluminum frame and vent extrusions shall have a minimum wall thickness of .125”.
   2. Mechanical fasteners, welded components, and hardware items shall not bridge thermal barriers. Thermal barriers shall align at all frame and vent corners.
   3. Depth of frame and vent shall not be less than 2 7/16” (61 mm).
   4. All frame and vent members shall be able to accommodate separate interior and exterior finishes and colors.
B. Frame
   1. Frame components shall be mechanically fastened.
C. Ventilator
   1. All vent extrusions shall be tubular.
   2. Each corner shall be mitered, reinforced with an extruded corner key, hydraulically crimped, and "cold welded" with epoxy adhesive.
   3. Each vent shall utilize two rows of weather stripping installed in specifically designed dovetail grooves in the extrusion. The exterior gasket will be omitted at the vent bottom rail for project-out vents and at the vent top rail for project-in vents, allowing air to pressure equalize the void between the vents and frame.
D. Finish
   1. Anodic
      a. Finish all exposed areas of aluminum windows and components with electrolytically deposited color in accordance with Aluminum Association Designation to be selected from manufacturers full color range.

PART 3 – EXECUTION

3.1 INSPECTION

A. Job Conditions
   1. Verify that openings are dimensionally within allowable tolerances, plumb, level, clean, provide a solid anchoring surface, and are in accordance with approved shop drawings.
   2. 2.Provide for manufacturer representation to conduct pre-installation site meeting.

3.2 INSTALLATION

A. Use only skilled tradesmen with work done in accordance with approved shop drawings and specifications.
B. Plumb and align window faces in a single plane for each wall plane, and erect windows and materials square and true. Adequately anchor to maintain positions permanently when subjected to normal thermal movement, specified building movement, and specified wind loads.
C. Adjust windows for proper operation after installation.
D. Furnish and apply sealants to provide a weather tight installation at all joints and intersections and at opening perimeters. Wipe off excess material and leave all exposed surfaces and joints clean and smooth.

3.3 ANCHORAGE

A. Adequately anchor to maintain positions permanently when subjected to normal thermal movement, specified building movement, and specified wind loads.

3.4 PROTECTION AND CLEANING

A. After completion of window installation, windows shall be inspected, adjusted, put into working order and left clean, free of labels, dirt, etc. Protection from this point shall be the responsibility of the general contractor.

END OF SECTION

SECTION 08710

DOOR HARDWARE

PART 1 – GENERAL

1.1 SECTION INCLUDES
A. Lock cylinders for doors for which hardware is specified in other sections.
B. Hardware for all doors.

1.2 RELATED SECTIONS
A. Section 08110 - Steel Doors and Frames

1.3 REFERENCES – NOT USED

1.4 SUBMITTALS
A. See Section 01300 - Administrative Requirements, for submittal procedures.
B. Shop Drawings:
   1. Indicate locations and mounting heights of each type of hardware, schedules, catalog cuts, electrical characteristics and connection requirements.
C. Samples:
   1. Submit 1 sample of hinge, latchset, lockset, and closer, illustrating style, color, and finish.
   2. Samples will be returned to supplier.
D. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.

1.5 QUALITY ASSURANCE
A. Hardware Supplier Qualifications: Company specializing in supplying commercial door hardware with five years of experience.

1.6 PRE-INSTALLATION MEETING
A. Convene one week prior to commencing work of this section.

1.7 DELIVERY, STORAGE, AND PROTECTION
A. Package hardware items individually; label and identify each package with door opening code to match hardware schedule.

1.8 COORDINATION
A. Coordinate the work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware.
B. Furnish templates for door and frame preparation.
C. Coordinate Owner's keying requirements during the course of the Work.

1.9 WARRANTY
A. See Section 01780 - Closeout Submittals, for additional warranty requirements.

PART 2 – PRODUCTS

2.1 MANUFACTURERS
A. Refer to drawings for hardware schedule and notes.

2.2 GENERAL REQUIREMENTS FOR DOOR HARDWARE PRODUCTS
A. Provide products that comply with the following:
   1. Applicable provisions of Federal, State, and local codes.
B. Finishes: Identified in schedule at end of section.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify that doors and frames are ready to receive work and dimensions are as indicated on shop drawings.

3.2 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions and applicable codes.
B. Use templates provided by hardware item manufacturer.
C. Mounting heights for hardware from finished floor to center line of hardware item: As listed in Schedule, unless otherwise noted:

3.3 ADJUSTING

A. Adjust work under provisions of Section 01700.
B. Adjust hardware for smooth operation.

3.4 PROTECTION OF FINISHED WORK

A. Protect finished Work under provisions of Section 01700.
B. Do not permit adjacent work to damage hardware or finish.

3.5 SCHEDULE

A. **Refer to Drawings for Hardware schedule and notes**

END OF SECTION

SECTION 08800

GLAZING

PART 1 – GENERAL

1.1 SECTION INCLUDES
A. Glass and plastic glazing.
B. Glazing compounds and accessories.

1.2 RELATED SECTIONS
A. Section 07900 - Joint Sealers: Sealant and back-up material.
B. Section 08110 - Steel Doors and Frames

1.3 REFERENCES
A. Unless otherwise noted the most current issue of the reference shall be used.
B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test
C. ASTM C 864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.
D. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants
E. ASTM C 1036 - Standard Specification for Flat GlassASTM C 1048 - Standard Specification for Heat-Treated Flat Glass--Kind HS, Kind FT Coated and Uncoated Glass
F. ASTM C 1193 - Standard Guide for Use of Joint Sealants
G. GANA (GM) - GANA Glazing Manual; Glass Association of North America.
H. GANA (SM) - FGMA Sealant Manual; Glass Association of North America

1.4 PERFORMANCE REQUIREMENTS
A. Provide glass and glazing materials for continuity of building enclosure vapor retarder and air barrier:
   1. In conjunction with materials described in Section 07260 and 07900.
   2. To utilize the inner pane of multiple pane sealed units for the continuity of the air barrier and vapor retarder seal.
   3. To maintain a continuous air barrier and vapor retarder throughout the glazed assembly from glass pane to heel bead of glazing sealant.

1.5 SUBMITTALS
A. See Section 01300 - Administrative Requirements, for submittal procedures.
B. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, and special handling or installation requirements.
C. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.
D. Samples: Submit two samples 12 x 12 inch in size of glass units.
E. Certificates: Certify that products meet or exceed specified requirements.
F. Manufacturer's Certificate: Certify that sealed insulated glass meets or exceeds specified requirements.

1.6 QUALITY ASSURANCE
A. Perform Work in accordance with GANA Glazing Manual and FGMA Sealant Manual for glazing installation methods. Maintain one copy on site.
B. Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience.

1.7 PRE-INSTALLATION MEETING
A. Convene one week before starting work of this section.

1.8 ENVIRONMENTAL REQUIREMENTS
A. Do not install glazing when ambient temperature is less than 50 degrees F.
B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing

compounds.

1.9 WARRANTY

A. See Section 01780 - Closeout Submittals, for additional warranty requirements.
B. Provide a five year warranty to include coverage for sealed glass units from seal failure, interpane dusting or misting, and replacement of same.

PART 2 – PRODUCTS

2.1 FLAT GLASS MATERIALS

A. Manufacturers:
   1. Guardian Industries Corporation: www.guardian.com.
   2. Pilkington Building Products North America: www.pilkington.com.
   3. Visteon Glass Systems: www.visteon.com
   4. Substitutions: Refer to Section 01600 - Product Requirements.
B. Interior Vision Glass (Type I-1): Clear; fully tempered with horizontal tempering.
   1. Comply with ASTM C 1036, Type I, transparent flat, Class 1 clear, Quality Q3 (glazing select) and ASTM C 1048.
   2. Comply with ANSI Z97.1.
   3. Typical interior glazing, unless noted otherwise in the Drawings or these specifications.
C. Interior Fire Rated, Safety Rated Glass Ceramic (I-2):
   1. Basis of Design Firelite Plus, premium grade surface condition, as manufactured by TGP, www.fireglass.com, 1-800-426-0279, or Architect approved equal.
   2. Typical interior glazing, where fire rating of assemblies are required per the Drawings.
D. Exterior Glass (Type E-1): Exterior Glazing Types:
   1. Clear Insulated Glass (E-1): ASTM E774 and ASTM E773; double pane with silicone edge seal; outer pane of **3/16”** inch tempered glass (match existing building main entrance tint); inner pane of **3/16”** inch clear tempered glass with PPG Solarban 60 Low E (or equal) coating on #3 surface; purge interpane space with dry Argon gas; total unit thickness of 1 inch.
      a. Glazing unit to provide the following:
         1) Light Transmission: 42%
         2) Winter U-Value: 0.29
         3) Summer U-Value: 0.27
         4) Shading Coefficient: 0.36
         5) Solar heat gain Coefficient: 0.31
   2. Tint color to be selected by Architect from Manufacturer’s full range.
   3. Comply with ASTM C 1036, Type I, transparent flat, Class 1 clear, Quality Q3 (glazing select) and ASTM C 1048.
   4. Comply with ANSI Z97.1
   5. Typical exterior glazing.

2.2 GLAZING COMPOUNDS

A. Manufacturers:
   1. Dow Corning Corp: www.dowcorning.com
   2. GE Plastics: www.geplastics.com
   3. Pecora Corporation: www.Pecora.com
   4. Substitutions: Refer to Section 01600 - Product Requirements.
B. Silicone Sealant: Single component; chemical curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C 920, Type S, Grade NS, Class 25, Uses M, A, and G; cured Shore A hardness of 15 to 25; color as selected.

2.3 GLAZING ACCESSORIES

A. Setting Blocks: Neoprene, 80 to 90 Shore A durometer hardness, ASTM C 864 Option I. Length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.
B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness, ASTM C 864 Option I. Minimum 6 inch long x one half the height of the glazing stop x thickness to suit application, self adhesive on one face.
C. Glazing Tape: Preformed butyl compound with integral resilient tube spacing device; 10 to 15 Shore A durometer hardness; coiled on release paper; 3/8 inch size; black color.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify that openings for glazing are correctly sized and within tolerance.
B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.

3.2 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.
B. Install sealants in accordance with ASTM C 1193 and FGMA Sealant Manual.

3.3 INSTALLATION - INTERIOR DRY METHOD (TAPE AND TAPE)

A. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch (1.6 mm) above sight line.
B. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.
C. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.
D. Place glazing tape on free perimeter of glazing in same manner described above.
E. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.
F. Knife trim protruding tape.

3.4 CLEANING

A. Remove glazing materials from finish surfaces.
B. Remove labels after Work is complete.
C. Clean glass and adjacent surfaces.

3.5 PROTECTION OF FINISHED WORK

A. After installation, mark pane with an 'X' by using removable plastic tape or paste.

END OF SECTION

SECTION 09260

GYPSUM BOARD ASSEMBLIES

PART 1 – GENERAL

1.1 SECTION INCLUDES
A. Metal stud wall framing.
B. Metal channel ceiling framing.
C. Acoustic insulation.
D. Cementitious backer board for interior applications.
E. Gypsum wallboard.
F. Joint treatment and accessories.

1.2 RELATED SECTIONS
A. Section 06114 - Wood Blocking and Curbing: Wood blocking for support of wall-mounted equipment.

1.3 REFERENCES
A. Unless noted otherwise, the most current issue of the reference shall be used.
B. ASTM C 645 - Standard Specification for Nonstructural Steel Framing Members.
C. ASTM C 665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
D. ASTM C 754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
E. Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
F. GA-600 - Fire Resistance Design Manual; Gypsum Association.

1.4 SUBMITTALS
A. See Section 01300 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.
C. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

1.5 QUALITY ASSURANCE
A. Perform in accordance with ASTM C 840. Comply with requirements of GA-600 for fire-rated assemblies.
B. Applicator Qualifications: Company specializing in performing gypsum board application and finishing, with minimum five years of documented experience.

1.6 REGULATORY REQUIREMENTS
A. Conform to applicable code for fire rated assemblies as indicated on drawings.

PART 2 – PRODUCTS

2.1 METAL FRAMING MATERIALS
A. Metal Framing Manufacturers:
   1. Clark Dietrich Building Systems; www.clarkdietrich.com
   2. Marino-Ware; www.marinoware.com.
   3. Telling Industries; www.buildstrong.com
   4. Substitutions: See Section 01600 - Product Requirements.
B. Metal Framing Connectors and Accessories:
   1. Same manufacturer as framing.
C. Non-Load bearing Framing System Components: ASTM C 645; galvanized sheet steel, of size and properties necessary to comply with ASTM C 754 for the spacing indicated unless exceeded herein, with maximum deflection of wall framing of L/240 at 5 psf. All interior framing shall be a minimum of 20 gauge.

1. Studs: C shaped with knurled faces.
2. Runners: U shaped, sized to match studs.
3. Ceiling Channels: C shaped.
4. Furring: Hat-shaped sections, minimum depth of 7/8 inch.

D. Shaft Wall Studs and Accessories: ASTM C 645; galvanized sheet steel, of size and properties necessary to comply with ASTM C 754 and specified performance requirements.
E. Ceiling Hangers: Type and size as specified in ASTM C 754 for spacing required.
F. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
   1. Material: ASTM A 653/A 653M steel sheet, SS Grade 50, with G60/Z180 hot dipped galvanized coating.

2.2 GYPSUM BOARD MATERIALS

A. Manufacturers:
   1. Georgia Pacific Gypsum Corporation; www.gp.com.
   2. National Gypsum Company; www.nationalgypsum.com.
   3. USG Corporation; www.usg.com.
   4. Lafarge North America Inc.; www.lafargenorthamerica.com
   5. Substitutions: See Section 01600 - Product Requirements.
B. Gypsum Wallboard: ASTM C 36/C 36M and ASTM C 1396/C 1396M. Sizes to minimize joints in place; ends square cut.
   1. Thickness: 5/8 inch.
   2. Edges: Tapered.
C. Type X: Fire resistant, UL or WH rated.
   1. Application: Vertical surfaces, unless otherwise indicated.
      a. Thickness: 5/8 inch.
D. Water-Resistant Gypsum Backing Board: ASTM C 630/C 630M and ASTM C 1396/C 1396M; ends square cut.
E. Fiber Reinforced Gypsum Board for Partition Walls: Laminated ply panel with reinforced gypsum core with multiple ply abrasion resistant paper on front, back and long edges
   1. Thickness: 5/8 in.
   2. Width: 4 ft.
   3. Length: maximum available length in place
   4. Edges: ends square cut, beveled edges
   5. Impact Resistance: Board shall show no failure and withstand 17 impacts when tested in accordance with ASTM E 695, modified.
   6. Indentation Resistance: Not less than the following loads to produce the indicated depth of surface indentation when tested in accordance with ASTM D 1037, modified:
      a. 0.100 in.: 232 lbs.
   7. 3M Surface Abrasion Resistance: Not greater than the following depths when tested using the indicated number of cycles in accordance with ASTM D 4977, modified:
      a. 100: 0.000 in.
   8. Taber Surface Abrasion Resistance: Not greater than the following depths when tested using the indicated number of cycles in accordance with ASTM D 4060, modified:
      a. 50: 0.004 in.
   9. Impact/Penetration Resistance Rating: Not less than 36 ft.-lbs. When tested in accordance with ASTM D 2394, modified.

2.3 CEMENTUOUS BACKING PANELS

A. Manufacturers
   1. Custom Building Products; www.custombuildingproducts.com
   2. FinPan, Inc.; www.finpan.com
   3. United States Gypsum Co; www.usg.com
   4. Substitutions: See Section 01600 - Product Requirements.

5. Cementitious Backer Board for Interior Applications meeting the following requirements:
6. .

2.4 ACCESSORIES

A. Acoustic Insulation: ASTM C 665; preformed glass fiber, friction fit type, unfaced. Thickness of 3-1/2 inches unless indicated otherwise.
B. Acoustic Sealant: Non-hardening, non-skinning, for use in conjunction with gypsum board.
C. Finishing Accessories: ASTM C 1047, galvanized steel or rolled zinc, unless otherwise indicated.
D. Joint Materials: ASTM C 475 and as recommended by gypsum board manufacturer for project conditions.
   1. Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
E. Screws: ASTM C 1002; self-piercing tapping type; cadmium-plated for exterior locations.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

3.2 FRAMING INSTALLATION

A. Metal Framing: Comply with ASTM C 754 and manufacturer's instructions.
B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
   1. Level ceiling system to a tolerance of 1/1200.
   2. Laterally brace entire suspension system.
C. Studs: Space studs as permitted by standard.
   1. Extend partition framing to structure where indicated and to ceiling in other locations.
   2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
   3. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.
D. T intersections: Construct T intersections by using minimum of three studs with top, bottom and intermediate blocking or four full studs. Lock all walls together by fastening framing members together at 16 inches on center vertically. Walls secured through Gypsum materials only shall not be permitted.
E. Corners: Construct corners using minimum of three studs with top, bottom and intermediate blocking or four full studs. Lock all walls together by fastening framing members together at 16 inches on center vertically. Walls secured through Gypsum materials only shall not be permitted.
F. Openings: Install minimum double studs at wall openings, sides, top and bottom at door and window jambs and all other openings.
G. Standard Wall Furring: Install at concrete and masonry walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.
   1. Orientation: Vertical.
   2. Spacing: As indicated.
H. Acoustic Furring: Install resilient channels at maximum 24 inches on center. Locate joints over framing members.
I. Furring for Fire Ratings: Install as required for fire resistance ratings indicated and to GA-600 requirements.
J. Blocking: Install blocking for support of plumbing fixtures, toilet partitions, wall cabinets, wood frame openings, toilet accessories, hardware, and other wall mounted items. Comply with Section 06100 for wood blocking.

3.3 ACOUSTIC ACCESSORIES INSTALLATION

A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
B. Acoustic Sealant: Install in accordance with manufacturer's instructions.

3.4 GYPSUM BOARD INSTALLATION

A. Comply with ASTM C 840. Install to minimize butt end joints, especially in highly visible locations.
B. Single Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
C. Single Layer Fire-Rated: Install gypsum board vertically, with ends and edges occurring over firm bearing.
D. Cementitious Backing Board: Install over studs in accordance with manufacturer’s instructions.
E. Installation on Metal Framing: Use screws for attachment of all gypsum board.

3.5 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
   1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
B. Corner Beads: Install at external corners, using longest practical length.
C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials and as indicated on drawings.

3.6 JOINT TREATMENT

A. Finish gypsum board in scheduled areas in accordance with levels defined in ASTM C 840 and as scheduled below.
B. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

3.7 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

3.8 FINISH LEVEL SCHEDULE

A. Level 1: Above finished ceilings concealed from view.
B. Level 2: Utility areas and areas behind cabinetry.
C. Level 3: Walls scheduled to receive textured wall finish.
D. Level 4: Walls and ceilings scheduled to receive flat or eggshell paint finish.
E. Level 5: Walls and ceilings scheduled to receive semi-gloss or gloss paint finish.

END OF SECTION

SECTION 09650

RESILIENT FLOORING

PART 1 – GENERAL

1.1 SECTION INCLUDES
A. Rubber wall base.
B. Installation accessories.
C. Subfloor preparation.

1.2 RELATED SECTIONS
A. Section 03300 - Cast-In-Place Concrete
B. Section 06100 - Rough Carpentry; subflooring.

1.3 REFERENCES
A. Unless noted otherwise, the most current issue of the reference shall be used.
B. ASTM F 1066 - Standard Specification for Vinyl Composition Floor Tile.
C. FS RR-T-650 - Treads, Metallic and Nonmetallic, Skid Resistant; Federal Specifications and Standards.

1.4 SUBMITTALS
A. See Section 01300 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
C. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.
D. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

1.5 DELIVERY, STORAGE, AND PROTECTION
A. Deliver materials in labeled packages. Store and handle in strict compliance with manufacturer's recommendations. Protect from damage due to weather, excessive temperatures, and construction operations.
B. Deliver materials sufficiently in advance of installation to condition materials to room temperature prior to installation.
C. Protect roll materials from damage by storing on end.

1.6 QUALITY ASSURANCE
A. Manufacturer: Provide resilient flooring manufactured by a firm with a minimum of 10 years experience in the fabrication of resilient flooring of types equivalent to those specified. Manufacturers proposed for use, which are not named in this Section, shall submit evidence of ability to meet performance requirements specified not less than 10 days prior to bid date.
B. Color Matching: Provide resilient flooring products, including wall base and accessories, from one manufacturer to ensure color matching.
C. Manufacturer capable of providing field service representation.
D. Installer's Qualifications: Installer experienced (minimum of 2 years) to perform work of this section who has specialized in the installation of work similar to that required for this project and who is acceptable to the product manufacturer.
E. Materials: For each type of material required for the work of this Section, provide primary materials which are the products of one manufacturer. Provide secondary materials which are acceptable to the manufacturer of the primary materials. Comply with applicable regulations regarding VOC (volatile organic compound) content of adhesives.

1.7 ENVIRONMENTAL REQUIREMENTS
A. Maintain temperature in storage area between 55 degrees F and 90 degrees F.
B. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Maintain a temperature of 68 degrees F plus or minus 5 degrees F in spaces to receive resilient flooring. Specified

temperature shall be maintained at least 48 hours before, during, and 48 hours after installation.

1.8 WARRANTY

A. Provide manufacturer's standard one-year warranty against defects in manufacturing and workmanship of resilient flooring products. Provide manufacturer's standard limited wear warranty/conductivity warranty as specified under each product as applicable.

1.9 EXTRA MATERIALS

A. See Section 01600 - Product Requirements, for additional provisions.
B. Provide 25 lineal feet of base of each type and color specified.

PART 2 – PRODUCTS

2.1 MATERIALS - BASE

A. Manufacturers:
   1. Armstrong World Industries, Inc.; www.armstrong.com
   2. Flexco Floors; www.flexcofloors.com
   3. Burke Flooring: www.burkeflooring.com
   4. Johnsonite, Inc.; www.johnsonite.com
   5. Roppe Corp.; www.roppe.com
   6. Nora: www.norarubber.com
   7. Substitutions: See Section 01600 - Product Requirements.
B. Resilient Base: ASTM F 1861, Type TS rubber, vulcanized thermoset; top set Style A and as follows:
   1. Profile: **Cove**
   2. Height: **6 inch**
   3. Thickness: 0.125 inch thick.
   4. Finish: Satin.
   5. Length: Roll.
   6. Color: Color as selected from manufacturer's standards.
   7. Accessories: Premolded external corners, internal corners, and end stops.

2.2 ACCESSORIES

A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.
B. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer.
C. Moldings and Edge Strips: Metal unless noted otherwise.
D. Filler for Coved Base: Plastic.
E. Sealer and Wax: Types recommended by flooring manufacturer

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify that sub-floor surfaces are smooth and flat within tolerances specified in Section 03300 and are ready to receive resilient flooring.
B. Verify that concrete sub-floor surfaces are ready for resilient flooring installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within the following limits:
   1. Moisture emission rate: Not greater than 3 lb per 1000 sq ft per 24 hours when tested using calcium chloride moisture test kit for 72 hours.
   2. Alkalinity: pH range of 5-9.
C. Verify that required floor-mounted utilities are in correct location.
D. Perform adhesive bond test in each major area, minimum 1 per 2,000 square feet, prior to

installation. Examine after 72 hours to determine whether bond is solid and no moisture is present. Do not proceed with work until results of bond test are acceptable.

3.2 PREPARATION

A. Where tile is shown or scheduled to be installed over existing tile, remove existing tile completely. Sand and level substrate with a latex underlayment acceptable to, or provided by, the tile flooring manufacturer. In addition, comply with the tile flooring manufacturer's procedures for installation over existing tile.
B. Where only tile patching is required, remove existing tile back to full tile units and match coursing. Clean substrate and comply with tile manufacturers instructions for installation over existing substrate.
C. Comply with ASTM F 710-92 and manufacturer's recommendations for surface preparation. Remove substances incompatible with resilient flooring adhesive by method acceptable to manufacturer.
D. Concrete floors with steel troweled (slick) finish shall be properly roughened up (sanded) to ensure suitable adhesion.
E. Concrete floors with curing, hardening, and breaking compounds shall be abraded with mechanical methods only to remove compounds. Use blastrac or similar equipment.
F. Remove sub-floor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.
G. Fill voids, cracks, and depressions with trowel-applied leveling compounds acceptable to manufacturer. Remove projections and repair other defects to tolerances acceptable to manufacturer.
H. Prohibit traffic until filler is cured.
I. Clean substrate by vacuuming subfloors immediately prior to installation to remove loose particles.
J. Apply primer as required to prevent "bleed-through" or interference with adhesion by substances that cannot be removed.

3.3 INSTALLATION - GENERAL

A. Install resilient flooring in accordance with manufacturer's printed installation instructions.
B. Comply with the following:
    1. Layout resilient flooring to provide equal size at perimeter. Adjust layout as necessary to eliminate resilient flooring which is cut to less than half full width.
    2. Lay resilient flooring with arrows in the same direction.
    3. Install resilient flooring without cracks or voids at seams. Lay seams together without stress. Remove excess adhesive immediately.
    4. Scribe resilient flooring neatly at perimeter and obstructions.
    5. Extend resilient flooring into reveals, closets, and similar openings.
    6. Install reducer strips at exposed edges.
    7. Do not mix manufacturing batches of a color within the same area.
    8. Do not install resilient flooring over building expansion joints.
    9. Do not install defective or damaged resilient flooring.

3.4 INSTALLATION - BASE

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.
B. Install base on solid backing. Bond tightly to wall and floor surfaces.

3.5 PROTECTION OF FINISHED WORK

A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION

SECTION 09900

PAINTS AND COATINGS

PART 1 – GENERAL

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

1.2 RELATED SECTIONS
A. Division 2 - Pavement markings.

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.
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
   2. Benjamin Moore & Co.; www.benjaminmoore.com
   3. PPG Pittsburgh Paints: www.ppg.com
   4. Sherwin-Williams Co: www.sherwin-williams.com
B. Primer Sealers:
   1. Glidden Professional; www.gliddenprofessional.com
   2. Benjamin Moore & Co.; www.benjaminmoore.com
   3. PPG Pittsburgh Paints: www.ppg.com
   4. Sherwin-Williams Co: www.sherwin-williams.com
C. Block Fillers:
   1. Glidden Professional; www.gliddenprofessional.com
   2. Benjamin Moore & Co.; www.benjaminmoore.com
   3. PPG Pittsburgh Paints: www.ppg.com
   4. Sherwin-Williams Co: www.sherwin-williams.com
D. Substitutions: See Section 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 - EXTERIOR

A. Paint ME-OP-3A - Ferrous Metals, Unprimed, Alkyd, 3 Coat:
   1. One coat of alkyd primer.
      a. Glidden Professional: 4360-XXXX Devguard Low VOC Multi-Purpose Tank & Structural Primer.
      b. Benjamin Moore & Co.: P06 Super Spec HP® Alkyd Metal Primer
      c. Sherwin-Williams Kem Bond HS, B50WZ Series
   2. Semi-gloss: Two coats of alkyd enamel.
      a. Glidden Professional: GP2406-XXXX Fortis 350 Exterior 100 Percent Acrylic Semi-Gloss Finish.
      b. Benjamin Moore & Co.: Moorcraft Super Spec Latex House & Trim #170
      c. Sherwin-Williams A-100 Exterior Coating, A8 Series
B. Paint MgE-OP-3A - Galvanized Metals, Alkyd, 3 Coat:
   1. Galvanize primer.
      a. Glidden Professional: Devoe Coatings 4360 Devguard Low VOC Multi-Purpose Tank & Structural Primer.
      b. Benjamin Moore: Super Spec HP® Acrylic Metal Primer P04
      c. Sherwin Williams ProIndustrial ProCryl Metal Primer, B66-310 Series
   2. Gloss: Alkyd enamel.
      a. Glidden Professional: Devoe Coatings 4309 Devguard Rust Preventative Gloss Enamel.

b. Benjamin Moore: Super Spec HP D.T.M. Alkyd Gloss Enamel #P26
c. Sherwin-Williams ProIndustrial Industrial Urethane Alkyd Enamel, B54-150 Series

3. Semi-gloss: Alkyd enamel.
   a. Glidden Professional: Devoe Coatings 4306 Devguard Rust Preventative Semi-Gloss Enamel.
   b. Benjamin Moore: Super Spec HP D.T.M. Alkyd Semi-Gloss #P24
   c. Sherwin-Williams Metalastic DTM Alkyd Enamel, B55 series

2.4 PAINT SYSTEMS – INTERIOR

A. Paint CI-OP-3L - Concrete/Masonry, Opaque, Latex, 3 Coat:
   1. Primer.
      a. Glidden Professional: GP3210 Gripper Interior /Exterior Primer
      b. Benjamin Moore: Fresh Start All Purpose 100% Acrylic Primer #046
      c. Sherwin-Williams: Problock Latex Primer/Sealer, B51W20
   2. Semi-gloss: Latex enamel.
      a. Glidden Professional: GP1416 Ultra-Hide 150 Interior Semi-Gloss Paint
      b. Benjamin Moore: Super Spec Latex Semi-Gloss Enamel #276
      c. Sherwin-Williams: ProMar 400 Interior Latex Semi-Gloss, B31-4450 Series
   3. Flat: Latex enamel.
      a. Glidden Professional: GP1210 Ultra-Hide 150 Interior Flat Paint
      b. Benjamin Moore: Super Spec Latex Flat #275
      c. Sherwin-Williams: ProMar 400 Interior Latex Flat, B30-4450 Series

B. Paint MI-OP-3A - Ferrous Metals, Unprimed, Alkyd, 3 Coat:
   1. One coat of alkyd primer.
      a. Glidden Professional: Devoe Coatings 4360 Devguard Low VOC Multi-Purpose Tank & Structural Prime.
      b. Benjamin Moore: P06 Super Spec HP® Alkyd Metal Primer
      c. Sherwin-Williams: Kem Bond HS Metal Primer, B50WZ Series
   2. Gloss: Two coats of alkyd enamel.
      a. Glidden Professional: Devoe Coatings 4309 Devguard Rust Preventative Gloss Enamel.
      b. Benjamin Moore: Super Spec HP D.T.M. Alkyd Gloss Enamel #P26
      c. Sherwin-Williams: ProIndustrial Industrial Urethane Alkyd Enamel, B54-150 Series
   3. Semi-gloss: Two coats of alkyd enamel.
      a. Glidden Professional: Devoe Coatings 4306 Devguard Rust Preventative Semi-Gloss Enamel.
      b. Benjamin Moore: Super Spec HP D.T.M. Alkyd Semi-Gloss #P24
      c. Sherwin-Williams: Metalastic DTM Alkyd Enamel, B55 Series

C. Paint MI-OP-2A - Ferrous Metals, Primed, Alkyd, 2 Coat:
   1. Touch-up with alkyd primer.
      a. Glidden Professional: Devoe Coatings 4360 Devguard Low VOC Multi-Purpose Tank & Structural Primer.
      b. Benjamin Moore: P06 Super Spec HP® Alkyd Metal Primer
      c. Sherwin-Williams: Kem Bond HS Metal Primer, B50WZ Series
   2. Gloss: Two coats of alkyd enamel.
      a. Glidden Professional: Devoe Coatings 4309 Devguard Rust Preventative Gloss Enamel.
      b. Benjamin Moore: Super Spec HP D.T.M. Alkyd Gloss Enamel #26
      c. Sherwin-Williams: ProIndustrial Industrial Urethane Alkyd Enamel, B54-150 Series
   3. Semi-gloss: Two coats of alkyd enamel.
      a. Glidden Professional: Devoe Coatings 4306 Devguard Rust Preventative Semi-Gloss Enamel.
      b. Benjamin Moore: Super Spec HP D.T.M. Alkyd Semi-Gloss #P24
      c. Sherwin-Williams: Metalastic DTM Alkyd Enamel, B55 Series

D. Paint GI-OP-3L - Gypsum Board/Plaster, Latex, 3 Coat:

1. One coat of fast-drying latex primer sealer.
   a. Glidden Professional: 1000 High-Hiding Interior Primer.
   b. Benjamin Moore: Moorcraft Super Spec Latex Enamel Undercoater & Primer Sealer #253
   c. Sherwin-Williams: ProMar 400 Interior Latex Primer, B28W8400
2. Semi-gloss: Latex enamel.
   a. Glidden Professional: GP1416 Ultra-Hide 150 Interior Semi-Gloss Paint.
   b. Benjamin Moore: Super Spec Latex Eggshell Enamel #274
   c. Sherwin-Williams: ProMar 400 Interior Latex Semi-Gloss, B31-4450 Series
3. Eggshell: Latex enamel.
   a. Glidden Professional: GP1412 Ultra-Hide 150 Interior Eggshell Paint.
   b. Benjamin Moore: Super Spec Latex Eggshell Enamel #274
   c. Sherwin-Williams: ProMar 400 Interior Latex EgShel, B20-4450 Series
4. Flat: Latex enamel.
   a. Glidden Professional: GP1210 Ultra-Hide 150 Interior Flat Paint.
   b. Benjamin Moore: Super Spec Latex Flat #275
   c. Sherwin-Williams: ProMar 400 Interior Latex Flat, B30-4450 Series

2.5 ACCESSORY MATERIALS

A. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified; commercial quality.
B. Patching Material: Latex filler.
C. Fastener Head Cover Material: Latex filler.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are ready to receive Work as instructed by the product manufacturer.
B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
C. Test shop-applied primer for compatibility with subsequent cover materials.
D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces 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. Metal Doors to be painted: Prime metal door top and bottom edge surfaces.

