# PROJECT MANUAL

# THE BLAKE HOUSE
## ADDITION AND ALTERATIONS
## 6621 Evansport Road
## Defiance, Ohio 43512

**November 17, 2020**

**Kraig A. Beilharz**
Registered Architect #9482

BEILHARZ
ARCHITECTS
INCORPORATED

**Project C0-4665**

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## ADVERTISEMENT FOR BIDS

Sealed Bids will be received by the Board of Defiance County Commissioners, c/o Ms. Stephanie Metz, in their office, 500 Court Street, Suite A, Defiance, Ohio 43512, until **1:00 p.m., Monday, December 14, 2020**, when they will be opened and read, for the **Blake House Addition and Alterations**, located at 6621 Evansport Road, Defiance, Ohio 43512, in accordance with the Drawings and Specifications prepared by Beilharz Architects, Inc.

Contract Documents may be reviewed without charge during business hours at the office of the Architect and various plan rooms obtaining documents. Contract Documents may be purchased from Newfax Corporation, 333 W. Woodruff, Toledo, OH 43604, 419-241-5157 or 800-877-5157, www.newfaxcorp.com, at the cost of reproduction and shipping. Addenda will be distributed to registered plan holders only.

All bids must be accompanied by a Bid Guaranty in the form of either a Bid Guaranty and Contract Bond for the full amount of the bid or a certified check, cashier's check, or an irrevocable letter of credit in an amount equal to 10% of the bid, in accordance with the Instructions to Bidders.

Each Contractor will be required to furnish an Affidavit of Contractor or Supplier on Non-Delinquency of Personal Property Tax (O.R.C. 5719.042).

Prevailing Wage Rates, as published by the Ohio Department of Commerce, shall be complied with throughout the entire project in accordance with O.R.C. 4115.03 et. seq.

No bidder may withdraw its bid for a period of 60 days after the opening thereof. The Owner reserves the right to waive irregularities in bids, to reject any or all bids, and to conduct such investigation as necessary to determine the responsibility of any bidder.

BY ORDER OF: DEFIANCE COUNTY COMMISSIONERS
DEFIANCE, OHIO

Advertising Dates: November 24 and December 1, 2020.

# INSTRUCTIONS TO BIDDERS

## 1. EXAMINATION OF CONTRACT DOCUMENTS AND PROJECT SITE:

A. Each Bidder shall visit the site prior to the bid date and shall be responsible for having ascertained pertinent local conditions such as location, accessibility, and general character of the site, the character and extent of the existing work within or adjacent to the site, and any other work being performed thereon at the time.

   1. Obtain all relevant information of conditions relating to transportation, handling and storage of materials, availability of electric power, utility company requirements, existing structures and equipment and all other facilities in the area which will impact the performance of work.

B. Each Bidder shall examine all Contract Documents for requirements which may affect the Bidder's Work in any way.

C. Failure of a Bidder to be acquainted with all available information will not be considered as a basis for additional compensation or extension of time, nor relief from responsibility for proper performance of the work.

D. Site visits may be arranged by contacting the Owner's Representative, Corey Walker, phone 419-782-3881.

## 2. PROJECT SCHEDULE AND ESTIMATE:

A. Refer to Section 01 1000 – Summary of Work.

B. COVID-19 has been accounted for in the schedule and estimate.

## 3. BIDDERS' QUESTIONS:

A. Questions and technical communications during bidding should be directed to the Architect by email (architects@beilharzarchitects.com). A list of bidders and plan holders will be posted on the Architect's web site at www.beilharzarchitects.com.

B. If a Bidder finds any perceived ambiguity, conflict, error, omission or discrepancy on or between any of the Contract Documents, submit a written request for interpretation or clarification to the Architect as directed above. Failure of a Bidder to make such request prior to bidding will result in rejection of claims for additional compensation or extension of time based on insufficiency of the Contract Documents.

C. Questions submitted later than 4 business days prior to the scheduled bid opening may not be answered.

D. Requests for Product Substitutions: Refer to Section 01 6000. Product substitution requests must be made by Prime Bidders only.

E. Information affecting all bidders will be distributed by written Addendum. The receipt of each Addendum shall be acknowledged in the space provided on the Bid Form. A

list of Addenda issued will be posted on the Architect's web site at www.beilharzarchitects.com.

F. Statements made orally by the Architect or Owner, or in any form other than a written Addendum, will not be binding.

G. All Addenda will be issued, except as hereafter provided, and mailed or otherwise furnished to all plan holders of record, at least 72 hours prior to the published time for the opening of bids, excluding Saturdays, Sundays and legal holidays. If any Addendum is issued within such 72 hour period, then the time for opening of bids shall be extended one week with no further advertising of bids required.