3.3 APPLICATION

A. Apply products in accordance with manufacturer's instructions.
B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
C. Apply each coat to uniform appearance. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.
D. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

3.4 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

A. Refer to Section 15075 and Section 16075 for schedule of color coding of equipment, duct work, piping, and conduit.
B. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
C. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.5 CLEANING

A. Collect waste material, which may constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.6 SCHEDULE - SURFACES TO BE FINISHED

A. Do Not Paint or Finish the Following Items:
   1. Items fully factory-finished unless specifically noted.
   2. Fire rating labels, equipment serial number and capacity labels.
B. Paint the surfaces described below under Schedule - Paint Systems.
C. Mechanical and Electrical: Use paint systems defined for the substrates to be finished.
   1. Paint all insulated and exposed pipes occurring in finished areas to match background surfaces, unless otherwise indicated.
   2. Paint shop-primed items occurring in finished areas.
   3. Paint interior surfaces of air ducts and convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
   4. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.

3.7 SCHEDULE - PAINT SYSTEMS

A. Concrete, Concrete Block, Brick Masonry: Finish all surfaces exposed to view.
   1. Exterior: CE-OP-3A, flat.
   2. Interior: CI-OP-3L, semi-gloss.
B. Gypsum Board: Finish all surfaces exposed to view.
   1. Interior Ceilings and Bulkheads: GI-OP-3L, flat.
   2. Interior Walls: GI-OP-3A, semi-gloss.
C. Steel Doors and Frames: Finish all surfaces exposed to view; MI-OP-3A, gloss.
D. Steel Fabrications: Finish all surfaces exposed to view.
   1. Exterior: ME-OP-3A, gloss; finish all surfaces, including concealed surfaces, before

installation.

2. Interior: MI-OP-3L, gloss.

E. Shop-Primed Metal Items: Finish all surfaces exposed to view.
   1. Finish the following items:
      a. Exposed surfaces of lintels.
      b. Elevator pit ladders.
      c. Exposed surfaces of steel stairs and railings.
      d. Mechanical equipment.
      e. Electrical equipment.

F. Exterior Pavement Markings: As noted on Drawings.

END OF SECTION

SECTION 10523

FIRE EXTINGUISHERS AND ACCESSORIES

PART 1 – GENERAL

1.1 SECTION INCLUDES
A. Fire extinguishers.
B. Accessories.

1.2 RELATED SECTIONS
A. Section 06114 – Wood Blocking and Curbing: Wood blocking and shims.

1.3 REFERENCES
A. NFPA 10 - Standard for Portable Fire Extinguishers; National Fire Protection Association; 2002.
B. UL (FPED) - Fire Protection Equipment Directory; Underwriters Laboratories Inc.; current edition.

1.4 PERFORMANCE REQUIREMENTS
A. Comply with NFPA 10.
B. Provide extinguishers classified and labeled by Underwriters Laboratories Inc. for the purpose specified and indicated.

1.5 SUBMITTALS
A. See Section 01300 - Administrative Requirements, for submittal procedures.
B. Shop Drawings: Indicate cabinet physical dimensions, rough-in measurements for recessed cabinets, wall bracket mounted measurements and location.
C. Product Data: Provide extinguisher operational features, color and finish and anchorage details.
D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.
E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
F. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.6 ENVIRONMENTAL REQUIREMENTS
A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Fire Extinguishers, Cabinets and Accessories:
   1. Johns Fire Extinguisher, Berne, IN 46711
   2. Potter-Roemer, Wooddale, Il 60191
   3. Larsen's Manufacturing Co., Lombard, IL 60148.
   4. Substitutions: See Section 01600 - Product Requirements.

2.2 FIRE EXTINGUISHERS
A. Dry Chemical Type (Ammonium Phosphate): Stainless steel tank, with pressure gauge.
   1. Class 4A-60B:C.
   2. Size 10.
   3. Finish: Baked enamel, color as selected.

2.3 ACCESSORIES
A. Extinguisher Brackets: Formed steel, chrome-plated.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.
B. Verify rough openings for cabinet are correctly sized and located.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Secure rigidly in place.
C. Place extinguishers and accessories in cabinets.

END OF SECTION

SECTION 10524

DATA AND KEY STORAGE CABINETS

PART 1 – GENERAL

1.1 SECTION INCLUDES
A. Data and key storage cabinet for fire/police rapid entry.
B. Accessories for installation.
C. Coordination requirements.

1.2 REFERENCES
A. Underwriter's Laboratories Listing

1.3 PERFORMANCE REQUIREMENTS
A. Conform to local Fire and Police Departments Standards and keying requirements unless exceeded herein.

1.4 SUBMITTALS
A. See Section 01300 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide Manufacturer's Complete product data and installation requirements for model(s) selected to be installed including all accessories.
C. Shop Drawings: Indicate location of unit, dimensions, clearances, depth of recess, mounting and reinforcing details. Indicate methods of installation differing from manufacturer's standard details. Indicate keying requirements as per the Local Fire and Police Departments standards and certify that keying has been approved.
D. Samples: Submit color charts from manufacturer's full range for selection by the Architect.
E. Test Reports: Indicate UL compliance on all items to be installed with the work of this section.
F. Local Jurisdiction Requirements: Submit two copies of requirements from local Fire and Police Departments for items connected with the work of this section.
G. Certificates: Certify that products of this section meet or exceed the requirements of the local Fire and Police Departments standards, and that this product has been approved for installation and use by the Local Fire and Police Departments.
H. Manufacturer's Instructions: Provide Manufacturer's instructions for unit installation and use.
I. Operation Data: Provide operation data on all items connected with the work of this section.
J. Maintenance Data: Provide Manufacturer's recommended maintenance schedule to maintain operations of the unit. Provide additional requirements for inspection of unit(s) by the local Fire and Police Departments.
K. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.5 QUALITY ASSURANCE
A. Perform all work in accordance with conformance with requirements of local Fire and Police Departments.
   1. Keep a copy of the requirements on site for review and reference.
B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than 5 years of documented experience.
C. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years of documented experience.

1.6 PRE-INSTALLATION MEETING
A. Convene one week before starting work of this section. Contractor must impart coordination information discussed to fire and or security alarm installer.
   1. Coordinate installation on pre-fabricated metal building manufacturer for surface mounted application.

1.7 DELIVERY, STORAGE, AND PROTECTION
A. Deliver all materials and accessories to project site in good condition and acceptable finish without defects.

B. Store all materials under controlled environment prior to installation. Do not allow materials to become wet or damaged.

1.8 PROJECT CONDITIONS

A. Coordinate the work of this section with that of the pre-fabricated metal building manufacturer.
B. Coordinate installation with all mechanical and electrical items; notify Architect immediately of any conflict.

1.9 WARRANTY

A. See Section 01780 - Closeout Submittals, for additional warranty requirements.
B. Correct defective Work within a one year period after Date of Substantial Completion.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Knox Company, 17672 Armstrong Avenue, Irvine, Ca. 92614 (800) 552-5669 www.knoxbox.com
B. Substitutions: See Section 01600 - Product Requirements.

2.2 MATERIALS

A. Procure all materials and accessories from single manufacturer.
B. Provide Knox Company "Knox Box" 3200 series surface mount, quantity and locations as shown on drawings.
   1. Provide 4 access keys to owner prior to substantial completion.

2.3 COLORS

A. As selected by Architect from Manufacturer's full range.

2.4 ACCESSORIES

A. Provide surface mounting kit.
B. Provide surface mounting flange, bolts and all other items required for a complete installation.
C. Provide tamper switch, wire lead and all other accessories required for interface with fire and or security alarm system(s).

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify that all materials are as specified, are free from defects and damage, and that construction is ready to receive new units

3.2 PREPARATION

A. Coordinate work with pre-fabricated building manufacturer for installation of surface mounting kit, reinforcing, unit and all related accessories.

3.3 INSTALLATION

A. Install unit and all accessories in accordance with Manufacturer’s recommended installation unless exceeded herein.

3.4 INSTALLATION TOLERANCES

A. Maximum deviation from level: 1/8 inch in 4 feet.
B. Maximum deviation from level plane at face frame: 1/16 inch

3.5 FIELD QUALITY CONTROL

A. Perform field inspection and review of installed units with necessary Fire and Police Department personnel. Notify architect in writing of inspection results.

3.6 COORDINATION WITH OTHER SYSTEMS

A. Coordinate installation of unit and all accessories with requirements of fire and or security systems. Mount and adjust tamper switch as required to interface with fire and or security system, and to achieve operable status.
B. Test operable condition of tamper switch and other accessories with other trades as required.

3.7 ADJUSTING

A. Adjust all hinges, locks, mounting hardware and other devices for smooth operation.

3.8 CLEANING

A. Thoroughly clean all surfaces both interior and exterior to unit with cleaning agent recommended by manufacturer.
B. Maintain all lock cylinders and other operable parts in lubricated condition and free from dirt, debris or other contaminates.

3.9 PROTECTION

A. Provide sufficient coverage protection from masonry and or mortar debris or other construction activities and materials until project completion.

END OF SECTION

SECTION 10800

TOILET ACCESSORIES

PART 1 – GENERAL

1.1 SECTION INCLUDES
A. Accessories for toilet rooms.
B. Grab bars.

1.2 REFERENCES
A. ASTM A 666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2000.
B. ASTM C 1036 - Standard Specification for Flat Glass; 2001.
C. GSA CID A-A-3002 - Mirrors, Glass; U.S. General Services Administration; 1996.

1.3 SUBMITTALS
A. See Section 01300 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data on accessories describing size, finish, details of function, attachment methods.

1.4 COORDINATION
A. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

PART 2 – PRODUCTS

2.1 MANUFACTURERS
A. Toilet Accessories:
   1. A and J Washroom Accessories, New Windsor, NY 12553
   2. American Dryer, Livonia, MI. 48150.
   3. American Specialties, Inc., Yonkers, NY 10701
   4. Bradley Corp., Menominee Falls, WI 53052
   5. Excel Dryer, Inc., East Longmeadow, MA 01028.
   6. McKinney Parker, Essex Industries, Scranton, PA 18505
   7. World Dryer, Berkeley, IL 60163
   8. Substitutions: Section 01600 - Product Requirements.
B. All items of each type to be made by the same manufacturer.

2.2 MATERIALS
A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
   1. Grind welded joints smooth.
   2. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.
B. Keys: Provide 3 keys for each accessory to Owner; master key all lockable accessories.
C. Stainless Steel Sheet: ASTM A 666, Type 304.
D. Mirror Glass: Float glass, ASTM C 1036 Type I, Class 1, Quality Q2, with silvering, copper coating, and suitable protective organic coating to copper backing in accordance with GSA CID A-A-3002.
E. Fasteners, Screws and Bolts: Hot dipped galvanized, tamper-proof, security type.

2.3 FINISHES
A. Stainless Steel: No. 4 satin brushed finish, unless otherwise noted.

2.4 TOILET ROOM ACCESSORIES
A. Mirrors: Stainless steel framed, 6 mm thick float glass mirror.
   1. Size: As indicated on Drawings
   2. Frame: 0.5 inch angle shapes, with mitered and welded and ground corners, and tamper-

proof hanging system; No. 4 finish.

3. Backing: Full-mirrored sized, minimum 0.03 inch galvanized steel sheet and non-absorptive filler material.
4. Product:
   a. ADA Mirror: 0535 manufactured by American Specialties
   b. Mirror: 0600 manufactured by American Specialties

B. Grab Bars: Stainless steel, 1-1/4 inches outside diameter, minimum 0.05 inch wall thickness, non-slip grasping surface finish, concealed flange mounting; 1-1/2 inches clearance between wall and inside of grab bar.
   1. Length and Configuration: As indicated on Drawings
   2. Product: Open

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.
B. Verify exact location of accessories for installation.
C. Verify that field measurements are as indicated on drawings.

3.2 PREPARATION

A. Deliver inserts and rough-in frames to site for timely installation.
B. Provide templates and rough-in measurements as required.

3.3 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions.
B. Install plumb and level, securely and rigidly anchored to substrate.
C. Mounting Heights and Locations: As required by accessibility regulations, as indicated on drawings, and as follows:

END OF SECTION

SECTION 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. Submittals.
   2. Coordination drawings.
   3. Record documents.
   4. Maintenance manuals.
   5. Rough-ins.
   6. Mechanical installations.
   7. 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, irregardless 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 2012
   11. International Mechanical Code 2012
   12. Factory Mutual

13. Illinois Administrative Code, including, but not limited to:
    a. Illinois State Plumbing Code 2014
    b. Illinois Accessibility Code 2008
14. National Electric Code (NEC)
15. National Electric Manufacturers' Association (NEMA)
16. All applicable sections of National Fire Protection Association (NFPA)
17. Underwriters' Laboratories (UL)
18. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)

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 COORDINATION DRAWINGS

A. Each trade shall prepare original coordination drawings in accordance with Division 1 Sections, other Division 15, 16 and 17 Sections and as additionally defined below. Provide individual drawings for each trade, including (1) reproducible copy. Provide original drawings meeting the requirements as described in this section. Marked up copies of the design documents are not acceptable.

B. Drawings shall include the latest architectural floor plan with column lines identified. These drawings shall detail all elements, components, and systems of the applicable mechanical, plumbing, or fire protection trade. Drawings shall also indicate the locations of other trades and indicate their relationship in all areas where limited space requires detailed coordination. All system components of trade being presented shall appear dark and be easily distinguished from architectural information or other system information included for coordination purposes. All information included that is not a part of the system being presented shall be indicated light or half tone. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:
    1. Indicate the proposed locations of piping, ductwork, equipment, and materials. Include the following:
        a. Ductwork mains and branches, size and location, for both exterior and interior; locations of dampers and other control devices; filters, boxes, and terminal units requiring periodic maintenance or repair.
        b. Mains and branches of all piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e., air separators, strainers, expansion compensators, tanks, etc.). Indicate actual inverts and horizontal locations of underground piping.
        c. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
        d. Clearances for installing and maintaining insulation.

e. Clearances for servicing and maintaining equipment, including tube removal, filter removal, and space for equipment disassembly required for periodic maintenance.
f. Equipment connections and support details.
g. Exterior wall and foundation penetrations.
h. Fire-rated wall and floor penetrations.
i. Sizes and location of required concrete pads and bases.
j. Valve stem movement.
k. Indicate location of all equipment, ductwork, plumbing fixtures, piping etc., with dimensions from prominent building lines; and elevations above corresponding floors, roofs or grade as applicable.

2. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.
3. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
4. Prepare reflected ceiling plans to coordinate and integrate installations, air outlets and inlets, light fixtures, communication systems components, sprinklers, and other ceiling-mounted items. Dimension all items from prominent building lines except for those located in modular type ceilings.
5. Submit all coordination drawings and/or shop drawings prior to purchase, fabrication, or installation of any equipment. Any work started or equipment purchased prior to the review of submitted drawings by the design engineer is done at the contractor's risk. The offending contractor shall be entirely responsible for all changes, modifications, and/or extra services required resulting from the improper coordination and/or improper submittal procedures.
6. Encircle or bubble any revisions made on drawings being submitted more than one time. Indicate all revisions or changes made subsequent to the previous submittal reviewed by the engineer.

C. Electronic backgrounds (plan sheets only) are available from the office of the Consulting Engineer for a flat fee of $250.00 per trade (i.e.: mechanical, plumbing, electrical, fire protection). Contractor will be required to sign a waiver of release of the documents prior to electronic transmittal.

D. See front end documents for additional coordination requirements.

1.7 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”.

1.8 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.

1.9 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.

1.10 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.

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.
   4. 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.
   5. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
   6. 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.
   7. 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.
   8. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components.
   9. 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.
   10. Install access panel or doors where units are concealed behind finished surfaces. Access panels and doors are specified in Division 15 Section - Ductwork Accessories.
   11. 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.
   12. 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.
   13. 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 15140

SUPPORTS AND ANCHORS

PART 1 GENERAL

1.1 WORK INCLUDED

A. Pipe and equipment hangers and supports.

B. Equipment bases and supports.

C Sleeves and seals.

D. Flashing and sealing equipment and pipe stacks.

1.2 RELATED SECTIONS

A. Section 15242 - Vibration Isolation.

B. Section 15260 - Piping Insulation.

C. Section 15410 - Plumbing Piping.

D. Section 15505 - Fuel Piping.

E. Section 15870 - Power Ventilators.

1.3 REFERENCES

A. American Society of Mechanical Engineers:
   1. ASME B31.1 – Power Piping.
   2. ASME B31.2 – Fuel Gas Piping.
   3. ASME B31.9 – Building Services Piping.

B. 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.

C. American Welding Society:
   1. AWS D1.1 – Structural Welding Code – Steel.

D. FM Global:
   1. FM – Approved Guide, A Guide to Equipment, Materials & Services Approved by Factory Mutual Research for Property Conservation.

E. 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.

SECTION 15140

SUPPORTS AND ANCHORS

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 for support of plumbing or hydronic piping.

PART 2 PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

A. Plumbing Piping - DWV:
1. Conform to ASME B31.9, ASTM F708.
2. Hangers for Pipe Sizes 2 to 1-1/2 Inch: Malleable iron, adjustable swivel, split ring.
3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
7. Vertical Support: Steel riser clamp.
8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
9. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

B. Plumbing Piping - Water:
1. Conform to ASME B31.9, ASTM F708.
2. Hangers for Pipe Sizes 2 to 1-1/2 Inch: Malleable iron, adjustable swivel, split ring.
3. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
4. Hangers for Hot Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.
5. Hangers for Hot Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron roll, double hanger.
6. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
7. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Over: Steel channels with welded spacers and hanger rods, cast iron roll.
8. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
9. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
10. Vertical Support: Steel riser clamp.

11. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
12. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
13. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

C. Fuel Gas Piping:
1. Conform to ASME B31.2, ASTM F708.
2. Hangers for Pipe Sizes 2 to 1-1/2 Inch: Malleable iron, adjustable swivel, split ring.
3. Hangers for Hot Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.
4. Hangers for Hot Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron roll, double hanger.
5. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
6. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Over: Steel channels with welded spacers and hanger rods, cast iron roll.
7. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
8. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
9. Vertical Support: Steel riser clamp.
10. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
11. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

D. Refrigerant Piping:
1. Conform to ASME B31.5, ASTM F708.
2. Hangers for Pipe Sizes to 1-1/2 Inch: Malleable iron, adjustable swivel, split ring.
3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
6. Vertical Support: Steel riser clamp.
7. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
8. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2.2 ACCESSORIES

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

2.3 INSERTS

A. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.4 FLASHING

A. Metal Flashing: 26 gage stainless steel.

B. Metal Counterflashing: 22 gage stainless steel.

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.

2.5 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.

2.6 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.

2.7 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.

2.8 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 INSERTS

A. Provide inserts for placement in concrete formwork.

B. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

C. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.

D. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

3.3 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.

3.4 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.

3.5 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 calk, 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.

E. 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.

3.6 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 calk air tight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

D. Install chrome plated steel escutcheons at finished surfaces.

3.7 SCHEDULES

A. Copper and Steel Pipe Hanger Spacing:

PIPE SIZE Inches	COPPER TUBING MAXIMUM HANGER SPACING Feet	STEEL PIPE MAXIMUM HANGER SPACING Feet	COPPER TUBING HANGER ROD DIAMETER Inches	STEEL PIPE HANGER ROD DIAMETER 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 Feet	HANGER ROD DIAMETER 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 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 15260 - Piping Insulation.

B. Section 15290 – Ductwork Insulation.

C. Section 15410 - Plumbing Piping.

D. Section 15505 - Fuel Piping.

E. Section 15535 – Refrigerant Piping and Specialties.

F. Section 15890 - Ductwork.

1.3 REFERENCES

A. ASME A13.1 - Scheme for the Identification of Piping Systems.

1.4 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.

1.5 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.

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. Install plastic pipe markers in accordance with manufacturer's instructions.

D. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.

E. 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.

F. Identify control panels and major control components outside panels with plastic nameplates.

G. Identify valves in main and branch piping with tags (ie: HWS, HWR, BWS, BWR, HW, CW, etc).

H. Identify air terminal units with numbered tags.

I. Tag automatic controls, instruments, and relays. Key to control schematic.

J. Identify piping, concealed or exposed, with plastic pipe markers. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

K. 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.

L. Identify calibrated balancing valves with tags indicating model number, flow rate, service and setting.

3.3 VALVE CHART AND SCHEDULE

A. Provide valve chart and schedule in aluminum frame with clear plastic shield. Install in location directed by Owner.

END OF SECTION

SECTION 15195

TESTING OF HVAC AND GAS PIPING

PART 1 GENERAL

1.1 WORK INCLUDED

A. Natural gas piping.

B. Refrigerant piping.

1.2 RELATED SECTIONS

A. Section 15505 - Fuel Piping.

B. Section 15535 – Refrigerant Piping and Specialties.

1.3 REFERENCES

A. NFPA.

B. ARI.

C. International Mechanical Code 2012.

1.4 REGULATORY REQUIREMENTS

A. Conform to International Mechanical Code 2012.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 GENERAL

A. Before final acceptance of all HVAC and gas piping systems, all systems must be tested in accordance with the schedule and prove to be free of leaks.
   1. Perform tests under observation of Architect/ Engineer.
   2. Remove, replace or satisfactorily repair defective work revealed by tests.
   3. Make piping repairs with new materials; caulking of screwed joints or pin holes is not permitted.
   4. Furnish all test equipment and materials for testing.
   5. Owner to furnish water for testing and flushing.

3.2 TESTING MATERIAL

A. Testing Medium:
   1. Hydrostatic Testing Medium: Clean water.
   2. Pneumatic Testing Medium: Clean compressed air.

B. Pressure Testing Gauges: ANSI B40.1, Grade AA; minimum 6 inch diameter dial with scale divisions equal or less than maximum allowable pressure drop.

3.3 TESTING SYSTEMS

A. All plumbing and fire protection piping to be tested as called for in Section 15410.

B. HVAC and Gas System Piping:
   1. Test with water and air.
   2. Water Test:
      a. When entire system is tested, tightly close all openings in pipes except highest opening and fill system with water to overflow point.
      b. When system is tested in sections, tightly plug each opening except highest opening, fill each section with water and test each section with minimum 10 foot head of water; test each preceding section until entire system has been tested with minimum 10 foot head of water, except uppermost 10 feet of system.
      c. Keep water in system or in portion under test, for minimum 30 minutes before inspection.
      d. System must be tight at all joints.
   3. Air Test:
      a. When tests are made with air, apply minimum 30 psi with force pump and maintain for period of time indicated in Paragraph D with no leakage apparent.
      b. Use mercury-column in making test.

C. Hydrostatic and Pneumatic Testing Requirements:
   1. Hydrostatic and pneumatic tests apply to piping indicate as scheduled is Paragraph D.
   2. Pressure to be raised gradually to given value; then block off tight at source.
   3. Allowable Pressure Drop: Maximum amount scheduled during corresponding minimum time interval.
      a. Visually examine all joints during test.
   4. Upon successful completion and test approval, relieve piping of pressure, drain, put into normal operation except for potable water to be sterilized before placing in service.

D. Hydrostatic and Pneumatic Testing Schedule:

Service	Normal Hydrostatic Work Pressure psig	Pneumatic Test Pressure psig	Maximum Allowable Test Pressure psig	Minimum Pressure Drop psi	Test Time Hours
1. Fuel					
Natural Gas	To 5	---	30	0	8
2. Miscellaneous					
Refrigeration	To 290	---	300	0	4

3.4 CLEANING AND ADJUSTING

A. Cleaning: Thoroughly clean all parts of the piping installation at completion of work.
   1. Remove grease, metal cutting and sludge from all equipment, pipes, valves all fittings.
   2. Repair all stoppages, discoloration or other damage to finish, furnishings or parts of building that are due to Contractor's failure to properly clean piping system.
   3. Remove and clean all flow control devices.

B. Adjusting:
   1. Adjust all valves and other parts of work for quiet operation.
   2. Adjust control devices for proper operation.
   3. Demonstrate to Architect/Engineer satisfactory operation following adjustment.
   4. Readjust or replace all items not functioning properly.

END OF SECTION

SECTION 15242

VIBRATION ISOLATION

PART 1 GENERAL

1.1 WORK INCLUDED

A. Vibration isolation for piping and equipment.

B. Piping flexible connections.

1.2 RELATED EQUIPMENT SECTIONS

A. Section 15410 – Plumbing Piping.

B. Section 15535 – Refrigerant Piping and Specialties.

C. Section 15870 – Power Ventilators.

D. 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. Provide all vibration isolators and equipment bases for Division 16 work from the product line of a single manufacturer, unless otherwise accepted by the Acoustics Consultant.

D. 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.

E. 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.

F. 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.

G. 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 Xl 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.

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.

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.

2.4 ACCEPTABLE PRODUCTS

A. (Type A) Elastomeric Pads: 5/16-inch minimum thickness, waffled or ribbed neoprene. Where multiple layers are required to provide the specified deflections, interleave pads with 16 gauge steel shim plates. Size pads for deflection equal to 10 to 15 percent of unloaded height and provide pads of sufficient thickness to achieve the specified deflection. Provide load-distributing top plates if required for uniform loading. Acceptable products include
   1. Individual pads
      a. Mason W, SW, and Super W
      b. Kinetics NP
      c. Amber-Booth NR
   2. Neoprene/Steel composite pads:
      a. Mason WSW
      b. Amber-Booth SP-NR Style E

B. (Type B) Neoprene-In-Shear Base-Mounted Isolators: Provide double-deflection isolators with steel bottom plates with pre-drilled bolt holes for attachment to floor or base, a threaded steel insert at the top of the isolator for attaching the equipment, and friction surfaces at both top and bottom. Coat all metal surfaces with neoprene. Design isolators for 0.25 to 0.35 inches of deflection. Acceptable products include:
   1. Neoprene-In-Shear Isolators:
      a. Mason ND
      b. Kinetics RD
      c. Amber-Booth RVD

C. (Type D) Restrained Open Spring Base-Mounted Isolators: 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 for Type C but with restraint studs and adjustable nuts. Provide ½ inch minimum clearance around the restraint studs. Use bridge-bearing quality neoprene for elastomeric friction pads at chillers and cooling towers. Acceptable products include:
   1. Restrained Base Mounted Isolators:
      a. Mason SLR
      b. Kinetics FLS
      c. Amber-Booth CT

D. (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

E. (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 pring 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:
      a. Mason 30N
      b. Kinetics SRH
      c. Amber-Booth BSRA

F. (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

G. (Type G) Floating Concrete Bases: Vibration isolator manufacturer shall furnish rectangular structural beams or channel concrete forms for floating foundations. The base depth need not exceed 12" unless specifically recommended by the base manufacturer for mass or rigidity. In general, bases shall be a minimum of 1/12th of the longest dimension of the base, but not less than 6". Forms shall include minimum concrete reinforcement consisting of half-inch bars or angles welded in place on 6" center running both ways in a layer 1-1/2" above the bottom, or additional steel as in required by the structural conditions. Forms shall be furnished with steel members to hold an anchor-bolt sleeves when the anchor bolts fall in concrete locations. Height saving brackets shall be employed in all mounting locations to maintain a 1" clearance below the base.
   1. Acceptable Manufacturers:
      a. Mason Industries – Type K.
      b. Korfund Dynamics.
      c. Amber Booth.

H. (Type P) Flexible Neoprene Piping Connectors: Provide flanged twin-sphere or threaded single-sphere isolators with Kevlar cord and peroxide-cured EPDM body with steel rings embedded in flanges to prevent pull-out. Connectors must accept elongation, compression, axial, and transverse motion. Select materials to suit system temperature, pressure, and fluid type. Do not use control rods or cables to limit extension of the isolator. Use twin-sphere isolators for pipes 2 inches to 14 inches in diameter. Single-sphere isolators may be used for pipes less than 2 inches and greater than 14 inches in diameter. Straight-wall flexible connectors are not acceptable except for sewage ejector pumps. Acceptable products include:
   1. Flexible Neoprene Piping Connectors:
      a. Mason types SFDEJ, SFDCR, and SFU

I. (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

J. (Type S) Elastomeric Isolators for Mounting Bolts: Provide neoprene grommets, bushings, and washers for all bolts used to secure isolators to floors and housekeeping slabs and for all snubbers. Size bolt holes and washers to accommodate grommets, sleeves, and bushings and to preclude contact between rigid components that would cause bridging between isolated elements and the building structure. Baseplates for neoprene pads may be rigidly bolted to the floor or housekeeping slab if the bolts secure the baseplates only and do not continue through the neoprene to meet any other rigid material. Do not exceed 40 durometer, Shore A hardness. Acceptable products include:
   1. Grommets (Washer Bushings):
      a. Mason HG
      b. E.A.R. Isodamp and C-1000
   2. Bushings:
      a. Mason HLB
   3. Washers:
      a. Mason HLW

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 vertical risers shall be isolated from the building structure by means of noise and vibration isolation guides and supports.
4. 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.
5. No rigid connections between equipment and building structure shall be made that degrades the noise and vibration isolation system herein specified.
6. Electrical circuit connections to isolated equipment shall be looped to allow free motion of isolated equipment.
7. 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.
8. 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.
9. 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.
10. 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 be discrepancies after installation shall be at the contractor's expense.
11. Obtain inspection and approval of any installation to be covered or enclosed, prior to such closure.
12. Correct, at to additional cost, all installation which are deemed defective in workmanship or materials.
13. 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. Isolate drain piping attached to vibration isolated equipment from rigid components of the building.

F. Limit stops must be inactive and out of contact with the isolator during equipment operation.

G. Adjust leveling bolts and hanger rod lengths so that equipment is level and in alignment with connecting ductwork and piping.

H. 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.

3.4 PIPING AND CONDUIT

A. Isolate all piping 1½ inches and larger in diameter that is connected to rotating or reciprocating equipment. Waste, vent, rainwater, and fire protection piping do not require isolation unless noted otherwise.