H. If a Bidder fails to indicate receipt of all Addenda through the last Addendum issued by the Architect on its Bid Form, the bid of such Bidder will be deemed to be responsive only if:
   1. The bid received clearly indicates that the Bidder received the Addendum, such as where the Addendum added another item to be bid upon and the Bidder submitted a bid on that item; or
   2. The Addendum involves only a matter of form or is one which has either no effect or has merely a trivial or negligible effect on price, quantity, quality, or delivery of the item bid upon.

**4. BID FORMS:**

A. Submit bids in duplicate on Bid Forms issued with the bidding documents. Fill in all blank spaces, typewritten or in ink. Submit original Bid Forms as follows:
   1. Corporation: State full legal name of corporation and State of Incorporation; apply original signature of authorized officer or officers; type or print name and corporate title beneath each signature.
   2. Partnership: State the full names of all partners; apply original signature of authorized partner or other representative; type or print name and title beneath signature.
   3. Sole Proprietor: Apply original signature of bidder; type or print name and title beneath signature, followed by the words "Sole Proprietor".
   4. When requested by Owner, furnish evidence of agency or authority of any person signing on behalf of another.

B. Submit two originals, or one original and one photocopy, of all attachments to Bid Forms.

C. Submit only the Bid Forms and required attachments. Do not submit Project Manuals or sets of Drawings as part of the bid.

D. The bid will be rejected if it contains an alteration or erasure, unless alteration is made by crossing out without obscuring the original information, and the correct information is printed in ink or typed adjacent thereto and initialed in ink by the person signing the bid.

E. The Bidder shall take the following precautions in preparing the bid:
   1. Sign the Bid Form and ensure that all blank spaces are filled in with requested information and that the Bid Guaranty is included in a sealed opaque envelope addressed as provided herein.
   2. Where the Bid Form provides for quoting either an addition or deduction for an Alternate item, indicate whether the sum named is an addition or deduction.
   3. Where the Bid Form provides for quoting a unit price, the Bidder should quote the unit price.
   4. When applicable, make sure that the Bid Guaranty is properly executed and signed by:
      a. The Bidder.
      b. The Surety or Sureties.
   5. Make sure that the amount of the Bid Guaranty is for a specific sum in an amount equal to the base bid amount plus all add alternates or is left blank.

## 5. MODIFICATION AND WITHDRAWAL OF BIDS:

A. Modification: A Bidder may modify its bid by written communication to the Owner at any time prior to the scheduled closing time for receipt of bids, provided such written communication is received by the Owner prior to the closing time. The written communication shall not reveal the bid price, but should provide the addition or subtraction or other modification so that the final prices or terms will not be known until the sealed bid is opened.

B. Withdrawal Prior to Bid Closing: Bids may be withdrawn pursuant to a written request submitted by Bidder or Bidder's agent and received by the Owner prior to the time fixed for closing of bids, without prejudice to the right of the Bidder to file a new bid. Withdrawn bids will be returned unopened. Negligence on the part of the Bidder in preparing a bid confers no right for withdrawal of bid after it has been opened.

C. Withdrawal After Bid Closing: A Bidder may withdraw its bid after the bid closing time when all of the following apply:
   1. The price bid was substantially lower than the other bids.
   2. The reason for the bid being substantially lower was a clerical mistake, rather than a mistake in judgment, and was due to an unintentional and substantial error in arithmetic or an unintentional omission of a substantial quantity of work, labor, or material.
   3. The bid was submitted in good faith.
   4. The Bidder provides written notice to the Owner within two business days after the bid opening for which the right to withdraw is claimed.

D. Bids shall remain valid and no bid may be withdrawn, except as permitted by applicable law, for a period of 60 days after the day set for the opening thereof, unless a longer period is stated on the Bid Form.

## 6. BID GUARANTY AND CONTRACT BOND:

A. Each bid shall be accompanied by a Bid Guaranty in one of the following forms, in the name of or payable to the order of the Owner. Any bid which is not accompanied by a completed Bid Guaranty in one of these forms will be considered "NO BID" and will be returned to the maker unrecorded.

1. A completed Bid Guaranty and Contract Bond with a satisfactory Surety Company, on the form included in this Project Manual.
2. A certified check, cashier's check, or irrevocable letter of credit made payable to the Owner in the amount of 10% of the maximum amount of the bid, including add alternates and excluding deduct alternates.
   a. The successful Bidder who, as a Bid Guaranty, submits a certified check, cashier's check, or irrevocable letter of credit in an amount equal to 10% of the amount of the bid, shall furnish to the Architect a Contract Bond as prescribed in Ohio Revised Code Section 153.57 in an amount equal to 100% of the Contract Sum, on the form included in this Project Manual, within 3 days of being notified of the Owner's intent to award the contract to the successful Bidder.