B. Select and install isolators in a manner that does not induce stresses in piping connections and does not result in misalignment of shafts and bearings. Maintain equipment and piping in rigid condition during installation. Do not transfer loads to the isolators until the installation is complete and under full operational load.

C. Isolator Types:
   1. For equipment isolated with supports and mounts containing springs, provide Type G or H spring/elastomer-in-series isolators for the first 4 horizontal piping hangers and associated vertical piping. Size these hangers to provide the same static deflection as the isolators for the equipment. For floor-supported piping, use Type D open spring base mount isolators and Type B neoprene-in-shear base mount isolators.
   2. Beyond the 4 hangers nearest the equipment, within the rooms housing the equipment and for a distance of not less than 50 feet from the equipment, provide Type F elastomeric hangers, and provide Type F hangers for all piping of 2-inch and smaller diameter and flow rates of greater than 4 feet per second.

3. For pipes larger than 2-inch and not greater than 6-inch diameter throughout the building, support entire length on Type F elastomeric hangers, Type B neoprene-in-shear base supports, or Type A elastomeric pads between the piping and all points of contact between piping and non-isolated construction.
4. For pipes larger than 6-inch diameter, support entire length throughout the building on Type H restrained spring/elastomer-in-series hangers, or Type D restrained spring/elastomer-in-series base mounts if supported from the floor.

D. Position isolators as high as possible in the hanger rod or strap assembly but not in direct contact with the building structure without manufacturer's written authorization. Provide 1 inch minimum clearance between isolator housing and structure above. Provide side clearance for hangers to allow full 360-degree rotation about the rod axis without contacting any object.

E. Parallel pipes can be hung together on a trapeze that is isolated from the structure. Isolator deflections must be equal to or greater than the greatest deflection required for the pipes if isolated individually. Do not mix isolated and non-isolated piping on the same trapeze.

F. Mount flexible connections for piping to equipment on the equipment side of shut-off valves.

G. Provide isolation of expansion tanks, air separators, and other devices similar to that provided for the attached piping.

3.5 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.

3.6 EQUIPMENT SCHEDULE

A. Equipment to be installed on isolators:
   1. Inline Exhaust fans.
   2. Ceiling cabinet unit heaters.
   3. Suspended unit heaters.
   4. Air cooled condensing units.
   5. Ceiling fan coil units.

3.7 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 15260

PIPE INSULATION

PART 1 GENERAL

1.1 WORK INCLUDED

A. All plumbing and hydronic piping jackets and accessories.

B. All piping saddles.

1.2 RELATED SECTIONS

A. Section 15140 - Supports and Anchors: Pipe covering protection shields.

B. Section 15190 - Mechanical Identification.

C. Section 15410 - Plumbing Piping.

D. Section 15535 - Refrigerant Piping and Specialties.

1.3 REFERENCES

A. ASTM C335 - Steady-State Heat Transfer Properties of Horizontal Pipe Insulation.

B. ASTM C449 - Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement.

C. ASTM C518 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

D. ASTM C534 - Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.

E. ANSI/ASTM C547 - Mineral Fiber Preformed Pipe Insulation.

F. ASTM C585 - Inner and Outer Diameters and Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing (NPS System).

G. ASTM C921 - Properties of Jacketing Materials for Thermal Insulation.

H. ASTM D1667 - Flexible Cellular Materials - Vinyl Chloride Polymers and Copolymers (Closed Cell Foam).

I. ASTM D2842 - Water Absorption of Rigid Cellular Plastics.

J. ASTM E84 - Surface Burning Characteristics of Building Materials.

K. ASTM E96 - Water Vapor Transmission of Materials.

1.4 REGULATORY REQUIREMENTS

A. Conform to 2012 International Mechanical Code and 2015 International Energy Code.

1.5 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. Submit manufacturer's installation instructions under provisions of Division 1 General Requirements.

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.

1.6 QUALITY ASSURANCE

A. Materials: Flame spread/fuel contributed/smoke developed rating of 25/50 or less in accordance with ASTM E84. Material shall not melt or drip when exposed to flame.

1.7 QUALIFICATIONS

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

1.8 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site under provisions of Division 1 General Requirements.

B. Store, protect and handling products under provisions of Division 1 General Requirements.

C. Deliver materials to site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Insulation Work:
   1. Maintain ambient temperatures and conditions for installation of insulation as required by manufacturers of insulation adhesives, mastics and insulation cements.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Insulation:
   1. Manville Corporation.
   2. Knauf Fiberglass.
   3. CertainTeed Corp.
   4. Owens Corning Fiberglass.

B. Steel and Wood Insulation Protection Saddles:
   1. Acceptable Manufacturers:
      a. Grinnell.
      b. B-Line.
      c. Unistrut.

2.2 FIBER GLASS INSULATION MATERIALS (TYPE A):

A. Glass Fiber Insulation
   1. Insulation: ASTM C547; rigid molded, noncombustible.
      a. K Value: 0.23 at 75 degrees F.
      b. Minimum Service Temperature: 0 degrees F.
      c. Maximum Service Temperature: 850 degrees F.
      d. Maximum Moisture Absorption: 0.2 percent by volume.
   2. Vapor Barrier Jacket:
      a. ASTM C921; factory applied vapor retarder composed of a white draft facing out reinforced with glass fiber yarn and bonded to aluminized film (ASJ).
      b. Moisture Vapor Transmission: ASTM E96; 0.02 perm inches.
      c. Secure with factory applied self-sealing longitudinal laps and butt strips.
      d. Jacket Temperature Limit: Minus 20 to 150 degrees F.
   3. Vapor Barrier Lap Adhesive:
      a. Compatible with insulation.
   4. Fittings (Concealed and Exposed):
      a. Insulate all fittings (plumbing and HVAC) with a minimum of two layers of precut blanket insulation.
      b. Insulation blanket thickness to equal K value of straight sections of insulation.
      c. Tie wire to be 18 gauge stainless steel with twisted ends.
      d. Jacket shall be a one piece pre-molded high impact fitting 25/50 rated, off-white color, 10 mil thick, brush on welding adhesive connections.
   5. Insulating Cement/Mastic:
      a. Acceptable Manufacturers:
         1) Fibrex.
         2) Pabco.
         3) Manville.
      b. ASTM C195; hydraulic setting on mineral wool.

2.3 ELASTOMERIC CELLULAR FOAM (TYPE B):

A. Manufacturers:
   1. Armstrong World Industries - Model AP Armaflex.
   2. Halstead.
   3. Rubatex.

B. Insulation: ASTM C534; flexible, cellular elastomeric, molded or sheet.
   1. K Value: ASTM C177 or C518; 0.27 at 75 degrees F.
   2. Minimum Service Temperature: -20 degrees F.
   3. Maximum Service Temperature: 220 degrees F.
   4. Maximum Moisture Absorption: ASTM D1056; 1.0 percent (pipe) by volume, 1.0 percent (sheet) by volume.
   5. Moisture Vapor Transmission: ASTMA E96; 0.20 perm inches.
   6. Maximum Flame Spread: ASTM E84; 25.
   7. Maximum Smoke Developed: ASTM E84; 50.
   8. Connection: Waterproof vapor barrier adhesive.

C. Elastomeric Foam Adhesive:
   1. Acceptable manufacturers:
      a. Armstrong - Model 520.
   2. Air dried, contact adhesive, compatible with insulation.

2.4 JACKETS

A. PVC Plastic (Fittings and **ALL** Exposed Interior Piping excluding Boiler Room and Mechanical Room)
   1. Jacket: ASTM C921, one-piece molded type fitting covers and sheet material, off-white color.
      a. Minimum service temperature: -40 degrees F.
      b. Maximum service temperature: 150 degrees F.
      c. Moisture vapor transmission: ASTM E96; 0.002 perm-inches.
      d. Maximum Flame Spread: ASTM E84; 25.
      e. Maximum Smoke Developed: ASTM E84; 50.
      f. Thickness: 10 mil.
      g. Connections: Brush on welding adhesive.

B. Aluminum Jacket: ASTM B209 (All exterior refrigerant piping serving air cooled condenser).
   1. Thickness: 0.016-inch sheet.
   2. Finish: Embossed.
   3. Joining: Longitudinal slip joints and 2-inch laps.
   4. Fittings: 0.016-inch thick die shaped fitting covers with factory attached protective liner.
   5. Metal Jacket Bands: 3/8 inch wide; 0.010-inch thick stainless steel.

C. Water Based Armaflex Finish: ASTM 84 (all exterior suction refrigerant piping service air cooled condenser)
   1. Color: Standard white.
   2. Composition: Pigmented Acrylic Latex.
   3. Flammability: Non flammable; water based.
   4. Application: Brass or roller.

PART 3 EXECUTION

3.1 INSULATION

A. Examination:
   1. Verify that piping has been tested before applying insulation materials.
   2. Verify that surfaces are clean, foreign material removed and dry. Flux to be removed from copper piping.

B. Installation:
   1. Install materials in accordance with manufacturer's instructions.
   2. On exposed piping, locate insulation and cover seams in least visible locations.
   3. All insulation to have a vapor barrier jacket (ASJ) with factory applied self-sealing longitudinal laps and butt strips.
   4. Support all piping with insulation protection saddles.
      a. Plumbing Piping:
         1) 2 Inch Pipe Size: Wood dowel with insulation shields.
         2) 3/4 Inch and Larger: High density pre-molded type with insulation shields or manufactured wood saddles.
      b. Hydronic Piping:
         1) 2 Inch to 2-1/2 Inch: High density pre-molded type with insulation shields.
         2) 3 Inch and Larger: Manufactured steel saddles welded to the pipe.
   5. Run insulation continuous through walls, floors, sleeves, pipe hangers and other pipe penetrations.
   6. Insulate all piping located behind chases.
   7. Insulate all piping installed inside cabinet unit heaters and fan coils.

8. **Insulate entire system including fittings, valves, unions, flanges, strainers, expansion joints, including domestic hot and cold water piping.**
9. Finish all insulation at supports, protrusions and interruptions.
10. Seal all aluminum jackets outdoors air and water tight.
11. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

3.2 INSULATION SCHEDULE

PIPING SYSTEMS	INSULATION TYPE	PIPE SIZES/INSULATION THICKNESS			
		1/2 To 1"	1-1/4 To 2"	2 ½ " To 4"	5" & Larger
A. Plumbing and Mechanical Systems					
Domestic Cold Water Supply	A	1"	1"	2"	2"
Domestic Hot Water Supply	A	1"	1"	2"	2"
Domestic Hot Water Recirc. (HWC)	A	1"	1"	2"	2"
Refrigerant Suction and Hot Gas	B	1"	1"	1-1/2"	--- (Exterior Piping Shall Include Aluminum Jacket)
Condensate Dew Drain Pipes (if installed in copper or steel pipe)	A	½"	½"	½"	½"
Plumbing Vents Within 10 Feet of Exterior	A	½"	½"	½"	½"
Sanitary Drainage From Mech. Equipment Rooms	A	½"	½"	½"	½"

Note: ALL exposed interior piping shall have a PVC jacket as specified.

END OF SECTION

SECTION 15290

DUCTWORK INSULATION

PART 1 GENERAL

1.1 WORK INCLUDED

A. Ductwork insulation.

B. Duct liner.

C. 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 2015 International Energy Code with all 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.

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.

2.3 GLASS FIBER DUCT LINER, FLEXIBLE (TYPE C)

A. Acceptable Manufacturers:
   1. Owens Corning Corp.
   2. Knauf Fiberglass.
   3. Manville.
   4. Certain Teed Corp.

B. Insulation: ASTM C553; flexible, noncombustible blanket.
   1. K Value: ASTM C518, 0.27 at 75 degrees F.
   2. Maximum Service Temperature: 250 degrees F.
   3. Density: 3.0 lb/cu.ft.
   4. EPA registered anti-microbial coating on air side.
   5. Maximum Velocity on Coated Air Side: 4,000 ft/min.

C. Adhesive:
   1. Waterproof fire-retardant type.

D. Mechanical Fasteners: Galvanized steel, self-adhesive pad or impact applied with press on head. Install in accordance with the requirements of SMACNA Standards. Compression of linear surface not to exceed 10% of thickness.

E. Liner shall be attached to sheet metal using adhesive covering 90% of the metal surface.
F. Coat edge of upstream end of liner with adhesive.

OCTAVE BAND CENTER FREQUENCY						
THICKNESS	125	250	500	2000	4000	5000
1 Inch	0.09	0.19	0.48	0.65	0.83	0.9
2 Inch	0.22	0.47	0.76	0.89	0.91	0.95

2.4 HIGH TEMPERATURE GLASS FIBER, FLEXIBLE DUCT WRAP (TYPE D)

A. Acceptable Manufacturers:
   1. CertainTeed Corp.
   2. Thermal Ceramics.
   3. 3M.

B. Insulation: UL1978, ASTM E-119, (2) layers @ 1.5" thick high temperature glass fiber blanket, completely encapsulated in a UL Classified Aluminum foil, fiberglass reinforced scrim, to achieve a two-hour fire rating. Insulation to provide zero clearance to combustible.

C. Secure insulation with stainless steel banding.

2.5 JACKET

A. Aluminum:
   1. Thickness: 0.016 inch sheet.
   2. Finish: Embossed.
   3. Joining: Longitudinal slip joints and 2-lap joints.
   4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
   5. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.

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.
   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. Duct and Plenum Liner Applications:
1. Adhere insulation with adhesive for 90 percent coverage.
2. Secure insulation with mechanical liner fasteners. Refer to SMACNA Standards for spacing.
3. Seal and smooth joints.
4. Seal liner surface penetrations with adhesive.
5. Duct dimensions indicated are net inside dimensions required for air flow. Increase duct size to allow for insulation thickness.

F. 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

TYPE DUCTWORK	THICKNESS INCHES	TYPE
All low and medium pressure rectangular supply and return ductwork	1”	C
Relief and transfer ducts	1”	C
Exhaust ducts	1”	C
Outdoor air intake ductwork/plenums	2”	B
All concealed or exposed round low pressure rectangular supply and return ducts	1-1/2”	A
All ductwork located in exterior of building or unconditioned duct/attic space, supply and return.	1” 3”	C B
Kitchen Hood	(2) 1-1/2”	D

END OF SECTION

SECTION 15310

FIRE PROTECTION PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pipe, fittings, valves, and connections for sprinkler systems.

1.2 RELATED SECTIONS

A. Section 15140 - Supports and anchors.

B. Section 15190 - Mechanical Identification: Piping identification.

C. Section 15325 - Sprinkler Systems: Sprinkler systems design.

1.3 REFERENCES

A. ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800.

B. ASME B16.3 - Malleable Iron Threaded Fittings, Class 150 and 300.

C. ASME B16.4 - Cast Iron Threaded Fittings, Class 125 and 250.

D. ASME B16.5 - Pipe Flanges and Flanged Fittings.

E. ASTM A135 - Electric-Resistance-Welded Steel Pipe.

F. ASTM A47 - Malleable Iron Castings.

G. ASTM A53 - Pipe, Steel, Black and Hot-Dipped, Zinc-coated Welded and Seamless.

H. AWS D10.9 - Specifications for Qualification of Welding Procedures and Welders for Piping and Tubing.

I. NFPA 13 - Installation of Sprinkler Systems (1994 Edition)

J. International Building Code, IBC (2012 Edition).

1.4 SUBMITTALS FOR REVIEW

A. Submit under provision of Division 1 General Requirements.

B. Product Data: Provide manufacturers catalog information. Indicate valve data and ratings.

C. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections. Provide complete 1/8 inch scale drawings.

D. Provide additional sprinkler heads as required for complete coverage of entire building and coordination with architectural reflected ceiling plans.

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 SUBMITTALS AT PROJECT CLOSEOUT

A. Submit under provisions of Division 1 General Requirements.

B. Project Record Documents: Record actual locations of components and tag numbering.

C. Operation and Maintenance Data: Include installation instructions and spare parts lists.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years experience.

1.7 REGULATORY REQUIREMENTS

A. Conform to UL and FM.

B. Sprinkler Systems: Conform work to NFPA 13.

C. Welding Materials and Procedures: Conform to ASME Code.

D. Fittings and Valves: Bear UL and FM label or marking. Provide manufacturer's name and pressure rating marked on fitting or valve body.

E. Products Requiring Electrical Connection: UL and FM listed and classified as suitable for the purpose specified and indicated.

F. Contactor Option: Contractor may substitute the specified butterfly valves where gate valves are shown on the drawings as long as the installation meets NFPA and FM installation requirements and approvals.

1.8 DELIVERY, STORAGE, AND PROTECTION

A. Deliver, store, protect and handle products to site under provisions of Division 1 General Requirements.

B. Deliver and store valves in shipping containers, with labeling in place.

C. Provide temporary protective coating on cast iron and steel valves.

D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

PART 2 PRODUCTS

2.1 ABOVE GROUND PIPING

A. Pipe 1-1/2 Inch and Smaller: ASTM A53 or A135, Schedule 40, approved for fire protection service; Dyna-Thread 40 or Super-Flow 40 are acceptable equals. Schedule 10/thin wall not allowed. Joints: Threaded. Fittings: Cast iron or malleable iron listed in NFPA 13 for fire protection service.

B. Pipe 2 Inches and Larger: ASTM A53 or A135, Schedule 40, cut or roll grooved or Schedule 10 roll grooved only. Joints: Ductile iron gasketed grooved (0 degree deflection) rigid couplings. Fittings: Ductile iron grooved. Weld-O-Lets allowed on Schedule 40, or on Schedule 10, when performed in a certified fabrication shop. 'Hooker' or 'Fit' fittings are not permitted.
   1. Acceptable Manufacturers:
      a. Grinnell Corp.
      b. Victaulic Co.

C. Cast Iron Pipe: ANSI/AWWA C151.
   1. Fittings: ANSI/AWWA C110, standard thickness.
   2. Joints: ANSI/AWWA C111, flanged with rubber gasket.
   3. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, 'C' shaped composition sealing gasket, steel bolts, nuts and washers; galvanized for galvanized pipe.

2.2 PIPE HANGERS AND SUPPORTS

A. Conform to the more stringent of NFPA 13 and Section 15140 requirements.

B. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron, adjustable swivel, split ring.

C. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.

D. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.

E. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.

F. Vertical Support: Steel riser clamp.

G. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

H. Refer to Section 15140 for spacing and additional requirements.

2.3 GATE VALVES

A. Up to and including 2 Inches:
   1. Manufacturers:
      a. Kennedy Valve Model 66.
      b. Nibco Valve Model T-104-0.
      c. Stockham Valve Model B-133.
   2. 175 psi WOG bronze body, bronze trim, rising stem, handwheel, inside screw single wedge disc, threaded ends, UL and FM listed.

B. Over 2 Inches:
   1. Manufacturers:
      a. Kennedy Valve Model 68.
      b. Nibco Valve Model F-607-OTS.
      c. Stockham Valve Model G-634.
   2. 175 psi WOG iron body, bronze trim, rising stem handwheel, OS&Y, single wedge, flanged ends, UL and FM listed.

2.4 CHECK VALVES

A. Up to and including 2 Inches:
   1. Manufacturers:
      a. Kennedy Valve Model 440SD.
      b. Nibco Valve Model KT-403.
      c. Stockham Valve.
   2. 175 psi WOG bronze body and swing disc, rubber seat, threaded ends, UL and FM listed.

B. Over 2 Inches:
   1. Manufacturers:
      a. Kennedy Valve Model 126.
      b. Nibco Valve Model F-608-B.
      c. Stockham Valve Model G-940.
   2. 175 psi WOG, Iron body, bronze trim, swing disc, renewable disc and seat, flanged ends, UL and FM listed.

2.5 DRAIN VALVES

A. Manufacturers:
   1. Milwaukee Valve.
   2. Nibco Valve.
   3. Kennedy Valve.
   4. Seco Co.

B. Bronze compression with hose thread nipple and cap.

C. Brass with cap and chain, 3/4 inch hose thread.

PART 3 EXECUTION

3.1 PREPARATION

A. Ream pipe and tube ends. Remove burrs.

B. Remove scale and foreign material, from inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.2 INSTALLATION

A. Install piping in accordance with NFPA 13 for sprinkler systems.

B. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.

C. Install piping to conserve building space, to not interfere with use of space and other work.

D. Group piping whenever practical at common elevations.

E. Sleeve pipes passing through partitions, walls, and floors.

F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

G. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.

H. Do not penetrate building structural members unless indicated.

I. Provide sleeves when penetrating footings, floors and walls. Seal pipe and sleeve penetrations to achieve fire resistance equivalent to fire separation required.

J. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

K. Die cut threaded joints with full cut standard taper pipe threads with red lead and linseed oil or other non-toxic joint compound applied to male threads only.

L. Install valves with stems upright or horizontal, not inverted. Remove protective coatings prior to installation.

M. Provide drain valves at main shut-off valves, low points of piping and apparatus.

N. Install valve supervisory switches on each gate or globe valve.

O. Provide auxiliary drains with 3/4 inch capped hose threads at all low points which cannot be drained to shut off valve.

P. Provide air relief valves at all system high points or where air may become trapped within the system.

Q. Provide inspector's test station at most remote area of each floor or zone with gate or globe valve and site glass piped to grade.

END OF SECTION

SECTION 15325

SPRINKLER SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Wet-pipe sprinkler system.

B. System design, installation, and certification.

1.2 RELATED SECTIONS

A. Section 15190 - Mechanical Identification.

B. Section 15310 – Fire Protection Piping.

C. Section 15430 - Plumbing Specialties

1.3 REFERENCES

A. NFPA 13 - Installation of Sprinkler Systems (1994 Edition).

B. FM - Factory Mutual Approval Guide.

C. NFPA 70 - National Electrical Code.

D. Screw Thread Connections:
   1. Comply with local fire department/marshal regulations for sizes, threading and arrangement of connections for fire department equipment to systems. Comply with NFPA 194 Standard for screw threads and gaskets for fire hose connections.

E. UL - Fire Resistance Directory.

F. UL 199 - Automatic Sprinklers.

G. UL 203 - Pipe Hanger Equipment for fire protection service.

H. UL 864 - Control units for fire protective signaling service.

I. International Building Code (IBC), 2012 Edition.

1.4 SYSTEM DESCRIPTION

A. Building has partial sprinkler coverage.

B. Provide coverage for remaining existing building areas as noted on the drawings. Provide system to NFPA 13 light hazard and ordinary hazard Group I occupancy requirements, as indicated on drawings.

C. Contractor Option: Utilize extended coverage type sprinkler heads at light hazard occupancy areas.

D. Provide a 10% or 10 psi, whichever is greater, safety factor on all flow calculations.

E. Provide flush mounted polished bronze Siamese fire department and fire pump test connections.

F. Fire sprinkler contractor is responsible for final design, layout and hydraulic calculations for a complete approved sprinkler system.

1.5 SUBMITTALS FOR REVIEW

A. Submit under provisions of Division 1 General Requirements.

B. Product Data: Provide data on sprinklers, valves, and specialties, including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

C. Shop Drawings:
   1. Submit preliminary 1/8" scale layout of finished ceiling areas indicating only sprinkler locations coordinated with ceiling installation.
   2. Indicate hydraulic calculations, detailed pipe layout, hangers and supports, sprinklers, components and accessories. Indicate system controls.
   3. Prepare submittal in accordance with NFPA-13 requirements.

D. Submit 1/8" scale shop drawings, product data and hydraulic calculations to authority having jurisdiction for approval. Submit proof of approval to Architect/Engineer.

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.

1.6 SUBMITTALS AT PROJECT CLOSEOUT

A. Submit under provisions of Division 1 General Requirements.

B. Project Record Documents: Record actual locations of sprinklers and deviations of piping from drawings. Indicate drain and test locations.

C. Manufacturer's Certificate: Certify that system has been tested and meets or exceeds specified requirements.

D. Operation and Maintenance Data: Include components of system, servicing requirements, record drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.

E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

F. Refer to Part 3 - Execution of this section for Owner Training Requirements.

1.7 QUALITY ASSURANCE

A. Perform Work in accordance with NFPA 13. Maintain one copy on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this Section with a minimum of 5 years documented experience.

C. Installer Qualifications: Company specializing in performing the work of this Section with minimum 5 years documented experience.

D. Design system under direct supervision of a Professional Engineer experienced in design of this Work.

1.8 REGULATORY REQUIREMENTS

A. Conform to UL and FM.

B. Perform Work in accordance with NFPA 13.

C. Equipment and Components: Bear UL and FM label or marking.

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

1.9 DELIVERY, STORAGE, AND PROTECTION

A. Deliver products to site under provisions of Division 1 General Requirements.

B. Store products in shipping containers and maintain in place until installation. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.10 EXTRA MATERIALS

A. Provide four (4) extra sprinkler heads of each type installed within each system in accordance with NFPA 13. Each system with it's own water service will be considered one (1) system. Store in steel cabinet with baked enamel finish located at each system's risers.

B. Provide cabinet with sufficient space to accommodate all sprinkler heads and suitable wrenches for each sprinkler type.

C. Provide 100 spare face plates to Owner.

D. Refer to Division 1 General Requirements for additional requirements.

PART 2 PRODUCTS

2.1 SPRINKLERS

A. Suspended Ceiling:
   1. Manufacturers:
      a. Tyco.
      b. Reliable Fire.
      c. Viking Corp.
      d. Substitutions: Not Permitted.
   2. Type: Concealed pendant type with matching clamp on or screw on escutcheon plate.
   3. Finish: Enamel, color white.
   4. Escutcheon Plate Finish: Enamel, color white.
   5. Fusible Link: Glass bulb type temperature rated for specific area hazard or as designated on plans.

B. Exposed Area Type:
   1. Manufacturers:
      a. Tyco.
      b. Reliable Fire.
      c. Viking Corp.
      d. Substitutions: Not Permitted.
   2. Type: Standard upright or pendant type with wire guard; coordinate sprinkler type with structure and ductwork.
   3. Finish: Brass.
   4. Fusible Link: Glass bulb type temperature rated for specific area hazard or as designated on plans.

C. Finished Area Sidewall Type:
   1. Manufacturers:
      a. Tyco.
      b. Reliable Fire.
      c. Viking Corp.
      d. Substitutions: Not Permitted.
   2. Type: Semi-recessed horizontal sidewall type with matching clamp on or screw on escutcheon plate.
   3. Head Finish: Enamel, color white.
   4. Fusible Link: Glass bulb type temperature rated for specific area hazard.

D. Exposed Area Sidewall Type:
   1. Manufacturers:
      a. Tyco.
      b. Reliable Fire.
      c. Viking Corp.
      d. Substitutions: Not Permitted.
   2. Type: Horizontal sidewall type with wire guard.
   3. Head Finish: Brass.
   4. Fusible Link: Glass bulb type temperature rated for specific area hazard.

E. Wire Guards:
   1. Provide wire guards on all exposed sprinkler heads unless otherwise indicated on the drawings.

2.2 PIPING SPECIALTIES

A. Water Flow Switch (FS): Paddle or vane type switch for mounting horizontal or vertical, rated 250 psi, with aluminum dust and moisture proof cover, adjustable time delay and two contacts rate 7.0 amp at 115 volt AC and 0.25 amp at 6-125 volt DC.
   1. Manufacturers:
      a. System Sensor, Inc.: Mode WPD.
      b. Substitutions: Not permitted.

B. Valve Supervisory Switch (VSS):
   1. Acid treated cast aluminum housing, nickel-plated corrosion-resistant parts, two contacts rated 7.0 amp at 115 volt AC and 0.25 amp at G-125 volt DC, tamper proof cover activates alarm when removed and unit to indicate closed position.
   2. Manufacturers:
      a. System Sensor, Inc. Model Series OSY2.
      b. Substitutions: Not Permitted.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with NFPA 13 and FM installation guide.

B. Install equipment in accordance with manufacturers instructions.

C. Place pipe runs to minimize obstruction to other work.

D. Place piping in concealed spaces above finished ceilings.

E. Center sprinklers in two directions in full or half section ceiling tile and provide piping offsets as required.

F. Apply masking tape or paper cover to ensure sprinkler heads, cover plates, and sprinkler escutcheons do not receive field paint finish. Remove after painting.

G. Flush entire piping system of foreign matter.

H. Hydrostatically test entire system.

I. Require test be witnessed by authority having jurisdiction, construction manager and Architect/Engineer.

J. Provide 1 inch diameter nipple and 1 inch x 1/2 inch reducing fitting for each head; bushings are not permitted.

K. Mount supervisory switches on each sectional valve.

L. Install manual air vents at high points of sprinkler piping.

M. Install drain valves with hose thread connections and brass caps in piping at low points of sprinkler piping.

N. Identification: Apply signs to control, drain, test and alarm valves to identify their purpose and function.
   1. Provide lettering size and style selected by Architect/Engineer from NFPA's suggested guides.

O. Provide access and access panels for all valves and devices located above ceiling. Provide ceiling tile identification for locating valves and devices.

P. All welding by certified welders.

3.2 FIELD QUALITY CONTROL

A. Hydrostatic Testing:
   1. After flushing system, test fire sprinkler piping hydrostatically for period of 2 hours at minimum 200 psi.
   2. Inspect system for leakage at joints.
   3. Measure hydrostatic pressure at low point of each system or zone being tested.
   4. The entire system (i.e. valves, sprinkler heads, flow switches, etc.) must be completely installed prior to performing tests in accordance with NFPA 13.

B. System Flushing:
   1. Contractor to flush water service prior to installation of backflow preventer provided by the Plumbing Contractor. If flushing occurs after backflow preventer installation, fire protection contractor to compensate plumbing contractor for testing and repairing backflow preventer.
   2. Contractor to flush sprinkler system.
   3. Request witness of flushing operations 48 hours in advance. Contact Construction Manager.
   4. Submit test reports in accordance with Division 1 General Requirements.

C. Repair or replace piping system to eliminate leakage in accordance with NFPA standards for "little or no leakage" and retest as specified to demonstrate compliance.

D. Submit test reports in accordance with Division 1 General Requirements.

END OF SECTION

SECTION 15410

PLUMBING PIPING

PART 1 GENERAL

1.1 SECTION INCLUDED

A. Pipe, pipe fittings, valves, and connections for piping systems.
   1. Sanitary sewer, drainage and vent
   2. Domestic water.

B. Testing, adjusting and balancing of domestic hot water system. Coordinate with Test and Balancing Contractor and Section 15900 provided under separate cover.

1.2 RELATED SECTIONS

A. Section 15140 – Supports and Anchors.

B. Section 15190 – Mechanical Identification.

C. Section 15260 – Piping Insulation.

D. Section 15430 – Plumbing Specialties.

E. Section 15450 – Plumbing Equipment

F. Section 15900 – Testing, Adjusting and Balancing.

1.3 REFERENCES

A. ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings Class 25, 125, 250 and 800.

B. ASME B16.3 - Malleable Iron Threaded Fittings.

C. ASME B16.4 - Cast Iron Threaded Fittings Class 125 and 250.

D. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.

E. ASME B16.22 - Wrought Copper and Bronze Solder Joint Pressure Fittings.

F. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings - DWV.

G. ASME B31.1 - Power Piping.

H. ASME SEC IX - Welding and Brazing Qualifications.

I. ASTM A53 - Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.

J. ASTM A74 - Cast Iron Soil Pipe and Fittings.

K. ASTM B32 - Solder Metal.

L. ASTM B88 - Seamless Copper Water Tube.

M. ASTM B306 - Copper Drainage Tube (DWV).

N. ASTM C564 - Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

O. ASTM E814 - Fire Tests of Through-Penetration Fire Stops.

P. ASTM F708 - Design and Installation of Rigid Pipe Hangers.

Q. AWS A5.8 - Brazing Filler Metal.

R. AWWA C105 - Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids.

S. AWWA C110 - Ductile - Iron and Gray - Iron Fittings 3 in. through 48 in., for Water and Other Liquids.

T. AWWA C111 - Rubber-Gasket Joints for Ductile Iron and Gray-Iron Pressure Pipe and Fittings.

U. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids.

V. AWWA C651 - Disinfecting Water Mains.

W. CISPI 301 - Cast Iron Soil Pipe and Fittings for Hubless Cast Iron Sanitary Systems.

X. CISPI 310 - Joints for Hubless Cast Iron Sanitary Systems.

Y. MSS SP58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.

Z. MSS SP69 - Pipe Hangers and Supports - Selection and Application.

AA. MSS SP-70 - Cast Iron Gate Valves, Flanged and Threaded Ends.

BB. MSS SP-71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends.

CC. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves.

DD. MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices.

EE. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

FF. UL 1479 - Fire Tests of Through-Penetration Firestops.

1.4 SUBMITTALS

A. Submit product data under provisions of Division 1 General Requirements.

B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

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 PROJECT RECORD DOCUMENTS

A. Submit project record documents under provision of Division 1 General Requirements.

B. Project Record Documents: Record actual locations of piping, valves, equipment, cleanouts, backflow preventers, drains, wall hydrants, etc.

1.6 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Division 1 General Requirements.

B. Maintenance Data: Include components of system, servicing requirements, record drawings, inspection data, replacement parts numbers and availability and location and numbers of service depot.

C. Refer to Part 3. - EXECUTION of this section for Owner training requirements.

1.7 QUALITY ASSURANCE

A. Perform Work in accordance with State of Illinois Plumbing Code, 2014. Maintain one copy on site.
   1. Provide reports of inspections by State of Illinois Plumbing inspectors in accordance with Division 1 General Requirements.

B. Valves: Manufacturer's name and pressure rating marked on valve body.

C. Welding Materials and Procedures: Conform to ASME SEC IX and applicable state labor regulations.

D. Welders Certification: In accordance with ASME SEC IX or ANSI/AWS D1.1.

E. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

F. All products to comply with State of Illinois Plumbing Code requirements 2014.

G. Underwriters Laboratory (UL):
   1. Products listed for 25/50 resistive construction.

1.8 REGULATORY REQUIREMENTS

A. Perform Work in accordance with State of Illinois Plumbing Code, 2014 edition.

1.9 DELIVERY, STORAGE, AND PROTECTION

A. Delivery products to site under provisions of Division 1 General Requirements.

B. Store and protect products under provisions of Division 1 General Requirements.

C. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

D. Provide temporary protective coating on cast iron and steel valves.

E. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

F. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.1 SANITARY SEWER AND VENT PIPING, BURIED

A. Cast Iron Pipe: ASTM A74 service weight.
   1. Fittings: Cast iron.
   2. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets or lead and oakum.

2.2 SANITARY SEWER PIPING, ABOVE GRADE

A. Cast Iron Pipe: ASTM A74, service weight.
   1. Fittings: Cast iron.
   2. Joints: ASTM C564, neoprene gasket system or lead and oakum.

B. Cast Iron Pipe: CISPI 301, hubless, service weight.
   1. Fittings: Cast iron.
   2. Joints: Neoprene gaskets and full, heavy-duty stainless steel clamp assemblies.

C. Steel Pipe: ASTM A53 Schedule 40, galvanized.
   1. Cast Iron Fittings: ASME B16.4, threaded fittings.

2.3 SANITARY VENT PIPING, ABOVE GRADE

A. Cast Iron Pipe: ASTM A74, service weight.
   1. Fittings: Cast iron.
   2. Joints: ASTM C564, neoprene gasket system or lead and oakum.

B. Cast Iron Pipe: CISPI 301, hubless, service weight.
   1. Fittings: Cast iron.
   2. Joints: Neoprene gaskets and fully, heavy-duty stainless steel clamp assemblies.

C. Steel Pipe: ASTM A53 Schedule 40, galvanized.
   1. Cast Iron Fittings: ASME B16.4, threaded fittings.

2.4 WATER PIPING, BELOW GRADE

A. Pipe Sizes Under 3 Inches: NOT ALLOWED.

B. Pipe Sizes 3 Inches & Larger: Ductile Iron Pipe: AWWA C151, Class 52 with AWWA C105 Polyethylene encasement.
   1. Fittings: AWWA C110, Class 250 ductile iron, standard thickness.
   2. Joints: AWWA C111, Class 250 mechanical joints (MJ) with rubber gasket, retainer gland, bolts and 3/4 inch diameter rods.

2.5 WATER PIPING, ABOVE GRADE

A. Copper Tubing: ASTM B88, Type L, hard drawn (all sizes).
   1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze. Contractor may utilize mechanically formed tee and coupling connections.
   2. Joints: ASTM B32, solder, Grade 95TA or AWS5.8, B-Cup silver braze for mechanically formed connections.

2.6 FLANGES, UNIONS, AND COUPLINGS

A. Pipe Size 3 Inches and Under: 150 psig malleable iron unions for threaded ferrous piping; bronze unions for copper pipe, soldered joints.

B. Pipe Size Over 3 Inches: 150 psig forged steel slip-on flanges for ferrous piping; bronze flanges for copper piping; neoprene gaskets for gas service; 1/16 inch thick performed neoprene.

C. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.7 BALL VALVES (BV)

A. Up to and Including 2 Inches:
   1. Manufacturers:
      a. Apollo Valve - Series 70.
      b. Hammond Valve - Model 8513.
      c. Milwaukee Valve - Model BA-150S.
      d. Nibco Valve - Model S-585-70-66.
      e. Stockham - Model S-216-BR1-RS.
      f. Jomar – Model T100NE

B. MSS SP-110, 600 psi WOG, bronze, two piece body, chrome plated ball, full port, teflon seats and stuffing box ring, blow-out proof stem, lever handle, solder ends.

2.8 BALANCING FITTINGS (BF)

A. Up to and Including 2 Inches:
   1. Manufacturers:
      a. Armstrong Pump Co - Model CBV-I.
      b. Tour/Anderson.
      c. Nibco – Model S-1710.

B. Construction: 150 psi WOG (minimum), wye bodied bronze globe valve with bronze stem and seat calibrated and readable balance fittings with readout ports fitted with integral check valves to prevent loss of fluid when attaching monitoring kit.

C. Calibration: Integral indicating degree of valve opening with positive shut-off and memory stop.

2.9 SWING CHECK VALVES (CK)

A. Up To and Including 2 Inches:
   1. Manufacturers:
      a. Hammond Valve - Model IB-912.
      b. Milwaukee Valve - Model 1509-T.
      c. Nibco Valve - Model S-413-W.
      d. Stockham - Model B-309.
   2. MSS SP-80, Class 125, bronze body and cap, bronze swing disc with rubber seat, solder ends.

2.10 FIRE AND SMOKE PENETRATION SEALANTS

A. Fire Seal:
   1. Seal penetrations of fire-rated walls, floors or ceilings by raceways for compliance with NEC 300-21.
      a. Acceptable Manufacturers:
         1) Dow Corning: Fire Stop.
         2) Nelson: Flameseal.
         3) T & B: Flameseal.
         4) 3M Co.: Fire Barrier.
         5) Oatey Co: Flame Barrier.
      b. Fill void around raceways.
      c. Sleeves: Heavy wall steel pipe, anchored to building construction and finished plumb with wall, ceiling to floor lines.

B. Thermal Seal:
   1. Seal penetrations of thermally insulated equipment or rooms to prevent heat transfer.
   2. Dual exterior of raceway with fiberglass or other material compatible to equipment or room and approved by Architect/Engineer.
   3. Seal interior of raceway with duct sealing compound at entry to equipment or room.

C. Water Seal:
   1. Seal penetrations of perimeter walls or floors below grade to prevent entry of water; use materials compatible with wall or floor construction and approved by Architect/Engineer.
   2. Seal Penetrations of Room: Sealed with flashings compatible with roof design and approved by roofing system manufacturer and Architect/Engineer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that excavations are to required grade, dry, and not over-excavated.

3.2 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

D. Contactor to employ the services of a Ground Penetrating Radar Specialist to perform x-ray of areas requiring saw-cutting, prior to actual saw-cutting.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide non-conducting dielectric connections wherever jointing dissimilar metals (i.e. copper to steel/iron pipe.).

C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

D. Install piping to maintain headroom, conserve space, and not interfere with use of space.

E. Group piping whenever practical at common elevations.

F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 15260.

H. Provide access where valves and fittings are not exposed.

I. Install vent piping penetrating roofed areas to maintain integrity of roof assembly. Locate vents 12 - 15 ft. away from air intake assemblies. Piping to extend min. 12" above roof.

J. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

K. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting.

L. Install bell and spigot pipe with bell end upstream.

M. Install valves with stems upright or horizontal, not inverted.

N. Install water piping to ASME B31.9.

O. Slope water piping and arrange to drain at low points. Provide drain valves at low points.

P. Sizing:
   1. Unless otherwise indicated, install all supply piping, including shut-off valves, strainers and accessory fixtures to pumps, fixtures and other equipment at line size with reduction in size being made only at inlet to control valve, fixture or pump.
   2. Install supply piping from outlet of control valve at full size connection to equipment served.

Q. Make reduction in water pipes with eccentric reducing fittings installed to provide drainage and venting.

R. Branch Take-Offs:
   1. Liquids: From top, bottom or side of mains or headers at either 45 degrees or 90 degrees from horizontal plane.
   2. Do not project branch pipes inside main pipe.

S. Pipe Drainage Provision:
   1. Slope water piping 1 inch in 40 feet and arrange to drain at low points.

T. Underground Pipe:
   1. Lay in dry trenches maintained free of accumulated water.
   2. Provide and operate sufficient pumping equipment to maintain excavations, trenches and pits free of water.
   3. Dispose of pumped water so operation areas and other facilities are not flooded.
   4. Pipe laying follows excavating close as possible.

U. Interior Sanitary Soil Waste, Vent:
   1. Connect underground sewers to site utilities at point 5 feet outside building walls or as specifically designated on drawings.

2. Pitch sewers and branches as follows, unless otherwise indicated on drawings:
   a. Pipe, 3 Inches and smaller: Minimum 1/4 inch per foot.
   b. Pipe, 4 Inches and larger: Minimum 1/8 inch per foot, but no less than 1%.
3. Continuously bed underground or on-ground piping on minimum 3 inch compacted sand or gravel, with depressions for hubs. Bed PVC pipe only on compacted sand bed; gravel not allowed.
4. Compact backfilling for 6 inches, sides and tops; and 3 inches under pipe to 95% proctor.
5. Complete backfilling to existing grade or to elevation indicated on Drawings, compacted to 95% proctor.

X. Contractor to clean and flush all faucet aerators and strainers at final completion of project.

Y. Contractor to insulate all cold, hot, tempered, and all recirculation domestic water piping in accordance with Section 15260.

3.4 APPLICATION

A. Install unions downstream of valves and at equipment or apparatus connections.

B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.

C. Provide balancing fittings flow controls in hot water recirculating systems where indicated.

D. Provide valve types as designated on drawings without deviation. All valves to be full line size of piping

3.5 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Prior to starting work, verify system is complete, flushed and clean.

B. Ensure Ph of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).

C. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.

D. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.

E. Maintain disinfectant in system for 24 hours.

F. If final disinfectant residual tests less than 25 mg/L, repeat treatment.

G. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.

H. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

I. Chlorinate and disinfect to point of new connection. Examine site water valving configuration to determine extent of chlorination. Contact site contractor to verify.

J. Submit reports in accordance with Division 1 General Requirements.

3.6 PIPE TESTING

A. Before final acceptance of piping, test all systems scheduled and prove to be free of leaks.
   1. Perform tests under observation of Construction Manager.
   2. Remove, replace or satisfactorily repair defective work revealed by tests
   3. Make piping repairs with new materials; caulking of screwed joints or pin holes not permitted.
   4. Underground systems tested before backfilling.
   5. Furnish test equipment and material for tests.
   6. Owner furnished water for testing and flushing.

B. Testing Medium:
   1. Hydrostatic Testing Medium: Clean pure water

C. Pressure Testing Gauges: ANSI B40.1, Grade AA; minimum 6 inch diameter dial with scale divisions equal or less than maximum allowable pressure drop.

D. Waste and Vent System Piping:
   1. Test with water and air before fixtures are set.
   2. Water Test:
      a. Apply to drainage and vent system in accordance or in entirety.
      b. When entire system is tested, tightly close all openings in pipes except highest single opening and fill system with water to overflow point.
      c. When system is tested in sections, tightly plug each opening except highest opening, fill each section with water and test each section with minimum 10 foot head of water; test each preceding section until entire system has been tested with minimum 10 foot of water, except uppermost 10 feet of system.
      d. Keep water in system, or in portion under test, for minimum 30 minutes before inspection.
      e. System must be tight at all joints; 1 inch in one hour leakage allowed.
   3. Air Test:
      a. Apply minimum 3 psi with force pump and maintain minimum 1 hour with no leakage apparent.
      b. Use mercury-column gauge in making test.

E. Domestic Water System:
   1. When rough-in is complete and before fixtures are set, test entire hot and cold water piping systems as scheduled and prove tight.
   2. Where portion of water piping system is concealed before completion, test that portion separately as specified for entire system.

F. Testing Requirements:
   1. Hydrostatic tests apply to piping indicated in Schedule in Paragraph G. below.
   2. Raise pressure gradually to given value; then block off source.
   3. Allowable Pressure Drop: Maximum amount scheduled during corresponding minimum time interval.
      a. Visually examine all joints during test.
   4. Upon successful completion and test approval, relieve piping of pressure, drain, put into normal operation except for potable water to be sterilized before placing in service.

G. Hydrostatic Testing Schedule:

Service	Normal Work Pressure psi	Hydrostatic Test Pressure psig	Maximum Pressure Drop psi	Minimum Time Hours
1. Domestic Water				
Portable Water	To 125	175	2	2

H. Submit test reports and certificates in accordance with Division 1 General Requirements.

END OF SECTION

SECTION 15430

PLUMBING SPECIALTIES

PART 1 GENERAL

1.1 SECTION INCLUDED

A. Floor drains.

B. Cleanouts.

C. Hose valves/Hose bibs.

D. Trench Drains.

E. Oil Interceptor.

F. Trench drain Catch Basins.

G. Wall Hydrants.

1.2 RELATED WORK

A. Section 15410 - Plumbing Piping.

B. Section 15440 - Plumbing Fixtures.

C. Section 15190 - Mechanical Identification: Product requirements for pipe identification for placement by this section.

D. Section 15260 - Piping Insulation.

E. Wall Hydrants.

F. Thermostatic Mixing Valves.

1.3 REFERENCES

A. ANSI/ASSE 1011 - Hose Connection Vacuum Breakers.

B. ANSI/ASSE 1019 - Wall Hydrants, Frost Proof Automatic Draining Anti-Backflow Types.

C. ANSI A112.21.1 - Floor Drains.

D. ANSI A112.26.1 - Water Hammer Arresters.

E. PDI WH-201 Water Hammer Arresters.

1.4 REGULATORY REQUIREMENTS

A. Conform to State of Illinois Plumbing Code (2014).

1.5 SUBMITTALS

A. Submit under provisions of Division 01 General Requirements.

B. Shop Drawings: Indicate dimensions, weights and placement of openings and holes.

C. Product Data: Provide component sizes, rough-in requirements, service sizes and finishes.

D. Manufacturer's Installation Instructions: Indicate assembly and support requirements.

E. CONTRACTOR SHALL REVIEW ALL SUBMITTALS PRIOR TO SUBMITTING THEM FOR THE ARCHITECT/ENGINEER'S REVIEW. CONTRACTOR SHALL STAMP EACH DRAWING AND EACH PIECE OF PRODUCT DATA TO CERTIFY THAT HE HAS REVIEWED IT. ARCHITECT/ENGINEER WILL NOT REVIEW ANY SUBMITTAL THAT CONTRACTOR HAS NOT STAMPED WITH HIS REVIEW CERTIFICATION.

1.6 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Division 01 General Requirements.

B. Record actual locations of equipment, cleanouts, backflow preventers and other devices.

1.7 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Division 01 General Requirements.

B. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

1.8 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Division 01 General Requirements.

B. Accept specialties on site in original factory packaging. Inspect for damage.

1.9 EXTRA MATERIALS

A. Deliver to maintenance department prior to project completion. Submit written verification to Architect/Engineer.

B. Provide the following quantities of the materials listed:

1. Four (4) wall hydrant aluminum loose keys.
2. Two (2) wall hydrant repair tool T-handle.
3. Three (3) wall hydrant repair kits.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURER - PLUMBING SPECIALTIES

A. Mi Fab. Company

B. Josam Co.

C. J.R. Smith

D. Tyler/Wade Co.

E. Watts Drainage.

F. Zurn Co.

2.2 ACCEPTABLE MANUFACTURER - HOSE VALVES

A. Chicago Faucet Co. - Quaturn Series.

B. No substitutions.

2.3 ACCEPTABLE MANUFACTURERS – FIXTURE THERMOSTATIC MIXING VALVES

A. Armstrong.

B. Leonard Valve.

C. Lawler.

D. Symmons.

E. Watts.

2.4 ACCEPTABLE MANUFACTURERS – TRENCH DRAINS AND CATCH BASINS

A. J.R. Smith/ ACO Polymer Products, Inc.

B. PolyDrain, Inc.

C. Quazite/Polycast.

2.5 FLOOR DRAINS

A. FD-1: ANSI A112.21.1; lacquered cast iron two piece body with double drainage flange, 6 inch diameter heavy-duty nickel bronze secured square hole strainer, sediment bucket, vandal resistant fasteners and not flashed; Model 2010-A-6-NB manufactured by J.R. Smith, or equal.

B. FD-2: FD-1, except with flashing flange and flashed.

C. Deep Seal P-Traps: Provide deep seal P-traps on all floor drains installed in the base slab.

2.6 CLEANOUTS

A. Exterior Areas (YCO): Round ductile iron access frame and non-skid gasketed cover; Model 4250-M manufactured by J.R. Smith, or equal.

B. Interior Finished Floor Areas (FCO): Lacquered cast iron, two piece body with double drainage flange, brass gasketed plug and adjustable nickel-bronze round vandal-proof scoriated cover in unfinished areas and round with depressed cover to accept floor finish or with carpet markers in carpeted floor area; Model 4021-U manufactured by J.R. Smith, or equal.

C. Interior Finished Wall Areas (WCO): Line type with lacquered cast iron body and round brass gasketed plug and round stainless steel access cover secured with vandal-proof fastener; Model 4532-U manufactured by J.R. Smith, or equal.

D. Interior Unfinished Accessible Areas (CO): Cast iron cleanout ferrule with brass tapered plug; Model 4425 manufactured by J.R. Smith, or equal.

2.7 TRENCH DRAINS (TD-1)

A. Trench Drain: Precast polyester concrete channels with 14,500 psi compressive strength, 2,900 psi bending pressure, 39.37 inches long, 6.1 inches wide, radiused bottom, 0.6% integral slope, slotted secured ductile iron grate secured to ductile iron frame; Model 9930-ADA manufactured by J.R. Smith/ACO Polymer Products, Inc.

2.8 TRENCH DRAIN CATCH BASINS (TD-CB)

A. Trench Drain Catch Basin: Precast polyester concrete channels with 14,500 psi compressive strength, 2,900 psi bending pressure, 19.69 inches long, 6.1 inches wide, galvanized trash bucket, 6 inch outlet, ductile iron grate secured to ductile iron frame; Model 9935-M manufactured by J.R. Smith/ACO Polymer Products, Inc.

2.9 OIL INTERCEPTORS

A. Acceptable Manufacturers:

1. Schier Products – Oil Reserve OS – 100.
2. CSI – 10.
3. Approved Equal.

B. Construction:

1. Material: Seamless, rotationally molded high density polyethylene with built-inflow control, vent connection.
2. Rough-in: Fully recessed, flush (deep rough-in) installation with anchor flange.
3. Accessories: Extension collar for bury depth, deep seal trap, engineered inlet and outlet diffusers, venting connection, draw-off assembly.
4. Field adjustable riser system.
5. Cover: Fiberglass composite, non-skid with gasket, bolted cover with 2,000 pound load capacity.
6. Verify connection depths in the field and coordinate with integral extension depth.

C. Unit Rating: 100 gpm flow, 275 gallon liquid holding capacity.

2.10 HOSE VALVE/HOSE BIBS

A. Interior (HV-1): Rough bronze chrome plated with 3/4 inch female inlet, replaceable slow compression cartridge hose thread spout, with handwheel, integral vacuum breaker in conformance with ANSI/ASSE 1011; Model B-0720-RGH modified with 5959-40 cartridge and 175 F handle with cold indicator manufactured by T & S Brass and Bronze Works, Inc, or equal.

2.11 WALL HYDRANTS

A. Wall Hydrant (WH-1): ANSI/ASSE 1019; non-freeze, self-draining type with stainless steel or nickel bronze lockable recessed box, hose thread spout, lockshield and removable key and integral self-draining vacuum breaker; Model 5509-QT manufactured by J.R. Smith Co, or equal.

2.12 WATER HAMMER ARRESTORS AND AIR CHAMBERS

A. Fit water supply to each fixture with air chamber; air chamber same size as supply line or 3/4 inch minimum and minimum 18 inches long.

PART 3 EXECUTION

3.1 PREPARATION

A. Coordinate cutting and forming of roof and floor construction to receive drains to required invert elevations.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance cleanout for rodding of drainage system.

C. Encase exterior cleanouts in concrete flush with grade.

D. Coordinate floor cleanout cover types and styles with floor finish schedule.

E. Install pre-charged water hammer arrestors complete with accessible isolation ball valve.

F. Contractor to adjust yard cleanout covers to coincide with finished grade.

G. Provide deep seal P-traps for all slab-on grade floor drains.

END OF SECTION

SECTION 15440

PLUMBING FIXTURES

PART 1 GENERAL

1.1 SECTION INCLUDED

A. Water closets.

B. Lavatories.

C. Sinks

1.2 RELATED WORK

A. Section 15140 - Anchors and Supports.

B. Section 15410 - Plumbing Piping.

C. Section 15430 - Plumbing Specialties.

D. Section 15450 – Plumbing Equipment.

1.3 REFERENCES

A. ANSI A112.6.1 - Supports for Off-the-Floor Plumbing Fixtures for Public Use.

B. ANSI A112.18.1 - Finished and Rough Brass Plumbing Fixture Fittings.

C. ANSI A112.19.2 - Vitreous China Plumbing Fixtures.

1.4 QUALITY ASSURANCE

A. Fixtures: By same manufacturer for each product specified throughout.

B. Trim: By same manufacturer for each product specified throughout.

1.5 SUBMITTALS

A. Submit product data under provisions of Division 1 General Requirements.

B. Include fixtures, sizes, rough-in dimensions, utility sizes, trim and finishes.

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.

1.6 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data under provision of Division 1 General Requirements.

B. Include fixture trim exploded view and replacement parts lists.

1.7 WARRANTY

A. Provide manufacturer's warranty under provisions of Division 1 General Requirements.

1.8 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site under provisions of Division 1 General Requirements.

B. Store, protect and handle products under provisions of Division 1 General Requirements.

C. Accept specialties on site in original factory packaging. Inspect for damage.

1.9 EXTRA MATERIALS

A. Deliver to maintenance department prior to project completion. Submit written verification to Architect/Engineer.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - LAVATORIES

A. American Standard Co.

B. Crane/Fiat Co.

2.2 ACCEPTABLE MANUFACTURERS - FIXTURE TRIM

A. Mustee (sink).

B. Moen (lavs)

C. Cambridge Brass/Delta Commercial. (lavs)

2.3 ACCEPTABLE MANUFACTURERS – WATER CLOSETS

A. American Standard Co.

B. Crane/Fiat Co.

2.4 ACCEPTABLE MANUFACTURERS – TOILET SEATS

A. Bemis.

B. Church.

C. Olsonite.

2.5 ACCEPTABLE MANUFACTURERS - FIXTURE CARRIERS

A. J.R. Smith Mfg. Co.

B. Tyler/Wade Co.

C. Zurn Co.

2.6 ACCEPTABLE MANUFACTURER – SINK TRIM

A. Mustee.

B. Or equal.

2.7 ACCEPTABLE MANUFACTURER - STOPS AND SUPPLIES

A. Brasscraft -- G2 Series or equal.

2.8 ACCEPTABLE MANUFACTURERS – DRAIN BOX

A. Guy Gray.

B. No Substitutions.

2.9 WATER CLOSET (WC-1)

A. Bowl: ANSI A112.19.2; floor mounted, handicap height, tank type, manual lever,siphon jet white vitreous china closet bowl, with elongated rim, 1-1/2 inch spud, china bolt caps; Cadet 3 Flowise manufactured by American Standard.

B. Seat: Anti-microbial solid white plastic, open front, extended, self-sustaining continuous stainless steel hinge, brass bolts, without cover.

2.10 LAVATORY (L-1)

A. Basin: ANSI A112.19.2; white vitreous china; handicapped wall-hung lavatory 21 X 18 inch minimum, with 4 inch high back, drillings on 4 inch centers, overflow and soap depression; Model Lucerne 0355.012 American Standard, no substitutions.

B. Trim: ANSI A112.18.1; chrome plated vandal resistant combination supply fitting with offset open grid strainer and tailpiece, 0.5 GPM water aerator, vandal proof push tilt self-closing metering handles, chrome plated 17 gauge brass P-trap (installed parallel with wall) and arm with escutcheon; manufactured by Delta. Provide undersink protective pipe covering for P-trap, tailpiece, angle valves and supply tubing; Model 103 as manufactured by Truebro, Inc.. Trim to be Delta Faucet Model 86T1053, no substitutions.

C. Wall Mounted Carrier: ANSI A112.6.1; cast iron and steel frame, lugs for wall attachment, exposed bracket supports, bearing plate and studs.

D. Stops: Chrome plated brass quarter turn stop, ½ inch O.D. flexible riser and female compression inlet.

2.11 SERVICE SINK (SK-1)

A. Bowl: ANSI A112.19.1; 24 x 20 x 14 inches deep, structural fiberglass sink, with 20 inch high legs, chrome plated strainer, cast iron P-trap; Model 19CFT UTILITUB COMBO manufactured by Mustee.

B. Trim: ANSI A112.18.1; swing 6” spout faucet with aerator and hose end.

2.12 STOPS

A. Stops: ANSI A112.18.1; chrome plated brass quarter turn stop, 3/8 inch O.D. flexible riser and 3/8 inch female compression inlet; Model G2 Series manufactured by Brasscraft, or equal.

PART 3 EXECUTION

3.1 INSPECTION

A. Review millwork shop drawings. Confirm location and size of fixtures and existing rough-in before installation.

3.2 INSTALLATION

A. Install each water closet with neoprene rubber closet gasket; felt or wax rings will not be accepted.

B. Install each fixture with trap, easily removable for servicing and cleaning.

C. Provide chrome plated rigid or flexible supplies to fixtures with loose key stops reducers and escutcheons on each service to fixture.

D. Install components level and plumb.

E. Install and secure fixtures in place with wall carriers and bolts.

F. Seal fixtures to wall and floor surfaces with sealant; color to match fixture.

G. Mount fixtures to the heights as specified on Architectural Drawings.

3.3 ADJUSTING AND CLEANING

A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise or overflow.

B. At completion, clean plumbing fixtures and equipment.

C. Solidly attach water closets to floor with new lag screws. Lead flashing is not intended hold fixture in place. Adjust closet flange as required.

D. Contractor to remove each aerator or strainer screen and flush piping system at each fixture.

3.4 FIXTURE ROUGH-IN SCHEDULE

A. Rough-in fixture piping connections in accordance with following table of minimum sizes for particular fixtures.

	Hot Water	Cold Water	Waste	Vent
Water Closet (WC)	----	½ inch	4 inch	2 inch
Lavatory (L)	½ inch	½ inch	1-1/2 inch	1-1/2 inch
Service Sink (SK)	½ inch	½ inch	2 inch	1-1/2 inch

END OF SECTION

SECTION 15450

PLUMBING EQUIPMENT

PART 1 - GENERAL

1.1 SECTION INCLUDED

A. Domestic electric hot water heaters.

B. Expansion tanks.

1.2 RELATED SECTIONS

A. Section 15410 - Plumbing Piping.

B. Section 15140- Anchors and Supports.

C. Section 15190 - Mechanical Identification.

D. Section 15260 - Piping Insulation.

E. Division 16 Specifications - Equipment Wiring Systems: Electrical characteristics and wiring connections.

1.3 REFERENCES

A. IECC 2015.

B. ASME Section 8D - Pressure Vessels.

C. NFPA 70 – National Electric Code.

1.4 SUBMITTALS

A. Submit under provisions of Division 01 Specification Sections.

B. Product Data:
1. Provide dimension drawings of water heaters, pumps, storage tanks, etc. indicating components and connections to other equipment and piping.
2. Indicate equipment's capacity, connection sizes and power requirements.
3. Provide certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
4. Provide manufacturer piping diagrams for review and/or modification by the Engineer. Compensate other trades due to system deviations from equipment scheduled.
5. Provide electrical characteristics, connection requirements and wiring diagrams.

C. Shop Drawings:
1. Indicate location and dimensions of saddles, manways, lining methods, anchors, attachments, lifting points, tappings, and drains.
2. CONTRACTOR SHALL REVIEW ALL SUBMITTALS PRIOR TO SUBMITTING THEM FOR THE ARCHITECT/ENGINEER'S REVIEW. CONTRACTOR SHALL STAMP EACH DRAWING AND EACH PIECE OF PRODUCT DATA TO CERTIFY THAT HE HAS REVIEWED IT. ARCHITECT/ENGINEER WILL NOT REVIEW ANY SUBMITTAL THAT CONTRACTOR HAS NOT STAMPED WITH HIS REVIEW CERTIFICATION.

D. Submit manufacturer's installation instructions in accordance with Division 01 Specification Sections.

E. Submit manufacturer's certificate that pressure vessels meet or exceed specified requirements in accordance with Division 01 Specification Sections.

1.5 PROJECT RECORD DOCUMENTS

A. Submit project record documents under provisions of Division 01 Specification Sections.

B. Project Record Documents: Record actual locations of components and equipment.

C. Submit under provisions of Division 01 Specification Sections - Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.

D. Submit under provisions of Division 01 Specification Sections - Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

E. Submit ASME certifications for all pressure vessels completed and registered in Owners name.

1.6 QUALITY ASSURANCE

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

B. Provide pumps with manufacturer's name, model number, and rating/capacity identified.

C. Ensure products and installation of specified products are in conformance with recommendations and requirements of the following organizations:
   1. National Sanitation Foundation (NSF).
   2. American Society of Mechanical Engineers (ASME).
   3. National Electrical Manufacturers' Association (NEMA).
   4. Underwriters Laboratories (UL).

D. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, operate within 25 percent of midpoint of published maximum efficiency curve.

E. Submit certification of start-up of systems by manufacturer’s authorized agent in accordance with Division 01 Specification Sections.

1.7 REGULATORY REQUIREMENTS

A. Conform to ASME Section 8D for tanks.

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

1.8 DELIVERY, STORAGE, AND PROTECTION

A. Transport, handle, store and protect products to site under provisions of Division 01 Specification Sections.

B. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

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 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 and 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 setting on wood planks and is completely protected with weatherproof covers.

1.9 WARRANTY

A. Submit under provisions of Division 01 Specification Sections.

B. Provide five year manufacturer warranty against leakage for all ASME constructed domestic water tanks and expansion tanks.

C. Provide manufacturer's standard warranty on all other equipment.

PART 2 PRODUCTS

2.1 DOMESTIC GAS HOT WATER HEATERS

A. Acceptable Manufacturers:
   1. A.O. Smith.
   2. State.
   3. Or equal.

B. Automatic, vertical storage type, 150 psig maximum working pressure; with 444 stainless steel tank; thermally insulated with minimum 2 inches (50 mm) glass fiber, encased in corrosion-resistant steel jacket; baked-on enamel finish; and legs.