B. For purposes of these Instructions to Bidders, a satisfactory surety company for the issuance of either a Bid Guaranty and Contract Bond or a Contract Bond is a surety company ("Surety") authorized by the Ohio Department of Insurance to transact business in the State of Ohio. The bond must be issued by a Surety capable of demonstrating a record of competent underwriting, efficient management, adequate reserves, and sound investments. These criteria will be deemed to be met if the Surety currently has an A.M. Best Company Policyholders Rating of "A-" or better and has or exceeds the Best Financial Size Category of Class VI; other sureties may be determined acceptable by the Owner.

C. All bonds shall be signed by an authorized agent of an acceptable Surety and by the Bidder. Affix Corporate Seals to all copies. The name and address of the Surety and the name and address of the Surety's Agent must be typed or printed on each bond.

D. Surety bonds shall be supported by credentials showing the Power of Attorney of the agent including the monetary limit of the power, a certificate showing the legal right of the Surety to do business in the State of Ohio, and a financial statement of the Surety.

E. All bid securities, except those of the two lowest qualified bidders, will be returned to their makers within 10 days after bid opening. All such retained securities will be returned immediately after signing of the Contract by the successful bidder.

## 7. ATTACHMENTS TO BID FORM:

A. Non-Collusion Affidavit: Each bidder shall submit with the bid a completed Non-Collusion Affidavit.

B. Nondiscrimination Agreement: Each bidder shall submit with the bid a completed Nondiscrimination Agreement.

C. Out-of-State Corporations: Corporations incorporated in jurisdictions other than the state of Ohio shall submit with the bid a Certificate of Good Standing from the Ohio Secretary of State and the name and address of the Ohio Statutory Agent.

D. Hourly Rates and Markups: Each bidder shall submit the following on the form provided in the Project Manual. The Owner reserves the right to reject any bid not including this information. This data will be included by reference in the Owner-Contractor Agreement and shall form the basis for Change Order pricing and evaluation for this project.
   1. Hourly labor rates for each classification of labor performed by the Contractor's own forces.
   2. Hourly usage rates for each classification of construction equipment owned by the Contractor.
   3. Proposed percentage markup on materials, supplies, and equipment rentals. Refer to Section 01 2900 for limitations.
   4. Proposed percentage markup on subcontracts. Refer to Section 01 2900 for limitations.

**8. BID OPENING:**

A. Bids will be publicly opened and read aloud at the date, time, and place stated in the Advertisement for Bids.

B. Bid results will not be available from the Architect for at least 24 hours after the bid opening, excluding weekends and holidays.

**9. BID EVALUATION CRITERIA:**

A. The Owner reserves the right to reject all bids or any bid, and to award the Contract to the lowest and best Bidder as determined by the Owner. The Owner also reserves the right to reject any alternate prices for additions to, or deductions from, the Base Bid, or to accept any or all of such alternate prices in any order.

B. The Owner reserves the right to waive, or allow any Bidder a reasonable opportunity to cure, a minor irregularity or technical deficiency in a bid, provided the amount of the bid is not affected and the Bidder does not thereby gain a competitive advantage.

C. Factors which may be considered by the Owner in evaluating bids may include, without limitation:
   1. Whether the bid responds to the Contract Documents in all material respects. Noncompliance with any requirement of the Contract Documents may cause a bid to be rejected.
   2. The experience, financial condition, bonding experience, licenses and certifications of the Bidder.
   3. The conduct and performance of the Bidder on previous contracts, including compliance with applicable laws, rules, and regulations.
   4. The management skills of the Bidder, and the ability of the Bidder to perform the Work in accordance with the Contract Documents.

5. The experience and capabilities of the Bidder's key personnel and subcontractors to be employed on the Project.
6. The equipment and facilities of the Bidder.
7. Additional factors as the Owner may determine to be appropriate.

D. The Owner may obtain from the lowest Bidder, and such other Bidders determined to be appropriate, any information determined to be relevant to the consideration of the above factors. The Owner may also obtain such information from, and verify such information with, third parties as may be considered relevant. By submitting a bid, each Bidder authorizes the Owner to obtain relevant third party information including, but not limited to, references and credit reports.