C. Brass water connections and dip tube, drain valve, high-density powered anodes and ASME rated temperature / pressure relief and vacuum relief valves.

D. Unit approved as automatic storage water heater and for operating at 180 degrees F.

E. Automatic water thermostat with temperature range adjustable form 120 to 180 degrees F.

F. See schedule on drawings for sizes and capacities.

2.2 EXPANSION TANKS

A. Acceptable Manufacturers:
   1. Amtrol, Inc.
   2. Bell & Gossett/ITT.
   3. Richmond Engineering (Reco).
   4. Wessells co.

B. Construction: Welded steel, tested and stamped in accordance with Section 8D of ASME Code; supplied with National Board Form U-1, rated for working pressure of 150 psig, with flexible EPDM diaphragm approved for potable water sealed into tank, and steel base.

C. Accessories: Air-charging fitting, tank drain; precharge to 65 psig.

D. Size: Refer to Schedule on drawings.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install water heaters in accordance with manufacturer's instructions.
   1. Provide drain pan that is 6” larger in all directions and 3” deep. Pan to be sealed water tight.
   2. Provide manufacturer approved/authorized start-up and certification. Submit start-up report to Architect/Engineer in accordance with Division 01 Specification Sections.

B. Coordinate all equipment with plumbing piping and related electrical work to achieve proper operating system.

C. Domestic Hot Water Expansion Tanks:
   1. Clean and flush after installation. Seal until pipe connections are made.
   2. Provide manufacturer approved/authorized start-up and certification. Submit start-up report to Architect/Engineer in accordance with Division 01 Specification Sections.

END OF SECTION

SECTION 15505

FUEL PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pipe and pipe fittings.

B. Valves.

C. Gas pressure reducing regulators.

D. Natural gas piping system.

1.2 RELATED SECTIONS

A. Section 15140 – Supports and Anchors.

B. Section 15195 – Testing of HVAC Piping.

1.3 REGULATORY REQUIREMENTS

A. Illinois State Plumbing Code 2014, ISPC.

B. Building Officials and Code Administrators International, Inc., 2012 International Mechanical Code.

C. National Fire Protection Association, NFPA-54: Installation Code for Natural Gas Burning Appliances and Equipment.

D. National Electric Code, NEC, Spread of Fire Products of Combustion.

1.4 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Division 1 General Requirements.

1.5 DELIVERY, STORAGE AND HANDLING

A. Store and protect products under provisions of Division 1 General Requirements.

B. Deliver and store valves in shipping containers with labeling in place.

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 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

2.1 NATURAL GAS PIPING, BURIED OUTSIDE THE BUILDING (UNLESS PROVIDED BY NICOR GAS)

A. Steel Pipe: ASTM A53 or A120, Schedule 40 black. Fitting: ASTM A234, forged steel welding type, with ANSI/AWWA C105 polyethylene jacket or double layer, half-lapped 10 mil polyethylene tape. Joints: ANSI/AWS D1.1, welded.

2.2 NATURAL GAS PIPING, ABOVE GRADE

A. Steel Pipe: ASTM A53 or A120, Schedule 40 black. Fittings: ANSI/ASME B16.3, malleable iron or ASTM A2434, forged steel welding type. Joints: Screwed for pipe 1-1/2 inches and under (exposed and accessible); ANSI/AWS D1.1, welded, for pipe two inches and over and for 1-1/2 inches and under (concealed and inaccessible; above ceiling).

2.3 FLANGES, UNIONS AND COUPLINGS

A. Pipe Size 2 Inches and under: 150 psig malleable iron unions for threaded ferrous piping; bronze unions for copper pipe, soldered joints.

B. Pipe Size 2 Inches and over: 150 psig forged steel slip-on flanges for ferrous piping; bronze flanges for copper piping; neoprene gaskets for gas service; 1/16 inch thick preformed neoprene.

C. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.4 ACCEPTABLE MANUFACTURERS - GAS COCKS

A. Stockham.

B. Eclipse, Inc.

C. Ladish Co.

2.5 GAS COCKS

A. Up to 2 Inches: Bronze body, bronze tapered plug, non-lubricated, teflon packing, threaded ends.

B. Over 2 Inches: Cast iron body and plug, non-lubricated, teflon packing, flanged ends.

2.6 BELOW GRADE PIPING PROTECTION

A. Factory applied, ANSI/AWWA C105 polyethylene jacket, bonded to pipe surface with hot-applied thermo-plastic adhesive.

2.7 CONCRETE EQUIPMENT PADS

A. Provide 6-inch concrete pad for mounting new gas meter and service. Verify overall pad dimensions with NICOR.

2.8 FIRE AND SMOKE PENETRATION SEALANTS

A. Fire Seal:
   1. Seal penetrations of fire-rated walls, floors or ceilings by raceways for compliance with NEC 300-21.
      a. Acceptable Manufacturers:
         1) Dow Corning: Fire Stop.
         2) Nelson: Flameseal.
         3) T & B: Flameseal.
         4) 3M Co.: Fire Barrier.
      b. Fill void around raceways.
      c. Sleeves: Heavy wall Schedule 40 steel pipe, anchored to building construction and finished plumb with wall, ceiling or floor lines.

B. Thermal Seal:
   1. Seal penetrations of thermally insulated equipment, walls or rooms to prevent heat transfer.
   2. Dual exterior of raceway with fiberglass or other material compatible to equipment or room and approved by Architect/Engineer.
   3. Seal interior of raceway with duct sealing compound at entry to equipment or room.

C. Water Seal:
   1. Seal penetrations of perimeter walls or floors below grade to prevent entry of water; use materials compatible with wall or floor construction and approved by Architect/Engineer.
   2. Seal Penetrations of Roof: Sealed with flashings compatible with roof design and approved by roofing system manufacturer and Architect/Engineer.

PART 3 EXECUTION

3.1 SERVICE CONNECTIONS

A. Natural gas utility company shall provide new gas service to the building as indicated on contract documents. Utility shall provide a new gas meter and/or regulators on inlet side of meter as required to meet the buildings new pressure and capacity requirements. Contractor to provide all gas regulators on the discharge side of the meter.
   1. School District will pay all utility connection and installation charges required for new service connection.

B. Contractor shall be responsible for installing from the leaving side of the meter, all gas piping, gas cocks, regulators, regulator vent piping, unions, hangers, supports and final connection to all new gas fired equipment.

C. Support all piping as called for in Section 15140, Supports and Anchors.

D. Run a vent line from each gas regulator, including the gas regulator at the gas meter, up through and/or above the roof and terminate with a goose neck a minimum of 18 inches above the roof. Provide insect screen on outlet of each vent pipe.

E. Install exterior gas piping on a minimum 4” sand bed approximately 30” below grade.

F. All gas piping in unfinished (exposed structure) areas to run exposed, tight to ceiling. All gas piping in finished (finished ceiling) areas to be run concealed, tight to structure above.
   1. All piping above inaccessible ceilings (i.e. drywall, plaster, etc.), buried in or under floor slabs or drops in walls or chases shall have welded or brazed joints, regardless of pipe size.
   2. All gas piping run on roof to be welded.

G. Install Schedule 40 steel pipe sleeves through all foundations, floors, walls and roofs. Each sleeve shall be sealed at both ends with one of the following:
   1. Fire Walls: Fire seal.
   2. Floors at Grade: Water seal.
   3. Floors Above Grade: Fire seal.
   4. Foundations and Outside Walls: Water seal.
   5. Walls (Not Fire walls): Thermal seal.

END OF SECTION

SECTION 15535

REFRIGERANT PIPING AND SPECIALTIES

PART 1 GENERAL

1.1 WORK INCLUDED

A. Piping.

B. Refrigerant.

C. Moisture and liquid indicators.

D. Valves.

E. Strainers.

F. Check valves.

G. Pressure relief valves.

H. Filter-driers.

I. Solenoid valves.

J. Expansion valves.

K. Receivers.

L. Flexible connections.

1.2 RELATED SECTIONS

A. Section 15260 – Piping Insulation.

1.3 REFERENCES

A. ANSI/ARI 495 - Refrigerant Liquid Receivers.

B. ANSI/ARI 710 - Liquid Line Dryers.

C. ANSI/ARI 750 - Thermostatic Refrigerant Expansion Valves.

D. ANSI/ASHRAE 15 - Safety Code for Mechanical Refrigeration.

E. ANSI/ASHRAE 34 - Number Designation of Refrigerants.

F. ANSI/ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.

G. ANSI/ASME B16.26 - Cast Copper Alloy Fittings For Flared Copper Tubes.

H. ANSI/ASME B31.5 - Refrigeration Piping.

I. ANSI/ASTM B88 - Seamless Copper Water Tube.

J. ANSI/ASME B32 - Solder Metal.

K. ASTM B280 - Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.

L. ANSI/AWS A5.8 - Brazing Filler Metal.

M. ANSI/AWS D1.1 - Structural Welding Code, Steel.

N. UL 429 - Electrically Operated Valves.

1.4 SYSTEM DESCRIPTION

A. Where more than one piping system material is specified ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

B. Provide pipe hangers and supports in accordance with ASTM B31.5 and Section 15140.

C. Liquid Indicators:
   1. Use line size liquid indicators in main liquid line leaving condenser.
   2. If receiver is provided, install in liquid line leaving receiver.
   3. Use line size on leaving side of liquid solenoid valves.

D. Valves
   1. Use service valves on suction and discharge of compressors.
   2. Use gage taps at compressor inlet and outlet.
   3. Use gage taps at hot gas bypass regulators, inlet and outlet.
   4. Use check valves on compressor discharge.
   5. Use check valves on condenser liquid lines on multiple condenser systems.

E. Refrigerant Charging Packed Angle Valve: Use in liquid line between receiver shut-off valve and expansion valve.

F. Strainers:
   1. Use line size strainer upstream of each automatic valve.
   2. Where multiple expansion valves with integral strainers are used, use single main liquid line strainer.
   3. On steel piping systems, use strainer in suction line.
   4. Use shut-off valve on each side of strainer.

G. Pressure Relief Valves: Use on ASME receivers and pipe to outdoors.

H. Permanent Filter-Driers:
   1. Use in low temperature systems.
   2. Use in systems utilizing hermetic compressors.
   3. Use filter-driers for each solenoid valve.

I. Replaceable Cartridge Filter-Driers:
   1. Use vertically in liquid line adjacent to receivers.
   2. Use filter-driers for each solenoid valve.

J. Solenoid Valves:
   1. Use in liquid line of systems operating with single pump-out or pump-down compressor control.
   2. Use in liquid line of single or multiple evaporator systems.
   3. Use in oil bleeder lines from flooded evaporators to stop flow of oil and refrigerant into the suction line when system shuts down.

K. Receivers:
   1. Use on systems 5 tons and larger, sized to accommodate pump down charge.
   2. Use on systems with long piping runs.

L. Flexible Connectors: Utilize at or near compressors where piping configuration does not absorb vibration.

1.5 SUBMITTALS

A. Submit under provisions of Division 1 General Requirements.

B. Shop Drawings: Indicate schematic layout of system, including equipment, critical dimensions, and sizes.

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.

1.6 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Division 1 General Requirements.

B. Maintenance Data: Include instructions for changing cartridges, assembly views, spare parts lists.

1.7 REGULATORY REQUIREMENTS

A. Conform to ANSI/ASME B31.5 for installation of piping system.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under Division 1 General Requirements.

B. Deliver and store piping and specialties in shipping containers with labeling in place.

C. Protect piping and specialties from entry of contaminating material by leaving end caps and plugs in place until installation.

D. Dehydrate and charge components such as piping and receivers, seal prior to shipment, until connected into system.

PART 2 PRODUCTS

2.1 PIPING

A. Copper Tubing: ASTM B280, Type ACR hard drawn or annealed.
   1. Fittings: ANSI/ASME B16.22 wrought copper.
   2. Joints: Braze, AWS A5.8 BCuP silver/phosphorus/copper alloy with melting range 1190 to 1480 degree F.

B. Copper Tubing to 7/8 inch OD: ANSI/ASTM B88, Type K, annealed.
   1. Fittings: ANSI/ASME B16.26 cast copper.
   2. Joints: Flared.

2.2 REFRIGERANT

A. Refrigerant: ASHRAE 34;
   1. 140A.

2.3 MOISTURE AND LIQUID INDICATORS

A. Indicators: Single port type, UL listed, with copper or brass body, flared or solder ends, sight glass, color coded paper moisture indicator with removable element cartridge and plastic cap; for maximum working pressure of 500 psig, and maximum temperature of 200 degrees F.

2.4 VALVES

A. UL listed, globe or angle pattern, forged brass body and bonnet, phosphor bronze and stainless steel diaphragms, rising stem and handwheel, stainless steel spring, nylon seat disc, solder or flared ends, with positive backseating; for maximum working pressure of 500 psig and maximum temperature of 275 degrees F.

B. Packed Angle Valves:
   1. Forged brass or nickel plated forged steel, forged brass seal caps with copper gasket, rising stem and seat with backseating, molded stem packing, solder or flared ends; for maximum working pressure of 500 psig and maximum temperature of 275 degrees F.

C. Service Valves:
   1. Forged brass body with copper stubs, brass caps, removable valve core, integral ball check valve, flared or solder ends, for maximum pressure of 500 psig.

2.5 FILTER-DRIERS

A. Replaceable Cartridge Angle Type:
   1. Shell: ARI 710, UL listed, brass, removable cap, for maximum working pressure of 350 psig.

2.6 SOLENOID VALVES

A. Valve: ARI 760, pilot operated, copper or brass body and internal parts, synthetic seat, stainless steel stem and plunger assembly, with flared, solder, or threaded ends; for maximum working pressure of 500 psig. Stem shall permit manual operation in case of coil failure.

B. Coil Assembly: UL listed, replaceable with molded electromagnetic coil, moisture and fungus proof, with surge protector and color coded lead wires, integral junction box.

PART 3 EXECUTION

3.1 PREPARATION

A. Ream pipe and tube ends. Remove burrs.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.2 INSTALLATION

A. Install refrigeration piping and specialties in accordance with manufacturer's instructions.

B. Route piping in orderly manner, with plumbing parallel to building structure, and maintain gradient.

C. Install piping to conserve building space and not interfere with use of space.

D. Group piping whenever practical at common elevations and locations. Slope piping one percent in direction of oil return.

E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

F. Inserts: Refer to Section 15140.

G. Arrange piping to return oil to compressor. Provide traps and loops in piping, and provide double risers as required. Slope horizontal piping 0.40 percent in direction of flow.

H. Provide clearance for installation of insulation and access to valves and fittings.

I. Provide access to concealed valves and fittings.

J. Flood piping system with nitrogen when brazing.

K. Where pipe support members are welded to structural building frame, brush clean, and apply one coat of zinc rich primer to welding.

L. Prepare unfinished pipe, fittings, supports, and accessories ready for finish painting.

M. Insulate piping and equipment; refer to Section 15260.

N. Follow ASHRAE 15 procedures for charging and purging of systems and for disposal of refrigerant.

O. Provide replaceable cartridge filter-driers, with isolation valves and valved bypass.

P. Locate expansion valve sensing bulb immediately downstream of evaporator on suction line.

Q. Provide external equalizer piping on expansion valves with refrigerant distributor connected to evaporator.

R. Install flexible connectors at right angles to axial movement of compressor, parallel to crankshaft.

S. Fully charge completed system with refrigerant after testing.

T. Provide electrical connection to solenoid valves.

3.3 FIELD QUALITY CONTROL

A. Test refrigeration system in accordance with ASME B31.5.

B. Pressure test system with dry nitrogen to 300 psig. Perform final tests at 27 inches vacuum and 300 psig using electronic leak detector. Test to no leakage.

3.4 REFRIGERATION PIPING DESIGN

A. All refrigeration piping shall be designed by the mechanical contractor based on ASHRAE recommended guidelines and the following:
   1. Size liquid piping for a maximum 6.0 PSI pressure drop and maximum velocity of 360 FPM.
   2. Size suction lines for maximum 2.0 PSI pressure drop at full load. At the lowest stage of unloading/compressor operation; design to minimum velocities of 500 FPM in horizontal lines and 1000 FPM in vertical lines: Install traps at the base of all suction risers and provide double suction risers if required.
   3. Size hot gas lines for maximum 6.0 PSI pressure drop at full load. At the lowest stage of unloading/compressor operation; design to minimum velocities of 500 FPM in horizontal lines and 1000 FPM in vertical lines: Install traps at the base of all hot gas risers and provide double risers if required.

B. Submit dimensioned shop drawings of all refrigeration piping to the engineer for review prior to fabrication.

3.5 REQUIRED COMPONENTS

A. Furnish and install a minimum of the following components for each refrigeration circuit:
   1. Filter Dryer
   2. Sight Glass / Moisture Indicator
   3. Pressure relief valve.
   4. Isolation valves at indoor and outdoor units.

B. Verify all requirements with equipment manufacturers.

END OF SECTION

SECTION 15575

BREECHING, CHIMNEYS AND STACKS

PART 1 GENERAL

1.1 WORK INCLUDED

A. Fabricated breechings.

B. Manufactured chimneys for gas fired equipment.

C. Manufactured double wall chimneys for fuel fired equipment.

D. Vent dampers.

1.2 RELATED SECTIONS

A. Section 15620 – Gas Fired Furnace.

B. Section 15625 – Gas Fired INFRA-RED Heating Equipment.

1.3 REFERENCES

A. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

B. NFPA 54 (ANSI Z223.1) - The National Fuel Gas Code.

C. UL 103 - Standard for Factory Built Low Heat Chimneys.

D. UL 441 - Standard for Gas Vents.

E. UL 641 - Standard for Low Temperature Venting Systems.

1.4 DEFINITIONS

A. Breeching: Vent Connector.

B. Chimney: Primarily vertical shaft enclosing at least one vent for conducting flue gases outdoors.

C. Smoke Pipe: Round, single wall vent connector.

D. Vent: That portion of a venting system designed to convey flue gases directly outdoors from a vent connector or from an appliance when a vent connector is not used.

E. Vent Connector: That part of a venting system that conducts the flue gases from the flue collar of an appliance to a chimney or vent, and may include a draft control device.

1.5 SUBMITTALS FOR REVIEW

A. Submit under provisions of the General Requirements.

B. Shop Drawings: Indicate general construction, dimensions, weights, support and layout of breechings. Submit layout drawings indicating plan view and elevations where factory built units are used.

C. Product Data: Provide data indicating factory built chimneys, including dimensional details of components and flue caps, dimensions and weights, electrical characteristics and connection requirements.

1.6 QUALITY ASSURANCE

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

B. Installer Qualifications: Company specializing in performing the work of the work of this section with minimum five years documented experience, approved by manufacturer.

1.7 REGULATORY REQUIREMENTS

A. Conform to applicable code for installation of natural gas burning appliances and equipment.

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

PART 2 PRODUCTS

2.1 DOUBLE WALL METAL STACKS – Category IV

A. Fabricate with 1 inch air space between walls. Liner to be ASTM A 959, type AL29-4C stainless steel, outer jacket 430 stainless steel approved for Category IV (Condensing, Positive Pressure) applications.

2.2 ACCEPTABLE MANUFACTURERS:

A. Factory Built Double Wall Vertical Stacks (Positive Pressure):
   1. Van Packer.
   2. Selkirk Metalbestos.
   3. AMPCO.
   4. Air Management Industries.
   5. MetalFab.
   6. No Substitutions.

2.3 CONSTRUCTION

A. Furnish all items which form a complete assembly including straight sections, tee sections, joint sealant, cleanout door, end capacity drain (1 inch minimum with P-trap designed for minimum 4 inch water seal), full angle ring wall and base supports, insulated roof thimble, roof support assembly, insulated thimble, flashing, counter-flashing, guying where required, Type 316 stainless steel rain cap.
   1. All sections shall be of double wall construction with minimum 1-inch air space between the liner and the shell.
      a. Note: Outer wall of stack above the roof line shall be Type 316 stainless steel.

B. Vent sections shall be sealed with banded flanges and silicone joint sealant with a UL tested pressure rating of 40” w.c.

C. Accessories: Tees, elbows, increasers, draft-hood connectors, terminations, adjustable roof flashings, storm collars, support assemblies, thimbles, firestop spacers, and fasteners; fabricated from similar materials and designs as vent-pipe straight sections; all listed for same assembly.
   1. Termination: Velocity Cones

2.4 WARRANTY

A. Contractor shall provide a one (1) year manufacturers warranty on parts on furnished equipment. Equipment parts warranty shall start at time of substantial completion. Contractor will provide a one (1) year warranty on all labor associated with the equipment and its' installation. Warranty shall start at date of final payment. See General Requirements for additional requirements.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NFPA 54 (ANSI Z223.1), NFPA 31.

C. Assemble and install stack sections in accordance with NFPA 82, industry practices, and in compliance with UL listing. Join sections with acid-resistant joint cement to ASTM C105. Connect base section to foundation using anchor lugs.

D. Level and plumb chimney and stacks.

E. Clean breechings, chimneys and stacks during installation, removing dust and debris.

F. At applications, provide slip joints permitting removal of appliance without removal or dismantling of breechings, breeching insulation, chimneys or stacks.

G. Provide minimum length of breeching to connect appliance to chimney.

3.2 OPERATION AND MAINTENANCE DATA BY INSTALLING CONTRACTOR

A. At the completion of the project, the Installing Contractor shall provide furnish two (2) hard copies and two (2) electronic copies of equipment manuals, maintenance manuals and repair parts list for all equipment and systems reviewed. See General Requirements for additional requirements.

END OF SECTION

SECTION 15620

FORCED AIR FURNACES

PART 1 - GENERAL

1.1 SECTION INCLUDED

A. Forced air furnaces.

B. Refrigerant cooling coils.

C. Air cooled condensing units.

D. Humidifier.

E. Controls.

1.2 SUBMITTALS FOR REVIEW

A. Provide under the General Requirements: Submittals - Procedures for submittals.

B. Product Data: Provide rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.

C. Shop Drawings: Indicate assembly, required clearances, and location and size of field connections.

1.3 SUBMITTALS AT PROJECT CLOSEOUT

A. Provide Operation and Maintenance Data: and Warranties and Bonds: Procedures for submittals.

B. Project Record Documents: Record actual locations of components and connections.

C. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.

D. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owners name and registered with manufacturer.

1.4 REGULATORY REQUIREMENTS

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

1.5 WARRANTY

A. Provide five year manufacturers warranty for heat exchangers.

B. Provide three year manufacturers warranty for solid state ignition modules.

C. Provide five year manufacturers warranty for condensing units.

1.6 EXTRA MATERIALS

A. Provide two filters for each furnace.

PART 2 - PRODUCTS

2.1 GAS FIRED FURNACES

A. Manufacturers:
1. Bryant.
2. Carrier.
3. Goodman.
4. Trane.
5. Heil.

B. Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, gas burner, controls, direct expansion cooling coil, air filter, humidifier, and accessories; wired for single power connection with control transformer.
1. Air Flow Configuration: Horizontal.
2. Heating: Natural gas fired.
3. Electric Refrigeration: Refrigerant cooling coil and outdoor package containing compressor, condenser coil and condenser fan.
4. Accessories: Electronic air cleaner and humidifier.

C. Cabinet: Steel with baked enamel finish, easily removed and secured access doors with safety interlock switches, glass fiber insulation with reflective liner.

D. Supply Fan: Centrifugal type rubber mounted with direct or belt drive, adjustable variable pitch motor pulley.

E. Heat Exchanger: Aluminized steel.

F. Gas Burner:
1. Atmospheric type with adjustable combustion air supply,
2. Gas valve provides 100 percent safety gas shut-off; 24 volt combining pressure regulation, safety pilot, manual set (On-Off), pilot filtration, automatic electric valve.
3. Electronic pilot ignition, with electric spark igniter.
4. Non-corrosive combustion air blower with permanently lubricated motor.

G. Gas Burner Safety Controls:
1. Thermocouple sensor: Prevents opening of gas valve until pilot flame is proven and stops gas flow on ignition failure.
2. Flame rollout switch: Installed on burner box and prevents operation.
3. Vent safety shutoff sensor: Temperature sensor installed on draft hood and prevents operation, manual reset.
4. Limit Control: Fixed stop at maximum permissible setting, de-energizes burner on excessive bonnet temperature, automatic resets.

H. Operating Controls
1. Programmable 7 Day - Room Thermostat: Cycles burner to maintain room temperature setting.
2. Supply Fan Control: Energize from bonnet temperature independent of burner controls, with adjustable timed off delay and fixed timed on delay, with manual switch for continuous fan operation.

I. Air Filters: 1 inch thick glass fiber, disposable type arranged for easy replacement.

J. Performance:
   1. Ratings: Energy Efficiency Rating (EER) not less than requirements of IECC 2015; seasonal efficiency to ASHRAE 103.
   2. Refer to Furnace Schedule. Gas heating capacities are sea level ratings.

2.2 EVAPORATOR COIL UNITS

A. Construction and Ratings: In accordance with ARI 210/240, and UL 207 and UL 303.

B. Evaporator Coil: Copper tube aluminum fin assembly, galvanized drain pan, drain connection, refrigerant piping connections, restricted distributor or thermostatic expansion valve, steel cabinet with baked enamel finish and insulation. Configured for horizontal installation.

2.3 CONDENSING UNITS

A. See drawing schedule – Air Cooled Condensing Units

2.4 THERMOSTATS

A. Electric solid state microcomputer based room thermostat with remote sensor:
   1. Automatic switching from heating to cooling.
   2. Preferential rate control to minimize overshoot and deviation from setpoint.
   3. Set-up for four separate temperatures per day.
   4. Instant override of setpoint for continuous or timed period from one hour to 31 days.
   5. Short cycle protection.
   6. Programming based on every day of the week.
   7. Selection features including degree F or degree C display, 12 or 24 hour clock, keyboard disable, remote sensor, fan on-auto, outdoor temperature degree F.
   8. Battery replacement without program loss.
   9. Thermostat display:
      a. Time of day.
      b. Actual room temperature.
      c. Programmed temperature.
      d. Programmed time.
      e. Duration of timed override.
      f. Day of week.
      g. System mode indication: heating, cooling, auto, off, fan auto, fan on.
   10. Thermostat to have keypad lock.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that floors are ready for installation of units and openings are as indicated on shop drawings. Verify that supports for air cooled condensers are completed.

B. Verify that proper power supply is available for furnace and condenser package.

C. Verify that proper fuel supply is available for connection.

D. Verify that water supply is available for humidifier.

3.2 INSTALLATION

A. Install in accordance with NFPA 90B.

B. Install gas fired furnaces in accordance with ANSI Z223.1 (NFPA 54).

C. Provide vent connections in accordance with NFPA 211.

D. Install refrigeration systems in accordance with ASHRAE 15.

E. Pipe drain from cooling coils to nearest floor drain.

F. Mount air cooled condenser-compressor package on concrete pad.

3.3 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. Contractor shall provide a minimum of four (4) hours of training for equipment provided under this Section of the contract.

END OF SECTION

SECTION 15625

GAS FIRED INFRA-RED HEATING EQUIPMENT

PART 1 GENERAL

1.1 WORK INCLUDED

A. An infrared radiant gas heating system.
   1. Burner.
   2. Burner Control.
   3. Radiant Piping – Heat Exchanger.
   4. Reflectors.
   5. Vent Assembly.
   6. Vacuum Pump.
   7. Control Panel.

1.2 RELATED SECTIONS

A. Section 15505 – Fuel Piping.

B. Section 15575 – Breeching, Chimneys and Stacks

1.3 REFERENCES

A. American National Standards Institute/American Society of Heating, Refrigerating and Air Conditioning Engineers, ANSI/ASHRAE.
   1. ANSI/ASHRAE 90A; Energy Conservation in New Building Design.

B. American National Standards Institute/National Fire Protection Association; ASNI/NFPA.
   1. ANSI/NFPA: National Fuel Gas Code.

C. National Fire Protection Association, NFPA:
   1. NFPA 90A: Installation of Air Conditioning and Ventilating Systems.

D. Unit(s) assembly shall be tested in accordance with Standard, ANSI Z83.8-2006 and CSA 2.6-2006 and shall bear the ETL label. The heater shall be certified by the American Gas Association and approved by the Canadian Gas Association.

E. Design certified by the American Gas Association per American National Standard Z83.6-1982 “vented infrared radiant heater.”

F. International Mechanical Code 2012.

1.4 SUBMITTALS FOR REVIEW

A. Shop Drawings: Indicate capacity and dimensions of manufactured products and assemblies required for this project. Indicate electrical service with electrical characteristics and connection requirements.

B. Product Data: Provide capacity and dimensions of manufactured products and assemblies required for this project. Indicate electrical service with electrical characteristics and connection requirements.

C. Submit manufacturer’s installation instructions. Indicate assembly, support details, connection requirements, and include start-up instructions.

1.5 OPERATION AND MAINTENANCE DATA

A. Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.

B. The equipment manufacturer's bid/proposal shall include start-up services, Owner's schooling, operating manuals and warranty for parts and labor on equipment only. All other warranty services are by the installing contractor.

1.6 WARRANTY

A. Provide three (3) year warranty on all parts associated with infrared heating system and one (1) year labor warranty for period after substantial completion.

1.7 CONTRACTOR'S RESPONSIBILITY TO VERIFY ELECTRICAL REQUIREMENTS

A. The mechanical and electrical drawings are coordinated based on the equipment scheduled on the drawings. The mechanical contractor shall verify and determine if electrical requirements for equal or substituted equipment are compatible with the electrical system shown on the plans. The mechanical contractor shall coordinate and pay for any electrical design and installation modifications required for the substituted equipment at no additional cost to the Owner.

PART 2 PRODUCTS

2.1 MANUFACTURERS – INFRARED RADIANT HEATING SYSTEM

A. Co Ray Vac.

B. Or Equal

2.2 INFRARED RADIANT HEATING SYSTEM

A. Burner Units:
   1. Each firing unit shall consist of an integral burner control installed in a factory furnished combustion chamber and shall have a maximum gas input rating as indicated on the drawing. Burner assembly shall consist of heavy duty cast iron burner head, pre-wired electronic gas controls with electronic ignition and combustion air filter.
   2. Burners shall be designed for firing in tandem without adverse effects from combustion gases from upstream burners.
   3. The combustion system shall be capable of being the combustion condensing type in which the products of combustion are exhausted below the dew point of the moisture in the flue gases (140^{o}F - 180^{o}F).
   4. Design firing rate for the burners shall be 60, 000 BTU/HR as scheduled on drawings.
   5. The design of the burners supplied shall provide for maintaining a constant proportion of fuel gas to filtered combustion air. These conditions are met for burners in which the pressure of both the fuel gas and the combustion air are both introduced at zero (atmospheric) pressure and the flow of each is established by a vacuum on the downstream side of the flow metering orifices.
   6. Outside Air: The system shall be capable of supplying air from outside to each burner and end vent for the support of combustion in contaminated environments.

B. Burner Control
   1. All burners shall be factory wired for 110 volts with transformer for 24 volt DSI operation as supplied with a grounded 18" three wire pigtail located at rear of burner.
   2. To assure a high degree of fail-safe operation, the design shall preclude main flow of gas if any or all of the following abnormal conditions occur:
      (a.) Main valve fails in open position
      (b.) Vacuum pump motor fails (vacuum proving switch cuts power to burners.)
      (c.) Power fails (gas valves in burners close in safe position.)
   3. All gas vacuum-firing burner units shall be equipped with a Direct Spark Ignition Module (DSI). The DSI module shall have a 15 second flame response time before lockout occurs. The spark shall shut off when the burner flame is established.
   4. All units to be supplied with outside air for combustion and any excess air required by system if inside air contains contaminants.

C. Radiant Piping - Heat Exchanger
   1. Provide Heat Treated Aluminized pipe throughout system. Minimum heat exchanger surface to be 75 sq. ft. for each 100,000 BTU/HR input. Connections to be made between pipe sections using stainless steel coupling assemblies.
   2. Hanging materials: All system pipe must be supported in accordance with acceptable practices, local codes, seismic requirements, applicable standards and as shown on plans. Pipe shall pitch down at least 1" in 20' toward vacuum pump.

D. Reflectors:
   1. All reflectors shall be deep dish of a highly infrared reflective material such as aluminum.
   2. Standard reflector shall be installed on all radiant pipe, manifold pipe, and tail pipe as indicated on system layout furnished.
   3. System to have perimeter side extension reflector in certain areas of layout as shown on plan when specified. Side reflector permanently attaches to side of top reflector and is secured to the pipe by three side reflector supports and two "Z" clips for each 8 ft section of side reflector.

E. End Vent Assembly:
   1. Each open end combustion chamber shall have an approved end vent and the reflector in this area shall have an end cap, and be installed according to manufacturer's installation instructions and as shown on plans.

F. Vacuum Pump:
   1. The system shall vent all products of combustion outdoors by means of the vacuum pump.
   2. Vacuum pump shall be equipped with a maximum of 3/4 HP, 60 Hertz, 120 Volt, 3450 RPM, single phase T.E.F.C. motor. This motor shall have thermal overload protection, ball bearings, and shall be constructed in accordance with electric motor industry standards.
   3. The scroll of this pump shall be cast iron with a minimum metal thickness of approximately 3/16 inch. The impeller wheel shall be cast 319 alloy aluminum with a minimum metal thickness of approximately 3/32 inch.
   4. Provide low voltage (24 volt) two wire circuit from the vacuum proving switch (located at the inlet to the vacuum pump) to the control panel.
   5. Provide connection between the pump inlet and tail pipe with an acoustic boot and clamps. Provide discharge connection with a 4.5 inch acoustic boot and 4" porcelain coated tail pipe.
   6. System will be under negative pressure at all times during operation to preclude the possibility of the escape of combustion gases inside the building.
   7. Vacuum pump motor requires a 1 wire grounded circuit 115 volts, single phase, 60 hertz for a total of 10 full load amps. Motor must have the same rotation to match the direction of the arrow on the fan scroll.

8. The vacuum pump shall be acoustically isolated from the system with a flexible connector with a temperature rating of 350°F minimum. The motor in the vacuum pump shall be secured with rubber mounts for acoustical isolation.
9. Provide stainless steel venting materials.

G. Control Panel:
1. Provide pre-wired solid state system control panel as furnished by the system manufacturer for each vacuum pump. The control panel shall provide all relays, controls, terminals, lights, etc. to control up to four temperature zones with individual thermostats. Controls shall include a pre-purge sequence of at least 20 seconds prior to initiation of firing and post-purge sequence of at least 20 seconds after shutdown of the last burner. An interlock shall be provided to insure that no burner may be fired without the vacuum pump operating, indicator lights shall appear on outside of panel cover to show Vacuum Pump Operation, Power On and Zone On.
2. Connect power wiring to burners and vacuum pumps. Connect control wiring between vacuum pumps, control panels and thermostats in accordance with manufacturer's wiring diagrams.

H. Thermostats:
1. Provide, where indicated, 24 volt thermostat(s) connected to control system. Mount thermostat(s) 48" above finished floor, if not otherwise indicated. Supply number of thermostats as shown on drawing. Provide locking guard.

I. System Controls
1. Prewired system control circuits shall be supplied in a control panel with each vacuum pump. The control panel for the control of the burners shall provide relays & terminals to accommodate up to four temperature zones with a thermostat and associated control circuits for the burners for each temperature zone. The control panel shall have indicator lights showing Power On, Vacuum Pump On and 3-Zones in Operation.
2. All control circuits must be properly polarized. All burner units located on one radiant pipe line must be on the same zone. All burner units using the same tail pipe also must be on the same zone (except last 10' into pump).
3. All combustion chamber and heat exchanger pipes connected to vacuum pump shall be pre-purged with air for a period of at least 20 seconds (10 air changes minimum) prior to initiation of firing sequence.
4. All combustion chamber and heat exchanger pipes connected to a vacuum pump shall be post-purged with air for a period of at least 20 seconds (10 air changes minimum) after shut down of the last burner firing into the vacuum pump.
5. All vacuum pumps shall be provided with vacuum proving switches to prevent opening of gas valves until vacuum in the pipe is proven.
6. Pre-purge of the system is obtained from the solid state timer relay located in the furnished panel. The first zone thermostat calling for heat will activate this relay. The pump motor will start and the vacuum proving switch, after sensing a minus pressure of 2" water column, completes the circuit to begin pre-purge. After approximately 45 seconds, the 110 volt control circuits will be activated and burners will light automatically. The burners will remain on until the thermostat is satisfied. At that time, the gas valve and DSI will drop out, but the pump will continue to run to give a post-purge. This post-purge period on the last zone thermostat to be satisfied (internally provided in panel box).
7. The infrared heating system zones to be controlled by the Building Automation System. See drawings for sequence of operation requirements.
8. The system wiring diagram shall conform to wiring diagrams furnished with installation and service sheets furnished with the units and as on plans.
9. All thermostats are low voltage bimetal action with heat anticipator. Low voltage thermostats shall be numbered instead of marked in degrees and shall not have thermometers. Low voltage fittings must follow local codes.

J. Gas Piping:
   1. Gas supply piping must meet local codes and fuel supplier requirements and be sized in accordance with BTU demand, available pressure, and the total equivalent length of pipe required (fittings included).
   2. Connection from gas supply line to burner unit must be made in accordance with installation details on plans. Special connections are used to allow for expansion and contraction of radiant piping.
   3. Gas shut-off cock, as supplied with unit, and controls in unit must not be subjected to more than 1/2# or 14 inches water column (W.C.) pressure. If high pressure testing of gas supply line is required, this test must be made with a plug in the 1/2 inch branch line to each burner. Never test the gas line with the 1/2 inch IPS x 3/4" SAB shut-off cock installed or with the burner unit connected.

K. Electrical:
   1. Wiring must conform to National Electric Code and local ordinances in accordance with submitted manufacturers' diagrams.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions at the site prior to bidding or beginning work.

B. Verify that space is ready to receive work.

C. Verify that proper power supply is available.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with International Mechanical Code 2012.

C. Radiant vacuum gas heating system must be vacuum vented to atmosphere and be under negative pressure at all times during operation.

D. Clearances to combustible materials shall not exceed those outlined and printed on the burner nameplate and on manufacturer's specification sheet.

E. Installation of all equipment and materials shall conform to the practices of good workmanship in accordance with applicable requirements. The combustion chambers, pipe work, gas lines and electrical conduit shall be attached to or suspended from the building structure in a manner suitable to meet standards of durability and safety.

3.3 MANUFACTURER'S FIELD SERVICE

A. Prepare and start systems.

3.4 FACTORY TESTED

A. Unit(s) shall be operated, tested and set at the factory using job-site conditions for electrical and gas input. All operating and safety controls shall be tested and set at the factory. Gas-pressure regulator shall be set for specified burning rate at specified inlet pressure.

3.5 SERVICE AND PARTS

A. The supplier shall furnish gas piping schematics, as-built wiring connection and control-circuit diagrams, dimension sheets and a full description of the unit. Service manuals, showing service and maintenance requirements, shall be provided with unit.

3.6 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. Contractor shall provide a minimum of four (4) hours of training for equipment provided under this Section of the contract.

END OF SECTION

SECTION 15870

POWER VENTILATORS

PART 1 GENERAL

1.1 WORK INCLUDED

A. Power wall and 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 Division 1 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 under provisions of Division 1 Sections.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Division 1 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. Contractor shall provide a one (1) year manufacturer's warranty on parts on furnished equipment. Equipment parts warranty shall start at time of substantial completion. Contractor will provide a one (1) year warranty on all labor associated with the equipment and its' installation. Warranty shall start at date of final payment. See General Requirements for additional requirements.

1.8 EXTRA MATERIALS

A. Provide two (2) sets of belts for each fan.

PART 2 PRODUCTS

2.1 POWER ROOF AND WALL EXHAUST FANS AND CURBS

A. Acceptable Manufacturers:
   1. Cook.
   2. Greenheck.
   3. Carnes.

2.2 SPUN ALUMINUM, ROOF OR WALL MOUNTED DIRECT OR BELT DRIVE, DOWNBLAST CENTRIFUGAL EXHAUST VENTILATOR.

A. Certifications: Fan shall be manufactured at an ISO 9001 certified facility. Fan shall be listed by Underwriters Laboratories (UL 705) and UL listed for Canada (cUL 705). Fan shall bear the AMCA certified ratings seal for sound and air performance.

B. The fan shall be of bolted and welded construction utilizing corrosion resistant fasteners. The spun aluminum structural components shall be constructed of minimum 16 gauge marine alloy aluminum, bolted to a rigid aluminum support structure. The aluminum base shall have continuously welded curb cap corners for maximum leak protection. The discharge baffle shall have stainless steel quick release latches to provide access into the motor compartment without the use of tools. An integral conduit chase shall be provided through the curb cap and into the motor compartment to facilitate wiring connections. The motor, bearings and drives shall be mounted on a minimum 14 gauge steel power assembly, isolated from the unit structure with rubber vibration isolators. These components shall be enclosed in a weather-tight compartment, separated from the exhaust airstream. Lifting lugs shall be provided to help prevent damage from improper lifting. 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.

C. Wheel: Wheel shall be centrifugal backward inclined, constructed of 100 percent aluminum, including a precision machined cast aluminum hub. Wheel inlet shall overlap an aerodynamic aluminum inlet cone to provide maximum performance and efficiency. Wheel shall be balanced in accordance with AMCA Standard 204-96, Balance Quality and Vibration Levels for Fans.

D. Motor: Motor shall be heavy duty type with permanently lubricated sealed ball bearings and furnished at the specified voltage, phase and enclosure.

E. Bearings: Bearings shall be designed and individually tested specifically for use in air handling applications. Construction shall be heavy duty regreasable ball type in a cast iron pillow block housing selected for a minimum L50 life in excess of 200,000 hours at maximum catalogued operating speed.

F. Belts & Drives: Belts shall be oil and heat resistant, non-static type. Drives shall be precision machined cast iron type, keyed and securely attached to the wheel and motor shafts. Drives shall be sized for 150 percent of the installed motor horsepower. The variable pitch motor drive must be factory set to the specified fan RPM. All belt drive fans to be provided with automatic belt tensioner.

G. Roof Curbs: 18 inch high stainless steel with continuously welded seams, one inch insulation and curb bottom and factory installed door nailer strip. Curb shall be fabricated to accommodate roof pitch so fan is mounted on a horizontal level plain. Provide interior sound baffle for units where scheduled.

H. Disconnect Switch: Factory wired, non-fusible, in housing for thermal overload protected motor.

I. Inlet Damper: Motorized backdraft, aluminum multiple parallel blade construction, felt edged with nylon bearings.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Secure roof exhaust fans with stainless steel lag screws to roof curb.

C. Extend ducts to roof exhaust fans into roof curb. Counterflash duct to roof opening.

D. Provide curb adaptor to match existing curbs. Field verify.

E. Provide sheaves, belts, pulleys, etc. required for final air balance.

F. Do not operate fans for any purpose until ductwork is clean, bearings lubricated and fan has been test run under observation.

G. Install flexible connections specified, between fan inlet and ductwork. (Not applicable for roof mounted fans). Ensure metal bands of connectors are parallel with minimum one inch flex between ductwork and fan while running.

3.2 OPERATION AND MAINTENANCE DATA BY INSTALLING CONTRACTOR

A. At the completion of the project, the Installing Contractor shall provide furnish two (2) hard copies and two (2) electronic copies of equipment manuals, maintenance manuals and repair parts list for all equipment and systems reviewed. See General Requirements for additional requirements.

END OF SECTION

SECTION 15890

DUCTWORK

PART 1 GENERAL

1.1 WORK INCLUDED

A. Low pressure (rectangular) ductwork.

B. Low pressure (round) ductwork.

C. Installation of all dampers in ductwork.

1.2 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.

1.3 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. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.

G. SMACNA - HVAC Air Duct Leakage Test Manual.

H. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.

I. UL 181 - Factory-Made Air Ducts and Connectors.

1.4 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.

SECTION 15890

DUCTWORK

1.5 REGULATORY REQUIREMENTS

A. Construct ductwork to N.F.P.A. 90A standards.

B. Conform to International Mechanical and Energy Code 2015.

1.6 SUBMITTALS

A. Submit under provisions of Division 1 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.

1.7 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Division 1 General Requirements.

B. Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.8 QUALITY ASSURANCE

A. Perform Work in accordance with SMACNA - HVAC Duct Construction Standards - Metal and Flexible.

B. Maintain one copy of document on site.

1.9 REGULATORY REQUIREMENTS

A. Construct ductwork to NFPA 90A standards.

1.10 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

2.1 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. Fasteners: Rivets, bolts, duct mate (TM) or sheet metal screws.

E. Sealant: Non-hardening, water resistant, fire resistive, compatible with mating materials; liquid used alone or with tape or heavy mastic.

F. Hanger Rod: Steel, galvanized; threaded both ends, threaded one end or continuously threaded.

2.2 LOW PRESSURE (RECTANGULAR) DUCTWORK

A. Fabricate and support in accordance with SMACNA Low Pressure Duct Construction Standards and ASHRAE handbooks, except as indicated. Provide duct material, gauges, reinforcing and sealing for operating pressure indicated.

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

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. Where acoustical lining is indicated, provide turning vanes of perforated metal with glass fiber insulation.

D. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible. Divergence upstream of equipment shall not exceed 30 degrees; convergence downstream shall not exceed 45 degrees.

E. Provide easements where low pressure ductwork conflicts with piping and structure. Where easements exceed 10 percent duct area, split into two ducts maintaining original duct area.

F. Use crimp joints with or without bead for joining round ducts 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 and fittings throughout the low pressure duct system (supply side) with SMACNA approved sealants. Sealants to have a service temperature range of -30 degrees F. to +175 degrees F.

2.3 LOW PRESSURE (ROUND) DUCTWORK

A. Duct rated for 2" pressure class.

B. Adjustable elbows for all changes of direction.

C. All fittings shall be screwed to duct.

PART 3 EXECUTION

3.1 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. 2012 International Energy Conservation Code.

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. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

I. Connect diffusers directly to low pressure ducts.

J. Seal all joints in ductwork with United duct sealer and per the International Energy Conservation Code.

K. Use UL-181A or 181B tapes and mastics on joints, seams and connections per SMACNA HVAC Duct Construction Standards and seal all ductwork per International Energy Conservation Code.

L. Connect ducts to fans and other air distribution equipment with mechanical fasteners, seals, mastics or gaskets.

3.2 INSTALLATION OF BUILDING AUTOMATION SYSTEM 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.

3.3 SCHEDULES

A. DUCTWORK MATERIAL AND PRESSURE CLASS SCHEDULE

Air System	Material	Material Pressure
Low Pressure Supply (Heating and Cooling Systems)	Steel	4”
Return and Relief	Steel	4” (Negative)
General Exhaust	Steel	2” (Negative)
Outside Air	Steel	4”

END OF SECTION

SECTION 15900

TESTING, ADJUSTING AND BALANCING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Testing, adjustment, and balancing of air systems.

B. Testing, adjustment, and balancing of hydronic systems.

C. 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.

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. BAS Contractor shall provide to the Test & Balance Company 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. BAS Contractor shall submit complete background experience of his proposed 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 Building Automation System (BAS) 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.

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. 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.

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 pitlot 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.

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
Gas Fired Warm Air Furnace
Exhaust 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

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. 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
8. 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
9. Exhaust 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

10. 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
11. 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
12. 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 15910

DUCTWORK ACCESSORIES

PART 1 GENERAL

1.1 WORK INCLUDED

A. Air turning devices/extractors.

B. Duct access doors.

C. Duct test holes.

D. Volume control dampers.

1.2 RELATED SECTIONS

A. Section 15242 - Vibration Isolation.

B. Section 15790 - Air Coils.

C. Section 15870 - Power Ventilators.

D. Section 15890 - Ductwork.

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.

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.

PART 2 PRODUCTS

2.1 AIR TURNING DEVICES/EXTRACTORS

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

2.2 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.

2.3 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.

C. Leaded Vinyl Sheet: Minimum 0.55 inch thick, 0.87 lbs per sq ft, 10 dB attenuation in 10 to 10,000 Hz range.

2.4 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 test holes where indicated and required for testing and balancing purposes.

C. Provide flexible connections immediately adjacent to equipment in ducts associated with all fans and motorized equipment, and supported by vibration isolators.

D. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.

E. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

F. Manual balancing dampers shall be multi blade type for any duct where the dimension perpendicular to the damper blades is greater than 14".

END OF SECTION

SECTION 15940

AIR OUTLETS AND INLETS

PART 1 GENERAL

1.1 WORK INCLUDED

A. Registers/Grilles

B. Diffusers

C. Louvers.

D. 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. Nailor.

B. Krueger.

C. Metalaire.

D. Price.

E. Titus.

F. Tuttle and Baily.

2.2 SQUARE/RECTANGULAR CEILING DIFFUSERS

A. Type: Square, adjustable pattern, stamped, multi-core diffuser to discharge air in 360 degree pattern.

B. Frame: Inverted T-bar type. In plaster ceilings, provide plaster frame and ceiling frame.

C. Fabrication: Steel with baked enamel finish selected by Architect.

D. Accessories: Radial opposed blade damper and multi-louvered equalizing grid with damper adjustable from diffuser face.

2.3 SUPPLY REGISTERS/GRILLES

A. Type: Aluminum border and individually adjustable blades, ¾ inch blade spacing, single deflection.

B. Frame: 1-1/4 inch margin with countersunk screw mounting and gasket.

C. Factory baked enamel finish as selected by Architect.

D. Damper: Aluminum opposed blade type, operable from face.

2.4 RETURN GRILLES/REGISTERS

A. Return grilles shall be 1/2" blade spacing with 0 degree fixed deflection blades. Blades shall be parallel to the long dimension of the grille or register.

B. Construction shall be of steel or aluminum as scheduled with a 1-1/4" wide border on all sides. Screw holes shall be countersunk for a neat appearance.

C. Deflection blades shall be contoured to a specifically designed and tested cross-section to meet published test data. Blades shall be firmly held in place by mullions from behind the grille and fixed in place by welding.

D. The grille finish shall be baked anodic acrylic paint as selected by the Architect.

E. Opposed blade volume damper shall be constructed of heavy gauge steel, operable from the face of the register.

2.5 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.

2.6 LOUVERS

A. Manufacturers:
   1. American Warming.
   2. DowCo.
   3. Greenheck.
   4. Ruskin Mfg.
   5. Vent Products.

B. Type: 4 inch deep, drainable with blades on 37.5 degree slope with a drain gutter in each blade and downspouts in frame jambs and mullions, heavy channel frame, birdscreen with 1/2 inch square mesh for exhaust and 3/4 inch for intake.

C. Fabrication: 12 gage thick extruded aluminum, welded assembly, with factory anodized finish, color to be selected by the Architect. Design shall incorporate structural supports required to withstand a wind load of 20 lbs. per sq. ft.

D. Design Basis Performance (based on 60” x 10” DowCo DWE-04):
   1. Maximum face velocity of free area: 750 fpm.

2.7 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 diffusers 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.

E. Secure louvers to wall openings with exposed stainless steel fastners 12 in. on center.

F. Caulk louver frames watertight. Entire installation shall be watertight under all weather conditions.

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, and1 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.

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. BOCA Building Officials and Code Administrators.
   2. NEC National Electrical Code.
   3. State of Illinois Building Code.
   4. 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 26 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. NFPANational 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).
   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.

I. In every installation where regulations of electric utility, telephone and cable TV companies apply, conformance with their regulations is mandatory and any costs involved shall be included in the Contract, with the exception of extra facility and other charges which are directly paid by the Owner.

1.7 APPROVALS

A. Prepare shop drawings and obtain approvals from inspection authorities for emergency and exit lighting, fire alarm and life safety systems, and other electrical installations requiring specific approval.

B. Prepare shop drawings and obtain approvals from governmental agencies and utility companies for applicable electrical installations requiring approval.

C. Copies of the final approved drawings shall be delivered to the Architect/Engineer. Approvals shall be obtained before commencement of related work.

1.8 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.

1.9 FEES

A. Pay fees and other charges incidental to electrical work and obtain and pay for required insurance, permits, licenses, inspections and taxes. Arrange for required inspections and delivery certificates and approvals for same to the Architect/Engineer.

1.10 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. Prior to ordering any switchboard, distribution panels, panelboards, or transformers, the contractor shall submit dimension drawings showing the switchboard will fit in the location shown on the drawings. In the event of conflicts, the contractor shall request a written clarification from the Architect/Engineer.

B. Coordination and Installation Drawings:
   1. In addition to the preparation and submittal of Shop Drawings and product data for manufactured electrical equipment and materials, prepare and maintain in current status, a complete set of detailed, completely circuited, and dimensioned electrical coordination and record drawings for electrical work included under the Contract.
   2. Coordination and installation drawings shall be made at the Contractor's expense on basic floor plan background. Electronic copies of the electrical drawings may be purchased from the Engineer for $250.00 a copy.
   3. Coordination and installation drawings shall be CAD drawings compatible with AutoCAD Version 2010 on the same size and with the same border lines and title blocks as the Architect/ Engineer's Drawings, with the Contractor's name added.
   4. Coordinate electrical work with the work of all other trades affecting the electrical work and in preparing the coordination drawings; coordinate the work of other trades in order to avoid possible installation conflicts, which includes but is not limited to mechanical equipment and architectural design elements. In the event of conflicts, interferences or discrepancies that are discovered during the coordination phase of the project, the contractor shall request a written clarification from the Architect/Engineer. If conflicts, interferences or discrepancies arise after the coordination phase of the project and no written clarification was requested, then the work shall be removed, replaced, modified or otherwise corrected at no additional cost to the owner.
   5. Record drawings shall indicate the electrical installation exactly as constructed and shall be periodically revised to reflect all changes, including those required by the Architect/Engineer, those which are or have been found necessary in the field and those which may be suggested by the Contractor and accepted by the Architect/Engineer. Drawings shall be revised when considered necessary by the Architect/Engineer or the Contractor in order to facilitate proper coordination.
   6. If, in the opinion of the Architect/Engineer, the drawings are in acceptable condition after each has been finally revised, they may be submitted as the field record drawings.
   7. 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.
   8. 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.
   9. The Drawings shall include floor plan and reflected ceiling plan electrical layouts. Similar drawings of each trade shall be of the same scale in order to permit respective plans to be superimposed upon all others. Drawing shall be prepared and submitted for coordination and review.
   10. Initial copy of all drawings shall be submitted for review. These submittals shall not be considered as shop drawings. Subsequent revised copies need not be issued to the Architect/Engineer unless so requested. It shall be clearly understood that these drawings are for installation coordination purposes only and cannot in any way alter the requirements of the Contract Documents. The Contract Documents, Specifications, and authorized revisions thereto, shall remain the only determinants of contract requirements.

11. Upon completion of the drawings and any revisions they shall be dated and certified by Contractor as having been fully coordinated. The work shown upon the completed drawings shall then be considered ready for construction.
12. Electrical work shall not begin until the drawings are certified and reviewed by the Architect/Engineer.
13. Drawings shall be made in accordance with a schedule prepared by the Contractor and arranged to coincide with actual construction in a manner to allow the construction to proceed without delay.
14. If, in the opinion of the Architect/Engineer, the drawings are in acceptable condition after all revisions, they may be submitted as the project “As-Built” drawings.
15. Provide “as-built” drawings.

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 ALTERNATES

A. Accepted alternates, if any, may affect portions of the Base Bid Work.

B. Acceptance of alternates shall include provisions necessary to alter, adjust or otherwise modify work affected by the alteration.

C. Shop drawings shall include alternate work and shall reflect changes necessitated to other work.

1.14 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.

1.15 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.

1.16 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.

C. Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of Architect/Engineer before proceeding.

1.17 CONTRACTOR'S RESPONSIBILITY TO VERIFY EQUIPMENT DIMENSIONS

A. The drawings, schedules and specifications have been prepared using one manufacturer for each piece of equipment as the basis for dimensional design. If the Contractor purchases equipment listed as a specified Acceptable Manufacturer but is not the scheduled manufacturer used for the base design, the Contractor shall be responsible for checking all the dimensions of the equipment to verify that it will fit in the space shown on the Drawings. Minor deviations in dimensions will be permitted, provided the ratings meet what was shown on the drawings and equipment will physically fit into the space allocated with suitable access around equipment for operation and maintenance on the equipment.

B. Contractor and/or manufacturer shall verify that the capacity and duty specified meets the characteristics of the equipment he submits for review.

C. If equipment is submitted for review and does not meet the physical size or arrangement of what was scheduled and specified, Contractor shall pay for all alternations required to accommodate such equipment at no additional cost to the Owner. Contractor shall also pay all costs for additional work required by other Contractors, Owner, Architect or Engineer to make changes which would allow the equipment to fit in the space.

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.

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.

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.

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 EXCAVATING AND BACKFILLING

A. Excavating, bracing and shoring, testing disposition of excess, excavated material, provision of borrow, and placing of backfill shall be in accordance with Division 33 Utilities Excavating and Backfilling.

3.10 TEMPORARY UTILITIES AND HEAT

A. Contractor's attention is directed to Division 01, which sets forth respective responsibilities of all concerned with furnishings temporary water, electricity and heat for use during construction of all Project.

3.11 EXECUTION, CORRELATION AND INTENT OF DOCUMENTS

A. In the event that conflicts, if any, cannot be settled promptly and amicably between the affected trades, with work proceeding in a workmanlike manner, then the Architect/Engineer shall decide which work is to be relocated and his judgment shall be final and binding on this Contractor.

3.12 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.

3.13 ACCESS PANELS

A. Provide access panels as required. The access panels shall comply with Division 8.

3.14 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 of 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.

3.15 MOUNTING HEIGHTS

A. Mounting heights of electrical items shall be as listed below, unless otherwise specified, or by the Architect/Engineer's field instructions. Dimensions are above finished floor, unless otherwise indicated. In areas where codes require different mounting heights, as in hazardous areas, comply with code requirements.

1.	General Receptacles	- 18" to C.L.
2.	Outdoor Receptacles	- 24" to C.L.
3.	General Tele and Data Outlets	- 18" to C.L.
4.	General Toggle Switches	- 46" to C.L.
5.	Fire Alarm Pull Stations	- 46" to C.L.
6.	Security and Intercom Call Stations	- 46" to C.L.
7.	Clock and Paging Speaker Outlets	- 84" to C.L.
8.	Fire Alarm AudioVisual Devices	- 82" to C.L.
9.	Corridor Wall Sconces ($\geq$4" deep)	- 66" to C.L.
10.	Exit Signs	- 90" to C.L.
11.	Volume Controls	46" to C.L.
12.	T.V. Outlets	82" to C.L.
12.	Individual Disconnects and Starters	- 60" to C.L.
13.	Grouped Disconnects and Starters	$\geq$ 12" to C.L. $\leq$ 72" to C.L.
14.	Panelboard Overcurrent Devices	$\geq$ 12" to C.L. $\leq$ 72" to C.L.
15.	Grouped Utility Revenue Meters	$\geq$ 30" to C.L. $\leq$ 66" to C.L.

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, liquidtight flexiblemetal 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.

1.8 COORDINATION

A. Coordinate under provisions of the General Requirement Specification Sections and Section 260500.

B. Design Requirements: Conduit Size per local electrical code.

C. Field Measurements: Verify that field measurements are as shown on Drawings.

D. Field Locations: Verify routing and termination locations of conduit prior to rough-in.

E. Where conduit routing is shown on Drawings, it is in approximate locations unless dimensioned. Include conduit lengths within 10 ft of length where shown.

F. 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. Protect PVC conduit from sunlight.

D. Conduit that shows corrosion within the guarantee period shall be replaced.

PART 2 PRODUCTS

2.1 CONDUIT SCHEDULE

A. Conduit Location	From Ø V up thru 50V	Above 50V up thru 250V	Above 250V up thru 600V
Above an Accessible Ceiling	≤ 2 1/2"EMT ≥ 3" IMC	≤ 2 1/2" EMT ≥ 3" IMC	≤ 2 1/2" EMT ≥ 3" IMC
Concealed in Walls	≤ 2 1/2"EMT ≥ 3" IMC	≤ 2 1/2"EMT ≥ 3" IMC	≤ 2 1/2"EMT ≥ 3" IMC
Exposed Interior	≤ 2 1/2"EMT ≥ 3" IMC	≤ 2 1/2" EMT ≥ 3" IMC	≤ 2 1/2" EMT ≥ 3" IMC
Below Slab	IMC/PVC	IMC/PVC	IMC/PVC
Hazardous Areas	IMC	IMC	HWG
Exposed Exterior	HWG	HWG	HWG
Below Grade	HWG/PVC	HWG/PVC	HWG/PVC
Corrosive Environments		HWG – PVC Coated	HWG – PVC 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.

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.

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. Pumps
   2. Boilers
   3. Chillers
   4. Air Supply Units
   5. Condensing Units

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

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

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.

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.

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. Installation of conduit in concrete structure shall conform to the requirements of ACI 318.

K. Sizes and spacing of conduits run in concrete shall be reviewed by the Architect/Engineer. Conduit shall not be reactive with the concrete. Conduit shall not cross-over one another.

L. Conduit embedded in concrete structure shall have a minimum cover of 1 inch to parallel concrete surface, or as otherwise specified. Parallel conduit runs within concrete shall have not less than 4 inches clear space between conduits, or spacing equal to 2 outside diameters, whichever is greater.

M. Conduit embedded in concrete shall be located by the trades concerned, between the bottom and top reinforcement. Conduit parallel to reinforcing steel shall not be supported by or tied directly to the steel. It shall be supported on bar chairs or support bars provided solely for that purpose.

N. 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.

O. 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 swaying.

P. Screws for exposed work shall be stainless steel.

Q. Cadmium plated steel screws may be used for interior unexposed dry locations only.

R. 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.

S. All underground site work conduit shall be minimum 36” below finished grade or below frost line whichever is deepest. Unless noted otherwise, underground conduits shall be PVC Schedule 40. Galvanized rigid steel conduits will be used under concrete areas and thru footing, foundation, etc.

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 16112

SURFACE RACEWAYS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. The General Provisions of the Contract, including Conditions of the Contract and the General Requirements, 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. Surface metal raceways.

B. Multi-outlet assemblies.

C. Wireways.

1.3 RELATED SECTIONS

A. Section 16140 - Wiring Devices: Receptacles.

1.4 REFERENCES

A. NECA (National Electrical Contractor's Association) Standard of Installation.

B. NEMA WD 6 - Wiring Device Configurations.

1.5 SUBMITTALS

A. Submit under provisions of the General Requirements and Section and 16010.

B. Product Data: Provide for surface metal raceways, multi-outlet assemblies, wireways, finishes, and accessories.

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 surface raceway and record actual circuiting arrangements in project record documents.

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.