E. Each Bidder's information will be considered separately and not comparatively. If the lowest Bidder is determined not to be responsible, the bid will be rejected and the Bidder will be notified of such action. Each next lowest Bidder will then be considered in sequence until the Contract is awarded or all bids are rejected.

F. By submitting its bid, the Bidder agrees that the Owner's determination of responsiveness and responsibility shall be final and conclusive, and that if the Bidder, or any person at the Bidder's urging, directly or indirectly challenges such determination in any legal proceeding and such challenge is not successful, the Bidder will reimburse the Owner for all legal fees and expenses incurred by the Owner that are related to such challenge, including the cost of collection.

G. The Owner further reserves the right to disqualify bids, before or after opening, upon evidence of collusion with intent to defraud or other illegal practices on the part of the Bidder.

H. The Bidder acknowledges that although there is an estimate for the cost of the Project, the market conditions may and frequently do result in the estimate being different from the sum of the bids received, either higher or lower.

**10. REGULATORY REQUIREMENTS:**

A. Sales and Use Taxes: Refer to Section 01 4000.

B. Statement of Personal Property Tax Status: After award of contract, and as a condition of entering into the contract, the successful bidder shall submit an Affidavit of Personal Property Taxes disclosing the amount, if any, of delinquent personal property taxes on the general tax list of personal property of any county in which the Owner has territory.

C. Prevailing Wage Rates: The prevailing wage rates of public improvements are required inasmuch as public money is used for this project. Prevailing rates of wages are a part of the Supplementary Conditions and have been incorporated in this Specification.

## 11. EXECUTION OF CONTRACT:

A. Notice of Intent to Award Contract. The successful Bidder will be notified of the award of the contract and provided with three copies of the Agreement between Owner and Contractor ("Agreement") in the form described in the Project Manual.

B. The successful Bidder shall sign and return the original forms to the Owner, or as otherwise directed, for execution by the Owner. The contract will be submitted to the Owner at its next regularly scheduled Board meeting for approval by the Owner. The successful Bidder will be provided with a fully executed copy of the Agreement for its records.

C. If the successful Bidder does not return the executed contracts to the Owner within 5 business days of its receipt of the contracts from the Owner, the Owner reserves the right to reject the bid and award the contract to the next low responsible Bidder.

## 12. EQUAL EMPLOYMENT OPPORTUNITY/NONDISCRIMINATION:

A. Minority, female, and disadvantaged businesses will be afforded full opportunity to submit bids, and Bidders will not be discriminated against on the grounds of race, color, religion, sex, age, handicap, ancestry, or national origin in the consideration of an award. The successful Bidder(s) shall include a provision in any subcontract entered into for the Project that requires that each of its Subcontractors not discriminate against any employee or applicant for employment on the basis of race, religion, color, sex, age, handicap, ancestry, or national origin in any actions that it takes. Such actions include, without limitation, employment, upgrading, demotion, transfer recruitment or recruiting advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeships.

END OF DOCUMENT

# BID FORM

(Submit two copies of Bid Form and all attachments)

**BIDDER:** _____

**PROJECT:**
The Blake House
Addition and Alterations
6621 Evansport Road
Defiance OH 43512

**BIDS DUE AT:**
Defiance County Commissioners
500 Court Street, Suite A
Defiance OH 43512

**BIDS DUE BY: <u>Monday, December 14, 2020, 1:00 p.m. EST</u>**

Having read the bid documents and specifications and examined the drawings prepared by the Architect, Beilharz Architects, Inc., Defiance, Ohio, for the item of work described above, and having inspected the site and the conditions affecting and governing the construction of the said project, and acknowledging that the bid documents, specifications and drawings are adequate for the performance of the Work, the undersigned hereby proposes to furnish all materials and perform all labor, as described in the specifications and shown on the drawings, for the following sum. Bid shall be good for 60 days.

**BASE BID:**

Complete Work for the Stipulated Sum of ..... $_____

Addenda received and included in this Bid: No. _____, _____, _____, _____, _____.

Attachments to Bid Form (submit 2 copies):

- ☐ Bid Guaranty and Contract Bond (or certified check)
- ☐ Non-Collusion Affidavit
- ☐ Nondiscrimination Agreement
- ☐ Out-of-State Corporation Information (if applicable)
- ☐ Hourly Rates and Markups

SIGNED: _____ _____
(Signature) (Name of Company or Corporation)

_____ _____
(Printed Name) (Business Address)

_____ _____ _____
(Title) (Date of Signature) (Phone)

**BID GUARANTY AND CONTRACT BOND**

KNOW ALL PERSONS BY THESE PRESENTS, that we, the undersigned,

_____
(Name and Address of Contractor)

as Principal and _____
(Name of Surety)

as Surety, are hereby held and firmly bound unto the Board of Defiance County Commissioners, hereinafter called the Obligee, in the penal sum of the dollar amount of the bid submitted by the Principal to the Obligee on _____
(Date)

to undertake the project known as The Blake House Addition and Alterations.