SECTION 16112

SURFACE RACEWAYS

1.8 COORDINATION

A. Coordinate under provisions of the General Requirements and Section 16010.

B. Field Meetings: Coordinate within pre-installation meeting.

C. Field Measurements: Verify that field measurements are as shown on Drawings.

PART 2 PRODUCTS

2.1 SURFACE METAL RACEWAY

A. Manufacturers:
   1. Wiremold, Mono-Systems, Hubbell or approved equal.

B. Description: Steel channel with fitted cover, suitable for use as surface metal raceway.

C. Size: V700 (minimum)

D. Finish: Buff enamel

E. Fittings, Boxes, and Extension Rings: Furnish manufacturer's standard accessories.

2.2 MULTIOUTLET ASSEMBLY

A. Manufacturers:
   1. Wiremold Series 4000, Hubbell 4000 Series or approved equal.

B. Multioutlet Assembly: Steel channel with fitted cover with pre-wired receptacles, suitable for use as multioutlet assembly.

C. Size: As required.

D. Receptacles: NEMA WD 6, type 5-20R, single receptacle.

E. Receptacle Spacing: 30” O.C. unless otherwise indicated on drawings.

F. Receptacle Color: Ivory or orange as indicated on drawings.

G. Finish: Buff enamel.

H. Fittings: Furnish manufacturer's standard couplings, elbows, outlet and device boxes, and connectors.

2.3 WIREWAY

A. Manufacturers:
   1. Wiremold, or equal

B. Description: General purpose type wireway.

C. Knockouts: Manufacturer's standard.

D. Size: As required to accommodate number of wires.

E. Cover: Screw cover.

F. Connector: Flanged.

G. Fittings: Lay-in type with removable top, bottom, and side; captive screws.

H. Finish: Rust inhibiting primer coating with gray enamel finish.

PART 3 EXECUTION

3.1 INSTALLATION

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

B. Use flat-head screws, clips, and straps to fasten raceway channel to surfaces. Mount plumb and level.

C. Use suitable insulating bushings and inserts at connections to outlets and corner fittings.

D. Wireway Supports: Provide steel channel.

E. Close ends of wireway and unused conduit openings.

F. Ground and bond raceway and wireway.

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.

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 >45°C ambient
Exposed Exterior	THHN/THWN	XHHW damp locations 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.

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 insure 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.

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.

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	Powered from TVSS Panel
120/208 Volts:	120/208 Volts:
Phase A – Black	Phase A - Purple
Phase B – Red	Phase B - Pink
Phase C – Blue	Phase C - Tan
Neutral – White	Neutral – White with Gray Stripe
Ground – Green	Ground – Green with Orange Stripe
277/480 Volts:	
Phase A – Brown	
Phase B – Orange	
Phase C – Yellow	
Neutral – Gray	
Ground – Green	

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 120 V	2 Wire 277 V	1 Phase 208V	1 Phase 480 V	3 Phase 208 V	3 Phase 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. 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 and floor boxes.

C. Project Record Documents: Record actual locations and mounting heights of outlet boxes, floor boxes, junction boxes, and pull boxes.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this Section with minimum three years experience.

SECTION 16130

BOXES

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.

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

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 feralloy. Provide gasketed cover and threaded hubs.

D. Wall Plates for Finished Areas: As specified in Section 16140.

2.2 FIRE RATED POKE THROUGH DEVICES

A. Manufacturers
   1. Hubbell or approved equal.

B. Description: Must be flush with floor and utilize a 4" core. Must meet a 4-hour fire rating and must meet or exceed UL514A Scrub Water Requirements. Provide IG receptacle and IG wiring where poke-through is used for an IG outlet.

C. Poke Through Devices shall be required to have at least two 1"EMT trade size conduit stems to feed power, communication and audio visual applications.

D. Hubbell part numbers or approved equal:
   1. SIPTFIT
   2. S1CFCXXX (CARPET FLANGE)
   3. S1TFCXXX (TILE FLANGE)
   4. Appropriate device subplate part number SISPXXX

2.3 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. In-Ground Cast Metal Box: NEMA 250, Type 6, flanged, recessed cover box for flush mounting:
   1. Material: Galvanized cast iron.
   2. Cover: Nonskid cover with neoprene gasket and stainless steel cover screws.

E. 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. Do not install flush mounting box back-to-back in walls; provide minimum 6 inches separation. Provide minimum 24 inches separation in acoustic rated walls.

S. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.

T. Use stamped steel bridges to fasten flush mounting outlet box between studs.

U. Install flush mounting box without damaging wall insulation or reducing its effectiveness.

V. Use adjustable steel channel fasteners for hung ceiling outlet box.

W. Do not fasten boxes to ceiling support wires.

X. Support boxes independently of conduit.

Y. Use gang box where more than one device is mounted together. Do not use sectional box.

Z. Use gang box with plaster ring for single device outlets.

AA. Use cast outlet box in exterior locations and wet locations.

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 floor box flush with finish flooring material.

C. Adjust flush-mounting outlets to make front flush with finished wall material.

D. 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 16140

WIRING DEVICES

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 switches.

B. Receptacles.

C. Device plates and decorative box covers

1.3 RELATED SECTIONS

A. Section 16130 - Boxes.

1.4 REFERENCES

A. NECA - (National Electrical Contractors Association) Standard of Installation.

B. NEMA WD 1 - General Requirements for Wiring Devices.

C. NEMA WD 6 - Wiring Device Dimensional Requirements.

D. NFPA 70 – National Electrical Code.

1.5 SUBMITTALS

A. Submit under provisions of the General Requirements and Section 16010.

B. Product Data: Provide for wiring devices, device plates, and fittings. Include manufacturer's catalog information showing dimensions, colors, and configurations.

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 devices and record actual circuiting arrangements 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, 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 Requirements and Section 16010.

PART 2 PRODUCTS

2.1 WALL SWITCHES

A. Manufacturers:
   1. Pass and Seymour.
   2. No Substitutions.

B. Specification Grade Toggle Style: 20A., 120-277V., back and side wired.

	Pass and Seymour
1P	CS20AC1
2P	CSB20AC2
3W	CSB20AC3
4W	CSB20AC4
1P-K	PS20AC1-L
1P-PL	PS20AC1-RPL
3W-PL	PS20AC3-RPL

C. Legend: 1P=single pole, 2P=double pole, 3W=three way, 4W=four way, K=keyed, PL=pilot light, MC=momentary contact.

D. Color: Ivory or red, unless otherwise specified. Final color selection shall be by the Architect.

2.2 WALL RECEPTACLES

A. Manufacturers:
   1. Pass and Seymour.
   2. No Substitutions.

B. Description: Receptacles shall be constructed to include a grounding pole from which a wired connection to ground shall be provided.

C. Specification Grade Traditional Style: 20A., 120V., NEMA 5-20R, back and side wired.

	Pass and Seymour
S	5361
D	
C	S3733-SS
GFI	2095
IG	IG5362-OSP
HG-S	8301
HG-D	8300
HG-GFI	2095-HG
HG-IGI	IG8300
TR	TR63

D. Range Outlet: 50A., 125/250V., NEMA 10-50R.

	Pass and Seymour
Single	3890

E. Combination Outlet: 15A., 125/250V., NEMA 5-15R & 6-15R.

	Pass and Seymour
Duplex	5290

F. Special NEMA configurations shall be specification grade, unless otherwise specified.

G. Color: Ivory or red, unless otherwise specified. Emergency devices: Orange, unless otherwise specified. Final color selection shall be by the Architect.

H. Legend: S=single, D=duplex, C=clock hanger, GFI=ground fault, IG=isolated ground, TR=tamper resistant, HG = Hospital Grade.

2.3 WALL PLATES

A. Manufacture: Match switch and receptacle manufacture. Provide matching cover plates for switches and receptacles within same area, unless otherwise specified.

B. Standard Cover Plate: Brushed stainless steel.

C. Weatherproof Cover Plate: Gasketed corrosion resistant cast metal with hinged and gasketed device cover.

2.4 FIRE RATED POKE THROUGH DEVICES

A. Manufacturers
   1. Hubbell or approved equal.

B. Description: Must be flush with floor and utilize a 4” core. Must meet a 4-hour fire rating and must meet or exceed UL514A Scrub Water Requirements. Provide IG receptacle and IG wiring where poke-through is used for an IG outlet.

C. Poke Through Devices shall be required to have at least two 1”EMT trade size conduit stems to feed power, communication and audio visual applications.

D. Hubbell part numbers or approved equal:
   1. SIPTFIT
   2. S1CFCXXX (CARPET FLANGE)
   3. S1TFCXXX (TILE FLANGE)
   4. Appropriate device subplate part number SISPXXX

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that device types, traditional or designer, finishes, and colors are in conformance with the Architects direction.

B. Verify that outlet boxes are installed at proper height.

C. Verify that outlet boxes for light switches are on strike side of door.

D. Verify that wall openings are neatly cut and will be completely covered by wall plates.

E. Verify that floor boxes are adjusted properly.

F. Verify that outlet boxes for wall dimmers are adequately sized to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.

G. Verify that exterior, wet locations, and other locations required by authority having jurisdiction, are provided with GFI type devices.

H. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.2 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean debris from outlet boxes.

3.3 INSTALLATION

A. Install in accordance with NECA "Standard of Installation."

B. Install fittings in accordance with manufacturers instructions.

C. Install devices plumb and level.

D. Install switches with OFF position down.

E. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.

F. Do not share neutral conductor on load side of dimmers.

G. Install receptacles with grounding pole on right side.

H. Connect wiring device grounding terminal to separate green branch circuit equipment grounding conductor.

I. Install decorative plates on switch, receptacle, and blank outlets in finished areas.

J. Connect wiring devices by wrapping conductor around screw terminal.

K. Use jumbo size plates for outlets installed in masonry walls.

L. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.

M. Install protective rings on active flush cover service fittings.

3.4 INTERFACE WITH OTHER PRODUCTS

A. Coordinate locations of outlet boxes provided under Section 16130 to obtain mounting heights as specified.

B. Coordinate the installation of wiring devices with furniture systems.

3.5 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of the General Requirements.

B. Inspect each wiring device for defects.

C. Operate each wall switch with circuit energized and verify proper operation.

D. Verify that each receptacle device is energized.

E. Test each receptacle device for proper polarity.

F. Test each GFI receptacle device for proper operation.

3.6 ADJUSTING

A. Adjust installed work under the provisions of the General Requirements.

B. Adjust devices and wall plates to be flush and level.

3.7 CLEANING

A. Clean installed work under the provisions of the General Requirements.

B. Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION

SECTION 16150

OCCUPANCY SENSORS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. The General Provisions of the Contract, including Conditions of the Contract and the General Requirement of 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. Occupancy sensors.

B. Power pack.

1.3 RELATED SECTIONS

A. Section 16130 - Boxes.

1.4 REFERENCES

A. Underwriters Laboratories Inc. – UL508, UL916.

B. ISO 9001 Quality Standard

C. NOM Certification Mark

D. American National Standards Institute

E. Institute of Electrical and Electronic Engineers

1.5 SUBMITTALS

A. Submit manufacturer's standard catalog data giving all application, wiring, and installation information on basic components. Provide test data and/or samples as required to demonstrate conformance with PART 2 of this specification.

B. Submit a lighting plan clearly marked by manufacturer showing proper product, location and orientation of each sensor

C. Submit any interconnection diagrams per major subsystem showing proper wiring.

D. Shall include a load schedule which indicates the actual connected load and load type per circuit, circuits and their respective control zones, circuits that are on emergency (if applicable), and the capacity, phase, and corresponding circuit numbers (per the electrical drawings).

E. Shall include all exceptions taken to the Specification.

1.6 APPROVALS

A. Prior approval is required for alternate proposals. For pre-approval, provide all the information listed under Submittals a minimum of ten (10) working days prior to initial bid date.

B. Complete Catalog data, specifications, and technical information on alternate equipment must be furnished to the Architect and Owner at least ten business days in advance of the bid date.

1.7 QUALITY ASSURANCE

A. Manufacturer shall have a minimum of 10 years continuous experience with occupancy sensors.

B. Occupancy sensors shall be UL, CUL or NOM listed (where appropriate). Manufacturer shall provide evidence of compliance on request.

C. Manufacturer shall have their quality system registered to the ISO 9001 Quality Standard, including in-house engineering for all product design activities. Due to the exclusion of the Design Control element, ISO 9002 Registration is not acceptable.

D. All devices shall be covered by a minimum one-year warranty.

1.8 PROJECT/SITE CONDITIONS

A. Lighting controls shall operate in an ambient temperature range of 0°C (32°F) to 40°C (104°F) and less than 90% non-condensing relative humidity without the requirement of a regularly scheduled maintenance program.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Leviton.

B. Or equal.

2.2 CEILING MOUNTED OCCUPANCY SENSOR

A. Leviton OSC10 – MOW, or equal.

B. Sensors and related relays shall be compatible with the specific lighting types controlled.

C. All sensors shall be of the same manufacturer, mixing brands of sensors is not acceptable.

D. All sensors and related equipment shall have a five year warranty.

E. All sensors and control modules shall be listed by Underwriters Laboratories.

F. Sensor shall incorporate ultrasonic and infrared technologies in a single unit for corridor or rooms. For washroom and stair only ultrasonic type sensor shall be used.

G. Sensor shall be Class 2, low voltage; capable of mounting in the ceiling for maximum coverage.

H. Sensor shall use internal microprocessor for motion signal analysis and automatic self-adjustment.

I. Sensor shall have automatic self-adjustment algorithm which adjusts timer and sensitivity settings to maximize performance and minimize energy usage.

J. Sensor shall have manual time-out adjustment from 8 minutes to 32 minutes and automatic time-out from 8 minutes to 100 minutes.

K. Sensor shall have test time-out setting of 8 seconds, with automatic return to 8 minutes after one hour if sensor is left in test mode.

L. Sensor's microprocessor shall automatically reduce either PIR or ultrasonic sensitivity in response to false on condition.

M. Sensor microprocessor will automatically monitor PIR background threshold signal level and makes corresponding sensitivity adjustments automatically.

N. Sensor microprocessor algorithm shall incorporate automatic adaptation to continuous airflow.

O. Infrared lens shall have 360 degree field of view. Two types of lens shall be availabe, standard and extra dense.

P. Sensor shall have a variety of mask inserts for PIR coverage rejection to prevent false tripping.

Q. Sensor shall have a rugged plastic housing, white in color.

R. Transducers shall be protected from tampering.

S. Sensor shall have manual adjustments for timer and sensitivities and override switches to force manual adjustment mode.

T. Sensor shall have adjustable sensitivity from 0% to 100% for both ultrasonic and infrared.

U. Controls shall be behind cover to resist tampering. All adjustments shall be accessible from the front of the sensor.

V. Sensor shall be available with a photocell adjustment from 20 to 3,000 Lux.

W. Sensor shall provide internal operating status and settings confirmation via LED motion lamp indicator.

X. Sensor shall have two (if 180 degree) or three (if 360 degree) real time LED motion indicators visible from the front of the unit: Red = Infrared; green = ultrasonic.

Y. Sensor shall be available with a set of form 1C isolated dry relay contacts for interfacing sensor to auxiliary systems. Relay shall provide common, normally open and normally closed connections.

2.3 WALL MOUNTED OCCUPANCY SENSOR

A. Leviton ODS10 – IDI, or equal.

B. Sensor shall utilize active ultrasonics to detect motion.

C. Sensor shall have two ultrasonic transmitters and one receiver, each 18mm in diameter, and shall operate at 32.768kHz.

D. Sensor shall incorporate an inrush current limiter circuit to protect the relay contacts.

E. Sensor shall utilize a dry relay contact for control of the lighting load.

F. Sensor shall have a time out adjustment from 8 seconds to 32 minutes. Timer shall be linear and controlled by a timer chip.

G. Sensor shall have automatic sensitivity adjustment and be microprocessor controlled.

H. Sensor shall have automatic gain setback to reduce the sensitivity after the sensor has turned off the lighting to prevent false tripping.

I. Sensor shall have transmitter control adjustments to prevent false tripping from hallway traffic.

J. Sensor shall have a 180 degree field of view, coverage up to 800 square feet, and shall detect six inches of hand movement towards the sensor at a distance of 22 feet. Sensor shall detect body motion towards the sensor at a distance of 32 feet.

K. Sensor shall operate at 120VAC and 277VAC.

L. Sensor shall have automatic on/off controls and also a manual override switch to disconnect power to the lighting load.

M. Sensor shall have a real time motion indicator on the front of the unit.

N. Sensor shall mount to a single or double gang switch box.

O. Sensor shall have a high impact injection molded housing.

P. Sensor shall be available with a second isolated dry relay for control of a second circuit. Relay shall be rated for 600 watts at 120VAC and 1400 watts at 277VAC. Applications shall include restroom fans.

Q. Sensor for restroom application shall be tamper resistant, incorporation a recessed automatic to off switch.

2.4 OCCUPANCY SENSOR POWER/CONTROL PACK

A. LEVITON OSP20 – DO, or equal.

B. Control module shall consist of a DC power supply and a dry contact relay for switching a lighting load.

C. Control module shall be available in versions to accept 120, 230, 277 and 347VAC line voltages.

D. Output shall be 24VDC nominal, and shall be inherently safe, low voltage, limited power output (Class 2).

E. Output shall supply 100mA current, in addition to current consumed internally to operate internal relay.

F. Relay shall utilize normally open, silver alloy dry contacts, and shall be rated for a 20A ballast load at 120V, 230V, 277V and 347V.

G. Relay function shall not require more than 5 mA control current to operate.

H. Control module shall have line voltage wiring, consisting of input voltage and relay contact connections, exiting from one end, and low voltage DC connections, consisting of ground, power, and control wires, exiting from the other end.

I. Control module shall be sized to fit inside a standard 4" X 4" junction box.

J. Control module shall be equipped with a ½ " EMT threaded male fitting on the line voltage end, such that it may be mounted to the outside of a junction box with the line voltage wiring internal to the box and the low voltage wiring external.

K. Slave module shall be available for switching additional circuits. Slave module has same construction and specifications as control module except without power supply function.

PART 3 EXECUTION

3.1 INSTALLATION

A. It shall be the contractor's responsibility to locate and aim sensory in the correct location required for a complete and proper volumetric coverage within the range of coverage(s) of controlled areas per the manufacturer's recommendations. Rooms shall have (90) to one hundred (100) percent coverage to completely cover the controlled area to accommodate all occupancy habits of single or multiple occupants at any location within the room(s). The locations and quantities of sensors shown on the drawings are diagrammatic and indicate only the rooms which are to be provided with sensors. The contractor shall provide additional sensors if required to properly and completely cover the respective room.

B. Contractor shall furnish all equipment, labor, system setup and other services necessary for the proper installation of the products/system as indicated on the drawings and specified herein.

C. Devices shall be installed utilizing manufacturer's recommended application, wiring and installation instructions.

D. Proper judgment shall be exercised in executing the installation so as to ensure the best possible installation in the available space and to overcome local difficulties due to space limitation or interference of structural components. The contractor shall also provide at the owner's facility, the training necessary to familiarize the owner's personnel with the operation, use, adjustment, and problem solving diagnosis of the occupancy sensing devices and systems.

3.2 FIELD QUALITY CONTROL

A. Locate sensor such that it provides the best coverage.

B. Adjust settings per manufacturer's recommendations.

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.

SECTION 16170

GROUNDING AND BONDING

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.

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 soderless 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 moister 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.

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.

SECTION 16180

EQUIPMENT WIRING

PART 2 PRODUCTS

Not Used.

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.

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 DESIGNATION TAG	LOAD			BREAKER SIZE	FUSE SIZE	CONDUIT AND WIRE SIZE
	VOLTS	PHASE	H.P.			
AIR SUPPLY UNIT						
ROOF TOP UNIT						
AIR COOLED CONDENSING UNIT						
CHILLER						
HOT WATER BOILER						
HOT WATER PUMP						
BOILER CIRCULATION PUMP						
CHILLED WATER PUMP						
COIL BOOSTER PUMP						
SINGLE PHASE EXHAUST FANS						
THREE PHASE EXHAUST FANS						
FAN POWERED BOX						
CABINET UNIT HEATER						
SUSPENDED UNIT HEATER						
UNIT VENTILATOR						
FIRE PUMP						
JOCKEY PUMP						
DOMESTIC WATER PUMP						
KITCHEN MAKE-UP 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 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. Conduit and equipment supports.

B. Anchors and fasteners.

C. Vibration Isolation.

D. Equipment Bases.

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.

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 with baked enamel finish.

2.3 VIBRATION ISOLATION

A. Suspended vibration producing equipment shall have spring elements in the hanger rods or isolation pads under the equipment.

2.4 EQUIPMENT BASES

A. Provide 4" high concrete pads for floor mounted electrical equipment. The edge of the concrete pads shall have 1/4" chamfer. The pad dimensions shall be at least one inch greater on each side than the floor dimensions of the electrical equipment.

B. Concrete pads shall include steel reinforcing and necessary bolts, anchors, etc. Where concrete pad is set directly on concrete floor, dowels in floor to tie base to floor shall be provided.

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. Support Recessed Lighting Fixtures:
   1. From ceiling suspension members, where weight is less than 60 pounds.
   2. Directly from structural slab, deck, or framing member, where weight is 60 pounds or more.

O. 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.

P. 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.

Q. Exposed parts of hangers and supports shall be painted with one coat of rust-inhibiting primer.

R. Equipment shall not be held in place by its own dead weight. Provide base anchor fasteners in each case.

S. Vertical raceway shall be supported with spring type hangers.

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.

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.

SECTION 16441

ENCLOSED SWITCHES

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.

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 16470

PANELBOARDS

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. Power panelboards.

B. Branch circuit panelboards.

1.3 RELATED SECTIONS

A. Section 16170 - Grounding and Bonding.

B. Section 16195 - Electrical Identification.

C. Section 16475 - Transient Voltage Surge Suppression.

1.4 DEFINITIONS

A. Lighting and Appliance Panelboard: A panelboard with thermal magnetic circuit breaker branches, bolt-on type only, designed for heavy commercial use, operating at 600 V and below, 3-phase versions, equipped as either surface or flush mounting. Panelboard shall have more than 10% of its overcurrent devices rated 30 amperes or less for which neutral connections are provided.

B. Overcurrent Protective Devices – a circuit breaker pole or single fuse. Example: a 2-pole device is considered 2 protective devices.

1.5 REFERENCES

A. ANSI 61.

B. ANSI/NEMA KS 1, Enclosed and Miscellaneous Distribution Equipment Switches (600 volts).

C. ANSI/NEMA PB 1, Panelboards.

D. ANSI/NFPA 70, National Electrical Code.

E. ASTM – American Society of Testing Materials.

F. CSA C22.2 No. 29, Panelboards and Enclosed Panelboards.

G. CSA C22.2 No. 5.1, Molded Case Circuit Breakers.

H. Federal Specification W-C-375, Rev. B, Amend. 1, Circuit Breakers, Molded Case; Branch Circuit and Service.

I. Federal Specification W-P 115, Rev. C, Panel, Power Distribution.

J. NEMA AB1, Molded Case Circuit Breakers and Molded Case Switches.

K. NEMA PB 1.1, General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.

L. UL 489, Molded-Case Circuit Breakers and Circuit-Breaker Enclosures.

M. UL 50, Enclosures for Electrical Equipment.

N. UL 67, Panelboards.

O. UL 943, Ground-Fault Circuit-Interrupters.

1.6 SUBMITTALS

A. Submit under provisions of the General Requirements and Section 16010.

B. Product Data: Provide for fusible switches and circuit breakers.

C. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.

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 panelboards and record actual circuiting arrangements in project record documents.

F. Maintenance Data: Include spare parts listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.7 QUALIFICATIONS

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

1.8 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70, unless otherwise specified.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

1.9 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 panelboards prior to rough-in.

1.10 DELIVERY, STORAGE, PROTECTION, AND HANDLING

A. Deliver, store, protect and handle products in accordance with recommended practices in manufacturer's Installation and Maintenance Manuals.

B. Deliver each lighting panelboard in individual shipping cases for ease of handling. Each panelboard shall be wrapped for protection.

C. Inspect and report concealed damage to carrier within specified time.

D. Store in a clean, dry space. Maintain factory protective or cover with heavy canvas or plastic to keep out dirt, water, construction debris, and traffic. (Heat enclosures to prevent condensation).

E. Handle in accordance with NEMA and manufacturer's written instructions to avoid damaging equipment, installed devices and finish.

1.11 OPERATION AND MAINTENANCE DATA

A. Manufacturer shall provide copies of installation, operation and maintenance procedures to Owner in accordance with general requirements of the General Requirements and Division 16.

B. Submit operation and maintenance data based on factory and field testing, operation and maintenance of specified product.

1.12 FIELD MEASUREMENTS

A. Make all necessary field measurements to verify that equipment shall fit in allocated space in full compliance with minimum required clearances specified in National Electrical Code.

1.13 EXTRA MATERIALS

A. Submit extra materials under provisions of the General Requirements and Section 16010.

B. Furnish five of each panelboard key.

PART 2 PRODUCTS

2.1 PANELBOARDS

A. Phase sequence and balance.
   1. Phase sequence: A-B-C, left to right.
   2. Load balance: Distribute loads for maximum 10 percent difference.

B. Each panelboard, and associated fused switches and circuit breakers, shall be of the same manufacturer.

C. Each panelboard lock shall be operable by the same key.

D. Panelboard Manufacturers: ITE/Siemens products have been used as the basis for design. The following other manufacturers' products of equivalent quality, dimensions and operating features may be acceptable, at the Engineer's discretion, if they comply with all requirements specified or indicated in these Contract documents.
   1. ITE/Siemens
   2. No Substitutions.

E. Fused Switch and Circuit Breaker Manufacturers: Must match existing equipment.
   1. ITE/Siemens
   2. Square D.
   3. Or equal.

2.2 BRANCH CIRCUIT PANELBOARDS

A. Equipment:
   1. Furnish ITE/Siemens Lighting Panelboards or equal as indicated in drawings.
   2. Minimum Short Circuit Rating: Fully rated, 22,000 amperes rms symmetrical for 240 volt panelboards; 22,000 amperes rms symmetrical for 480 volt panelboards, or as indicated, or as required to be greater than the available short circuit current.

B. Enclosure
   1. Boxes shall be a nominal 20 inches wide and 6 inches deep with wire bending space per local electrical code.
   2. Fronts shall be reinforced steel with concealed hinges and concealed trim adjusting screws. Trim clamps are unacceptable.
   3. All door locks shall be corrosion proof Valox (or equal) with retractable latches. All door locks shall be keyed for a single key.
   4. Clean Lexan (or equal) directory card holders shall be permanently mounted on front door.
   5. All panelboard series ratings shall be prominently displayed on dead front shield.
   6. Interiors shall permit top or bottom incoming cables.
   7. Boxes shall be corrosion resistant, zinc finish galvanized.
   8. Fronts shall be powder finish paitned ANSI G1 gray.

C. Bus bars
   1. Bus bars shall be copper and phase sequenced, fully insulated and supported by high impact Noryl (or equal) interior base assemblies.
   2. Panelboard Bus: 1000 amp per sq. in. Copper, ampere and voltage ratings as indicated. Provide copper ground bus in each panelboard. Provide insulated ground bus where identified. Provide 200% rated neutral where identified.
   3. Bus bars shall be mechanically supported by zinc finished galvanneal steel frames to prevent vibration and damage from short circuits.
   4. Terminations shall be UL tested and listed and suitable for UL copper wire.
   5. Provide [1] continuous bus bar per phase. Each bus bar shall have sequentially phased branch circuit connectors for bolt-on branch circuit breakers. Bus bars shall be rated as indicated in drawings.
   6. Split solid neural bus shall be plated and located in main compartment for all incoming neutral cables to be same length.
   7. Lugs shall be rated for 75 degree C terminations.
   8. Main lugs for copper conductors shall be bolted lugs.
   9. Lug bodies shall bolt in place.

D. Circuit Breakers
   1. Molded case circuit breakers shall be bolt-on type.
   2. All circuit breakers shall have thermal and magnetic type elements in each pole.
   3. Two and three pole breakers shall have internal common trip crossbars for simultaneous tripping of each pole.
   4. Circuit breakers shall not be restricted to any mounting location due to physical size.
   5. All branch breakers 15 to 100 amperes shall be able to be mounted in any panel position for twin or double mounting without space penalty. Sum of ratings for 2 such twin mounted devices shall not exceed 180 amperes.
   6. Main and sub-feed circuit breakers may be vertically or horizontally mounted.
   7. Branch breaker panelboard connections shall be copper to copper.
   8. All panelboard terminations shall be rated as indicated in drawings.
   9. All breakers shall have an over center mechanism and be quick make and quick break.
   10. All breakers shall have handle trip indication and a trip indicator in window of circuit breaker housing.
   11. Breaker handle and faceplate shall indicated rated ampacity.
   12. Circuit breaker escutcheon shall have standard ON/OFF markings.
   13. Main breakers shall be UL listed for use with: Shunt, Under Voltage, and Ground Fault Shunt Trips; Auxiliary and Alarm Switches; and Mechanical Lug Kits. Provide these accessories as indicated on drawings.
   14. Where indicated on drawings, the branch circuit breakers shall be SWD type, type HACR for air-conditioning equipment, ground fault circuit interrupter type, arc fault circuit interrupter type and shall have shunt trip accessories.

E. Contactors
   1. Contactors shall be mechanically held GE type CR160MC, or ASCO Type 920 or approved equal.

2.3 ACCESSORIES

A. Contactor control relays.

B. Tork (or equal) time clocks.

C. Locking devices for breakers and/or operating handles.

D. Furnish nameplates for each device as indicated in drawings.

E. Provide Transient Voltage Surge Suppression system as specified.

PART 3 EXECUTION

3.1 PREPARATION

A. Provide concrete equipment base for floor mounted equipment installation.

B. Verify field measurements.

C. Verify that required utilities are available, in proper location and ready for use.

D. Beginning of installation means installer accepts conditions.

3.2 INSTALLATION

A. Install panelboards in accordance with NEMA and NECA standards and as instructed by manufacturer.

B. Install panelboards plumb. Install recessed panelboards flush with wall finishes.

C. Support free-standing panelboards with structural channel framework.

D. Height: 6 feet to top of panelboard; install panelboards taller than 6 feet with lowest operating handle not lower than 18" above finished floor per NEC.

E. Provide filler plates for unused spaces in panelboards.

F. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads.

G. Provide engraved plastic nameplates under the provisions of Section 16195.

H. Provide 3-3/4" spare conduits out of each recessed panelboard to an accessible location above ceiling. Identify each as SPARE.

I. Ground and bond panelboard enclosure according to Section 16170.

J. Inspect installed panelboards for anchoring, alignment, grounding and physical damage.

K. Check tightness of all accessible mechanical and electrical connections with calibrated torque wrench. Minimum acceptable values are specified in manufacturer's instructions.

L. Test each key interlock system for proper functioning.

3.3 ADJUSTING

A. Measure steady state load currents at each panelboard feeder; rearrange circuits in the panelboard to balance the phase loads to within 10 percent of each other. Maintain proper phasing for multi-wire branch circuits.

B. Adjust all circuit breakers, access doors, operating handles for free mechanical and/or electrical operation as described in manufacturer's instructions.

3.4 CLEANING

A. Clean installed work under the provisions of the General Requirements.

B. Clean interior of cabinets and enclosures to remove dust, debris, and other material.

C. Clean surfaces and touch up scratched or marred surfaces to match original 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. Bussmann Fusetron FRN-R
      b. Gould Shawmut.

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

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 16481

ENCLOSED MOTOR CONTROLLERS

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. Manual motor starters.

B. Magnetic motor starters.

C. Combination magnetic motor starters.

1.3 RELATED SECTIONS

A. Section 16170 - Grounding and Bonding.

B. Section 16180 - Equipment Wiring Systems.

C. Section 16190 - Supporting Devices.

D. Section 16195 - Electrical Identification.

E. Section 16441 - Enclosed Switches.

F. Section 16477 - Fuses.

1.4 REFERENCES

A. NFPA 70 – Local Electrical Code.

B. CSA C22 No 14, Industrial Control Equipment.

C. NEMA ICS 2, Industrial Control and Systems: Controllers, Contactors and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.

D. UL 508, Industrial Control Equipment.

1.5 SUBMITTALS

A. Submit under provisions of the General Requirements and Section 16010.

B. Product Data: Provide catalog sheets showing voltage, controller size, ratings and size of switching and overcurrent protective devices, short circuit ratings, dimensions, and enclosure details.

C. Test Reports: Indicate field test and inspection procedures and test results.

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, installation, and starting of Product.

E. Project Record Documents: Record actual locations of controllers in project record documents.

F. Maintenance Data: 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 ten years documented experience.

1.7 REGULATORY REQUIREMENTS

A. Conform to requirements of local electrical codes, unless otherwise specified.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and indicated.

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 controllers prior to rough-in.

1.9 DELIVERY, STORAGE, PROTECTION, AND HANDLING

A. Deliver, store, protect, and handle products in accordance with recommended practices listed in manufacturer's Installation and Maintenance Manuals.

B. Deliver each combination starter in individual shipping cartons for ease of handling. Each starter shall be wrapped for protection.

C. Inspect and report concealed damage to carrier within specified time.

D. Store in a clean, dry space. Storage temperature shall be minus 30 to plus 65 degrees C. Maintain factory protection or cover to keep out dirt, water, construction debris, and traffic. (Heat enclosures to prevent condensation.)

E. Handle in accordance with NAED and manufacturer's written instruction to avoid damaging combination starters, installed device and finish.

1.10 OPERATION AND MAINTENANCE DATA

A. Manufacturer shall provide copies of installation, operation and maintenance procedures to Owner.

B. Submit operation and maintenance data based on factory and field testing, operation and maintenance of specified product.

SECTION 16481

ENCLOSED MOTOR CONTROLLERS

1.11 QUALITY ASSURANCE (QUALIFICATIONS)

A. Manufacturer shall be specialized in the manufacture and assembly of combination starters for 10 years.

B. Combination starters shall be listed and/or classified by Underwriters Laboratories in accordance with standards listed in Article 1.03 of this specification.

C. Manufacturer's Certificate of ISO 9000 Compliance.

D. Installer's Certificate of ISO 9000 Compliance.

PART 2 PRODUCTS

2.1 CONTROLLERS

A. Phase sequence and balance.
   1. Phase sequence: A-B-C, left to right, front to rear, top to bottom.

B. Each NEMA type controller and combination controller, shall be of the same manufacturer.

C. General operating voltage characteristics unless otherwise specified:
   1. Motors 1/2 hp and larger 460 volts, operating on 480 volt, 3 phase, 60 Hertz system.
   2. Motors 1/3 hp and smaller 115 volts, operating on 120 volt, 1 phase, 60 Hertz system.

D. Minimum 3 phase starter size: NEMA 1.

E. Manufacturers:
   1. ITE/Siemens
   2. GE
   3. No Substitutions.

2.2 MANUAL CONTROLLERS

A. Fractional Horsepower Manual Controller for motors: NEMA ICS 2, AC general-purpose Class A manually operated, full-voltage controller for fractional horsepower induction motors, with thermal overload unit, red pilot light, and toggle operator suitable for mounting in standard outlet box.

B. Manual Motor Controller: NEMA ICS 2, AC general-purpose Class A manually operated, full-voltage controller with auxiliary contacts, red pilot light, START-STOP push button switches, overload elements, and control power transformer.

C. Enclosure: NEMA ICS 6; Type 1, 12, or 3R as suitable for the location.

2.3 AUTOMATIC CONTROLLERS

A. Magnetic Motor Controllers: NEMA ICS 2, AC general-purpose Class A automatically operated, full-voltage controller with auxiliary contacts, green pilot light, ON-OFF-AUTO selector switch, overload elements, fusible lockable disconnect and control power transformer.

B. Reduced Voltage Controllers: NEMA ICS 2, AC general-purpose Class A automatically operated, closed transition reduced-voltage autotransformer type controller with 50%, 65%, and 80% tap settings, auxiliary contacts, green pilot light, ON-OFF-AUTO selector switch, overload elements, fusible lockable disconnect and control power transformer.

C. Reversing Controllers: NEMA ICS 2, AC general-purpose Class A automatically operated, full-voltage controller with auxiliary contacts, green pilot light, ON-OFF-AUTO selector switch, FORWARD-OFF-REVERSE selector switch, overload elements, fusible lockable disconnect, and control power transformer. Include electrical interlock and integral time delay transition between FORWARD and REVERSE rotation.

D. Two Speed Controllers: NEMA ICS 2, AC general-purpose Class A automatically operated, full-voltage dual single winding controller with auxiliary contacts, green pilot light, ON-OFF-AUTO selector switch, FAST-SLOW selector switch, overload elements, fusible lockable disconnect and control power transformer. Include integral time delay transition between FAST and SLOW speeds. Verify exact starter requirement with mechanical contractor.

E. Enclosure: NEMA ICS 6, Type 1 or 12 or 3R as suitable for the location.

F. Size: The starter shall be large enough to serve the motor being served.

2.4 PRODUCT FEATURES

A. Auxiliary Contacts: NEMA ICS 2, 2 normally open, 2 normally closed field convertible contacts in addition to seal-in contact.

B. Cover Mounted Pilot Devices: NEMA ICS 2, heavy duty type.

C. Pilot Device Contacts: NEMA ICS 2, Form Z, rated A150.

D. Indicating Lights: LED type.

E. Selector Switches: Rotary type, on-off-auto.

F. Overload Relays: NEMA ICS; melting alloy, one per phase, wired on the line side of the holding coil.

G. Cover Mounted Overload Relay Reset: Recessed pushbutton type.

H. Relays: NEMA ICS 2.

I. Control Power Transformers: 120 volt secondary with capacity for starter coils, relays, pilot lights, etc. Provide fused primary and secondary, and bond unfused leg of secondary to enclosure.

J. Remote start-stop stations: Include green ON pilot light.

2.5 DISCONNECTS

A. Combination Controllers: Combine motor controllers with non-fusible switch or fusible switch disconnect within common enclosure.

B. Description: Refer to section 16441.

2.6 FUSES

A. Fuse: Class RK-1, dual element, time delay.

B. Description: Refer to section 16481.

2.7 WARNING SIGNS

A. Steel and enamel, painted as follows: WARNING! THIS MOTOR HAS AN AUTOMATIC CONTROL AND MAY START AT ANY TIME

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify the actual manufacture, size, and location of each motor provided to determine final connection, control, and overcurrent protection selection.

3.2 INSTALLATION

A. Perform Work in accordance with NECA Standard of Installation.

B. Install enclosed controllers where indicated, in accordance with manufacturer's instructions.

C. Install enclosed controllers plumb. Provide supports in accordance with Section 16190.

D. Select and install fuses in motor controller fusible switches to match installed motor characteristics. Verify time-current curves for proper selection.

E. Select and install overload heater elements in motor controllers to match installed motor characteristics.

F. Provide engraved plastic nameplates under the provisions of Section 16195.

G. Provide neatly typed label inside each motor controller door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating.

H. Install warning signs at automatically controlled motors.

3.3 FIELD QUALITY CONTROL

A. Inspect and test each enclosed controller to NEMA ICS 2.

B. Clean starter enclosure to remove construction debris, dirt, shipping material.

C. Repaint scratched or marred exterior surfaces to match original finish.

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. Exit signs.

C. Lamps.

D. Luminaire accessories.

1.3 RELATED SECTIONS

A. Section 16190 - Supporting Devices.

1.4 REFERENCES

A. ANSI C78.379 - Electric Lamps - Incandescent and High-Intensity Discharge Reflector Lamps - Classification of Beam Patterns.

B. ANSI C82.1 - Ballasts for Fluorescent Lamps - Specifications.

C. ANSI C82.4 - Ballasts for High-Intensity Discharge and Low Pressure Sodium Lamps (Multiple Supply Type).

D. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

E. NFPA 70 - National Electrical Code.

F. NFPA 101 - Life Safety Code.

G. IESNA LM-80-08 IESNA - Approved Method for Measuring Lumen Maintenance of LED Light Source.

H. IESNA TM-21-2011 - Projecting Long Term Lumen Maintenance of LED Light Sources.

I. UL 1310 and 8750 - Light Emitting Diode (LED) Equipment for use in Lighting Products.

J. IEC 61347-2-13 - Particular requirements for electronic control gear for LED modules.

K. IEC-62384 - DC or AC supplied electronic control gear for LED modules - performance requirements.

L. 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 Lumuinaire 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.

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. Recessed incandescent luminaires shall have a thermal protective device within the luminaire housing.

J. Luminaire shall carry the lighting facts label, verified based on LM-85 test reports.

2.2 EXIT SIGNS

A. Furnish Products as scheduled and in compliance with applicable codes.

B. Description: Exit sign fixture.

C. Housing: Sheet steel.

D. Face: Translucent glass face with red letters on white background.

E. Letters: 6" high, with 3/4" stroke, minimum.

F. Directional Arrows: As indicated, with letters 4 1/2" high, 3/4" stroke, minimum.

G. Lamps: Light emitting diodes.

H. Electrical Connections: Conduit connection.

I. Indicators: Lamps to indicate AC-ON and RECHARGING.

2.3 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.
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.
6. Dimming quality to be defined by dimming range, freedom from perceived flicker or visible strobscopic 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 ove 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 ±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 per 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. In rush 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.
   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.
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.

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.

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 Luminaries

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. ANSIE1.20 - 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.

SECTION 16515

INTERIOR LUMINAIRES LED DIMMING DRIVERS

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).

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 Amps2 - 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.

G. Diver 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.

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 16705

CONDUIT ROUGH-IN FOR SPECIAL SYSTEMS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and the General Requirement Specification Sections, apply to 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 DESCRIPTION

A. Furnish and install Conduit Rough-In systems including all work incidental thereto as shown on Drawings and specified.

B. This section is applicable to data/voice, and security systems.

C. This section covers steel Tele-power Pole Systems used to extend branch circuit wiring and/or data network, voice, and other communication cabling to points of use as shown on the building plans. The Tele-Power Pole System shall consist of the Tele-Power Pole Multioutlet Assembly, Appropriate fittings and accessories to complete the installation per the electrical and/or communication drawings.

1.3 SUBMITTALS

A. Shop drawings are not required for material and equipment specified under this section of the specifications.

PART 2 PRODUCTS

2.1 OUTLET BOXES

A. Two gang for data, voice, cable TV, CCTV, card reader and sound system devices.

2.2 PLASTER COVER RINGS

A. Single gang for single device, double gang for two devices, etc.

2.3 COVER PLATES

A. Cover plates for data, voice, cable TV, CCTV, card reader and sound systems shall be provided by its respective trade.

2.4 RACEWAYS

A. Per appropriate section with insulated throat bushings on all conduit runs and rubber grommeted holes between boxes or box sections. Provide pull strings.

2.5 TELE-POWER POLE SYSTEM

A. The Tele-Power Systems specified herein for extension of power branch circuit wiring and/or communication cabling services shall be the 30TP-4V System as manufactured by The Wiremold Company or equal.

B. 30 Series

1. The Tele-Power Pole channel shall be steel, ivory baked enamel finish with cross section of 3"x2.75" with two separate compartments. One compartment is to be factory wired with four duplex 20A, 125V NEMA 5-20R grounding type specification grade receptacles, and ivory colored to match the pole finish. The harness is to be two circuit (3 conductor plus ground) with #12 AWG solid type THHN conductors, factory assembled to the receptacles. 6" [152mm] conductor leads are to be furnished for termination to the overhead wiring system.

   The second compartment is to be for field installation of telephone or data network cabling. A 12" [305mm] removable cover section in this compartment must be provided to assemble and mount communications connectors. This section must be removable without dismantling or removing the Tele-Power Pole after installation. The cover section is to have four knockouts for modular voice-data jacks (RJ-type) and a 1.375"x2.7" rectangular knockout for a modular furniture outlet. A "mouse hole" knockout with furnished grommet is to be included for straight through communication cable access.

   The Tele-Power Pole shall be 10'-5" long.

2. A full compliment of fittings for the Tele-Power Pole shall be available including, but not limited to, entrance end fitting for top of the electrical channel, ceiling trim plate, pole-mounting bracket, Velcro carpet gripper pad, and adhesive pad.

3. The Tele-Power Pole must be UL Listed for field modifications, changes and additions of receptacles, devices and circuits. Field installed device plates shall be available to add duplex, single 1.40" and 1.59" dia., and rectangular type receptacles. These plates must be ivory in color to match the Tele-Power Pole.

   Add-on communication covers must be available to mount workstation device faceplates, inserts, and specialty mounting bezels. The power pole manufacturer will provide a complete line of connectivity outlets and multi-media modular inserts for UTP, fiber optic, coaxial, and cabling types.

   UPT inserts shall feature a unique recessed area for port labeling and shall be able to accommodate designation icon buttons or icon labels. Custom label capabilities shall be available using templates that can be downloaded from the internet.

PART 3 EXECUTION

3.1 COORDINATION

A. Comply with all requirements of the Owner's representative for all raceways, boxes, cover plates, etc., and their specific installation considerations.

B. Consult with Owner's representative prior to installation to determine special raceway requirements for all data, telephone, cable TV, CCTV, card reader and sound systems.

3.2 INSTALLATION

A. Furnish and install the trunk raceways, outlet box, and outlet box raceways as shown on drawings and specified.

B. Install trunk raceways to within six inches of backboards.

C. Stub outlet box raceways to cable support system provided by others within accessible ceiling cavity.

D. Minimum outlet box conduit sizes shall be 3/4 inch.

E. In each instance where two or more device boxes are generally located in the same vicinity and at the same mounting height, mount those devices in a common multi-gang barrier box appropriate for the device types.

F. Mark each conduit end for identification and destination of raceway.

G. Provide required sleeves in all walls and floors as required by low voltage system contractors.

H. Provide pull rope in each raceway.

I. Provide insulating bus wings and locknuts for all raceways.

J. There shall not be more than the equivalent of three 90 degree bends in any single run of conduit between boxes or fittings.

K. Bends shall be made so that the conduit will not be flattened or kinked and the internal diameter of the conduit will not be reduced.

L. The radius of the curve of the inner edge of any bend shall not be less than as indicated by the National Electrical Code and ANSI/TIA/EIA 569A Commercial Building Standard for Telecommunications Pathways and Spaces.

M. In no case shall any conduit be bent or any fabricated elbow be applied no less than the allowable bending radius as specified by the cable manufacturer of the installed conductor.

N. Provide blank cover plates for each unused outlet box.

O. Prior to and during installation of Tele-Power Pole System refer to system layout or approval drawings containing all elements of the system. Installer shall comply with detailed manufacturer's instruction sheets, which accompany system components, as well as complete system instruction sheets, whichever is applicable.

P. All raceway systems shall be mechanically continuous and connected to all electrical outlets, boxes, device mounting brackets, and cabinets, also in accordance with manufacturer's installation sheets.

Q. All metal raceway shall be electrically continuous and bonded in accordance with the National Electric Code for proper grounding.

R. Raceway shall be securely supported at intervals not exceeding 5' [1.5m] or in accordance with manufacturer's installation sheets.

S. All Tele-Power Pole Systems shall be installed complete in accordance with the manufacturer's installation sheets. All unused openings shall be closed.

END OF SECTION

SECTION 16721

FIRE ALARM AND DETECTION SYSTEM

PART 1 GENERAL

1.1 DESCRIPTION

A. This section of the specification includes the furnishing, installation, connection and testing of the microprocessor controlled, intelligent reporting fire alarm equipment required to form a complete, operative, coordinated system. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, auxiliary control devices, annunciators, and wiring as shown on the drawings and specified herein.

B. Provide a complete new fire alarm system **Fire-Lite** MS9600-UDLS. No Substitutions.

C. The peripheral devices shall be manufactured by Fire-Lite.

D. Underwriters Laboratories Inc. (UL) - USA:
1. Manually Actuated Signaling Boxes
2. Cabinets and Boxes
3. Control Units for Fire Protective Signaling Systems
4. Smoke Detectors for Fire Protective Signaling Systems
5. Smoke Detectors for Duct Applications
6. Waterflow Indicators for Fire Protective Signaling Systems
7. Audible Signaling Appliances
8. Heat Detectors for Fire Protective Signaling Systems
9. Visual Notification Appliances

E. All fire alarm wiring shall be in conduit.

1.2 SCOPE

A. The intelligent, microprocessor-controlled, fire alarm detection system shall be extended/modified in accordance to the project specifications and drawings.

B. Basic Performance:
1. Alarm, trouble and supervisory signals from all intelligent reporting devices shall be encoded on NFPA Style 4 (Class B) Signaling Line Circuits (SLC).
2. Initiation Device Circuits (IDC) shall be wired Class B (NFPA Style B) as part of an addressable device connected by the SLC Circuit.
3. Notification Appliance Circuits (NAC) shall be wired Class B (NFPA Style Y) as part of an addressable device connected by the SLC Circuit.
4. All circuits shall be power-limited, per UL864 requirements.
5. A single ground fault or open circuit on the system Signaling Line Circuit shall not cause system malfunction, loss of operating power or the ability to report an alarm.
6. Alarm signals arriving at the main FACP shall not be lost following a primary power failure or outage of any kind until the alarm signal is processed and recorded.

C. BASIC SYSTEM FUNCTIONAL OPERATION

When a fire alarm condition is detected and reported by one of the system initiating devices, the following functions shall immediately occur:
1. The system Alarm LED on the FACP shall flash.
2. A local sounder with the control panel shall sound.

3. A backlit 80-character LCD display on the FACP shall indicate all information associated with the fire alarm condition, including the type of alarm point and its location within the protected premises.
4. In response to a fire alarm condition, the system will process all control programming and activate all system outputs (alarm notification appliances and/or relays) associated with the point(s) in alarm. Additionally, the system shall send events to a central alarm supervising station via either dial-up over PSTN or Internet or Intranet via PSDN or virtual private network.

1.3 SUBMITTALS

A. General:
1. Two copies of all submittals shall be submitted to the Architect/Engineer for review.
2. All references to manufacturer's model numbers and other pertinent information herein is intended to establish minimum standards of performance, function and quality. Equivalent compatible UL-listed equipment from other manufacturers may be substituted for the specified equipment as long as the minimum standards are met.
3. For equipment other than that specified, the contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment.

B. Shop Drawings:
1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
2. Include manufacturer's name(s), model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts.
3. Show annunciator layout, configurations, and terminations.

C. Manuals:
1. Submit simultaneously with the shop drawings, complete operating and maintenance manuals listing the manufacturer's name(s), including technical data sheets.
2. Wiring diagrams shall indicate internal wiring for each device and the interconnections between the items of equipment.
3. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate the equipment and system.

D. Software Modifications
1. Provide the services of a qualified technician to perform all system software modifications, upgrades or changes. Response time of the technician to the site shall not exceed 4 hours.
2. Provide all hardware, software, programming tools and documentation necessary to modify the fire alarm system on site. Modification includes addition and deletion of devices, circuits, zones and changes to system operation and custom label changes for devices or zones. The system structure and software shall place no limit on the type or extent of software modifications on-site. Modification of software shall not require power-down of the system or loss of system fire protection while modifications are being made.

1.4 WARRANTY

A. All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least one (1) year from the date of acceptance. The full cost of maintenance, labor and materials required to correct any defect during this one year period shall be included in the submittal bid.

1.5 MAINTENANCE

A. Maintenance and testing shall be on a semi-annual schedule or as required by the local AHJ. A preventive maintenance schedule shall be provided by the contractor describing the protocol for preventive maintenance. The schedule shall include:
   1. Systematic examination, adjustment and cleaning of all detectors, manual fire alarm stations, control panels, power supplies, relays, waterflow switches and all accessories of the fire alarm system.
   2. Each circuit in the fire alarm system shall be tested semiannually.
   3. Each smoke detector shall be tested in accordance with the requirements of NFPA 72 Chapter 10.

B. As part of the bid/proposal, include a quote for a maintenance contract to provide all maintenance, tests, and repairs described below. Include also a quote for unscheduled maintenance/repairs, including hourly rates for technicians trained on this equipment, and response travel costs for each year of the maintenance period. Submittals that do not identify all post contract maintenance costs will not be accepted. Rates and costs shall be valid for the period of five (5) years after expiration of the guaranty.

1.6 APPLICABLE STANDARDS AND SPECIFICATIONS

The specifications and standards listed below form a part of this specification. The system shall fully comply with the latest issue of these standards, if applicable.

A. National Fire Protection Association (NFPA) - USA:

   1. No. 13 Sprinkler Systems
   2. No. 70 National Electric Code (NEC)
   3. No. 72 National Fire Alarm Code
   4. No. 101 Life Safety Code
   5. No. 38 Manually Actuated Signaling Boxes
   6. No. 217 Smoke Detectors, Single and Multiple Station
   7. No. 228 Door Closers-Holders for Fire Protective Signaling Systems
   8. No. 268 Smoke Detectors for Fire Protective Signaling Systems
   9. No. 268A Smoke Detectors for Duct Applications
   10. No. 346 Waterflow Indicators for Fire Protective Signaling Systems
   11. No. 464 Audible Signaling Appliances
   12. No. 521 Heat Detectors for Fire Protective Signaling Systems
   13. No. 864 Control Units for Fire Protective Signaling Systems
   14. No. 1481 Power Supplies for Fire Protective Signaling Systems
   15. No. 1610 Central Station Burglar Alarm Units
   16. No. 1638 Visual Signaling Appliances
   17. No. 1971 Visual Signaling Appliances
   18. No. 2017 General-Purpose Signaling Devices and Systems
   19. CAN/ULC S524-01 Standard for Installation of Fire Alarm Systems
   20. The FACP shall be ANSI 864, 9th Edition Listed. Systems listed to ANSI 864, 8th edition (or previous revisions) shall not be accepted.

B. The system and its components shall be Underwriters Laboratories, Inc. listed under the appropriate UL testing standard as listed herein for fire alarm applications and the installation shall be in compliance with the UL listing.

C. Local and State Building Codes.

D. All requirements of the Authority Having Jurisdiction (AHJ).

1.7 APPROVALS

A. The system shall have proper listing and/or approval from the following nationally recognized agencies: UL Underwriters Laboratories Inc

PART 2 PRODUCTS

2.1 EQUIPMENT AND MATERIAL, GENERAL

A. All equipment and components shall be new, and the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a fire protective signaling system, meeting the National Fire Alarm Code.

B. All equipment and components shall be installed in strict compliance with manufacturers' recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.

C. All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

D All equipment must be available "over the counter" through the Security Equipment Distributor (SED) market and can be installed by dealerships independent of the manufacturer.

2.2 CONDUIT AND WIRE

A. Conduit:
   1. Conduit shall be in accordance with The National Electrical Code (NEC), local and state requirements.
   2. All wiring shall be installed in conduit or raceway. Conduit fill shall not exceed 40 percent of interior cross sectional area where three or more cables are contained within a single conduit.
   3. Cable must be separated from any open conductors of power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, per NEC Article 760-29.
   4. Wiring for 24-volt DC control, alarm notification, emergency communication and similar power-limited auxiliary functions may be run in the same conduit as initiating and signaling line circuits. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.
   5. Conduit shall not enter the fire alarm control panel, or any other remotely mounted control panel equipment or backboxes, except where conduit entry is specified by the FACP manufacturer.
   6. Conduit shall be 3/4-inch minimum.

B. Wire:
   1. All fire alarm system wiring shall be new.
   2. Wiring shall be in accordance with local, state and national codes (e.g., NEC Article 760) and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 18 AWG for Initiating Device Circuits and Signaling Line Circuits, and 14 AWG for Notification Appliance Circuits.
   3. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.

4. Wiring used for the multiplex communication circuit (SLC) shall be twisted and support a minimum wiring distance of 10,000 feet when sized at 12 AWG. The design of the system shall permit use of IDC and NAC wiring in the same conduit with the SLC communication circuit. Shielded wire shall not be required.
5. All field wiring (with exception of external communications Ethernet) shall be electrically supervised for open circuit and ground fault.
6. The fire alarm control panel shall be capable of T-tapping NFPA Style 4 (Class B) Signaling Line Circuits (SLCs). Systems which do not allow or have restrictions in, for example, the amount of T-taps, length of T-taps etc., is not acceptable.

C. Terminal Boxes, Junction Boxes and Cabinets:
1. All boxes and cabinets shall be UL listed for their use and purpose.

D. The fire alarm control panel shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the main power distribution panel as FIRE ALARM. Fire alarm control panel primary power wiring shall be 12 AWG. The control panel cabinet shall be grounded securely to either a cold water pipe or grounding rod. The control panel enclosure shall feature a quick removal chassis to facilitate rapid replacement of the FACP electronics.

2.3 MAIN FIRE ALARM CONTROL PANEL

A. The new FACP shall be a Fire-Lite system with a microprocessor-based Central Processing Unit (CPU), or equal.

2.4 SYSTEM COMPONENTS

A. All system components shall be Fire-Lite.

B. Intelligent Photoelectric Smoke Detector
1. The detectors shall use the photoelectric (light-scattering) principal to measure smoke density and shall, on command from the control panel, send data to the panel representing the analog level of smoke density.
2. The detectors shall be ceiling-mounted and available in an alternate model with an integral fixed 135-degree heat-sensing element.
3. Each detector shall contain a remote LED output and a built-in test switch.
4. Detector shall be provided on a twist-lock base.
5. It shall be possible to perform a calibrated sensitivity and performance test on the detector without the need for the generation of smoke. The test method shall test all detector circuits.
6. A visual indication of an alarm shall be provided by dual latching Light Emitting Diodes (LEDs), on the detector, which may be seen from ground level over 360 degrees. These LEDs shall periodically flash to indicate that the detector is in communication with the control panel.
7. The detector shall not go into alarm when exposed to air velocities of up to 1500 feet per minute (fpm).
8. The detector screen and cover assembly shall be easily removable for field cleaning of the detector chamber.
9. All field wire connections shall be made to the base through the use of a clamping plate and screw.

C. Intelligent Thermal Detectors
1. Thermal detectors shall be intelligent addressable devices rated at 135 degrees Fahrenheit and have a rate-of-rise element rated at 15 degrees F per minute. It shall connect via two wires to the fire alarm control panel signaling line circuit.

D. Intelligent Duct Smoke Detector
   1. The smoke detector housing shall accommodate either an intelligent ionization detector or an intelligent photoelectric detector, of that provides continuous analog monitoring and alarm verification from the panel.
   2. When sufficient smoke is sensed, an alarm signal is initiated at the FACP, and appropriate action taken to change over air handling systems to help prevent the rapid distribution of toxic smoke and fire gases throughout the areas served by the duct system.

E. Addressable Dry Contact Monitor Module
   1. Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional alarm initiating devices (any normally open dry contact device) to one of the fire alarm control panel SLCs.
   2. The monitor module shall mount in a 4-inch square, 2-1/8 inch deep electrical box.
   3. The IDC zone shall be suitable for Style D or Style B operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.
   4. For difficult to reach areas, the monitor module shall be available in a miniature package and shall be no larger than 2-3/4 inch x 1-1/4 inch x 1/2 inch. This version need not include Style D or an LED.

F. Addressable Control Relay Module
   1. Addressable control relay modules shall be provided to control the operation of fan shutdown and other auxiliary control functions.
   2. The control module shall mount in a standard 4-inch square, 2-1/8 inch deep electrical box, or to a surface mounted backbox.
   3. The control relay module will provide a dry contact, Form-C relay. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to insure that 100% of all auxiliary relays may be energized at the same time on the same pair of wires.
   4. The control relay module shall be suitable for pilot duty applications and rated for a minimum of 0.6 amps at 30 VDC.

G. Alphanumeric LCD Type Annunciator (Ann-Bus Mode):
   1. The alphanumeric display annunciator shall be a supervised, remotely located back-lit eighty (80) characters LCD display for alarm annunciation in clear English text.
   2. The LCD annunciator shall display all alarm and trouble conditions in the system.
   3. An audible indication of alarm shall be integral to the alphanumeric display.
   4. It shall be possible to connect up to 8 LCD displays and be capable of wiring distances up to 6,000 feet from the control panel.
   5. Up to 8 total devices of any kind, LCD, printer gateway, LED, Relay or I/O module may be installed on the ANN-BUS.

2.5 SYSTEM COMPONENTS - ADDRESSABLE DEVICES

A. All addressable components shall be Fire-Lite.

B. Addressable Devices - General
   1. Addressable devices shall employ the simple-to-set decade addressing scheme. Addressable devices which use a binary-coded address setting method, such as a DIP switch, are not an allowable substitute.
   2. Detectors shall be addressable and intelligent, and shall connect with two wires to the fire alarm control panel signaling line circuits.

3. Addressable smoke and thermal (heat) detectors shall provide dual alarm and power/polling LEDs. Both LEDs shall flash under normal conditions, indicating that the detector is operational and in regular communication with the control panel, and both LEDs shall be placed into steady illumination by the control panel, indicating that an alarm condition has been detected. An output connection shall also be provided in the base to connect an external remote alarm LED.
4. Using software in the FACP, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. The detectors shall be listed by UL as meeting the calibrated sensitivity test requirements of NFPA Standard 72, Chapter 7.
5. Detectors shall be ceiling-mount and shall include a separate twist-lock base with tamper proof feature. Base options shall include a base with a built-in (local) sounder rated for a minimum of 85 DBA, a relay base and an isolator base designed for Style 7 applications.
6. Detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel.
7. Detectors shall also store an internal identifying type code that the control panel shall use to identify the type of device (ION, PHOTO, THERMAL).
8. Detectors shall provide address-setting means using decimal switches.

2.6 BATTERIES

A. New batteries shall be installed in the FACP.

B. The batteries are to be completely maintenance free. No liquids are required. Fluid level checks for refilling, spills, and leakage shall not be required.

PART 3 EXECUTION

3.1 INSTALLATION

A. Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer.

B. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas, new walls in unfinished areas and may be exposed in unfinished areas with existing walls. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.

C. All fire detection and alarm system devices, shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas.

D. Manual pull stations shall be suitable for surface mounting or semi flush mounting as shown on the plans, and shall be installed not less than 42 inches, nor more than 48 inches above the finished floor.

E. All fire alarm wiring will be in conduit.

3.2 TEST

A. The service of a competent, NICET level II technician shall be provided to technically supervise and participate during all of the adjustments and tests for the system. All testing shall be in accordance with NFPA 72, Chapter 10. WRITTEN TEST/REPORT SHALL BE PROVIDED TO OWNER FOR THEIR FILES.

B. The system shall be tested in late July 2016 with report submitted to district (Owner) by August 15, 2016. The system shall be tested again in late July 2017 with reports submitted to district (Owner) by August 15, 2017.

C. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.

D. Close each sprinkler system flow valve and verify proper supervisory alarm at the FACP.

E. Verify activation of all waterflow switches.

F. Open initiating device circuits and verify that the trouble signal actuates.

G. Open and short signaling line circuits and verify that the trouble signal actuates.

H. Open and short notification appliance circuits and verify that trouble signal actuates.

I. Ground all circuits and verify response of trouble signals.

J. Check presence and audibility of tone at all alarm notification devices.

K. Check installation, supervision, and operation of all intelligent smoke detectors using the walk test.

L. Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.

M. When the system is equipped with optional features, the manufacturer's manual shall be consulted to determine the proper testing procedures. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.

3.3 FINAL INSPECTION

A. At the final inspection a minimum NICET Level II technician shall demonstrate that the system functions properly in every respect.

3.4 INSTRUCTION

A. Instruction shall be provided as required for operating the system. Hands-on demonstrations of the operation of all system components and the entire system including program changes and functions shall be provided.

B. The contractor or installing dealer shall provide a user manual indicating "Sequence of Operation."

END OF SECTION