The penal sum referred to herein shall be the dollar amount of the Principal's bid to the Obligee, incorporating any additive or deductive alternate proposals made by the Principal on the date referred to above to the Obligee, which are accepted by the Obligee. In no case shall the penal sum exceed the amount of

_____ Dollars ($_____).

(If the above line is left blank, the penal sum will be the full amount of the Principal's bid, including add alternates. Alternatively, if completed, the amount stated must not be less than the full amount of the bid, including add alternates, in dollars and cents. A percentage is not acceptable.)

For the payment of the penal sum well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors, and assigns.

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH, that whereas the above named Principal has submitted a bid on the above referred project:

NOW, THEREFORE, if the Obligee accepts the bid of the Principal and the Principal fails to enter into a proper contract in accordance with the bid, plans, details, specifications and bills of material; and in the event the Principal pays to the Obligee the difference not to exceed ten percent of the penalty hereof between the amount specified in the bid and such larger amount for which the Obligee may in good faith contract with the next lowest bidder to perform the work covered by the bid; or in the event the Obligee does not award the contract to the next lowest bidder and resubmits the project for bidding, the Principal will pay the Obligee the difference not to exceed ten percent of the penalty hereof between the amount specified in the bid, or the costs, in connection with the resubmissions, of printing new contract documents, required advertising and printing and mailing notices to prospective bidders, whichever is less, then this obligation shall be void, otherwise to remain in full force and effect. If the Obligee accepts the bid of the Principal and the Principal within ten days after the awarding of the contract, enters into a proper contract in accordance with the bid, plans, details, specifications and bills of material, which said contract is made a part of this bond the same as though set forth herein; and

IF THE SAID Principal shall well and faithfully perform each and every condition of such contract; and indemnify the Obligee against all damage suffered by failure to perform such

contract according to the provisions thereof and in accordance with the plans, details, specifications and bills of material therefor; and shall pay all lawful claims of subcontractors, materialmen, and laborers, for labor performed and materials furnished in the carrying forward, performing or completing of said contract; we agreeing and assenting that this undertaking shall be for the benefit of any materialman or laborer having a just claim, as well as for the Obligee herein; then this obligation shall be void; otherwise the same shall remain in full force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall in no event exceed the penal amount of this obligation as herein stated.

THE SAID Surety hereby stipulates and agrees that no modifications, omissions, or additions, in or to the terms of said contract or in or to the plans and specifications therefor shall in any ways affect the obligations of said Surety on this bond, and it does hereby waive notice of any such modifications, omissions or additions to the terms of the contract or to the work or to the specifications.

SIGNED AND SEALED this _____ day of _____ , _____ .

PRINCIPAL:

_____
(Name of Company or Corporation)

_____
(Street Address)

_____
(City, State, ZIP)

By: _____
(Signature)

_____
(Printed Name)

_____
(Title)

SURETY:

_____
(Name of Company or Corporation)

_____
(Street Address)

_____
(City, State, ZIP)

By: _____
(Signature of Attorney-in-Fact)

_____
(Printed Name)

_____
(Agency Name)

_____
(Street Address)

_____
(City, State, ZIP)

_____
(Telephone Number)

_____
(Fax Number)

_____
(Email)

## HOURLY RATES AND MARKUPS

(Attach additional sheets if needed)

**BIDDER:** _____

**LABOR RATES:**

| Classification | Hourly Rate |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |

**EQUIPMENT RATES:**

| Classification | Hourly Rate |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |

**MARKUPS:**
(including overhead and profit; refer to Section 01 2900 for limitations)

| | Add Change Orders | Deduct Change Orders |
|---|---|---|
| Materials and Supplies: | % | % |
| Equipment Rental: | % | % |
| Subcontracts: | % | % |

## NON-COLLUSION AFFIDAVIT

STATE OF OHIO

TO: Defiance County Commissioners
Defiance, Ohio 43512

The undersigned, being first duly sworn, having bid on a contract by you for

_____
(Name of Project)

hereby states that such bid is not made in the interest of or on behalf of any undisclosed person, partnership, company, association, organization, or corporation; that such bid is genuine and not collusive or sham; that said bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, or connived or agreed with any bidder or anyone else to put in a sham bid, or that any one shall refrain from bidding; that said bidder has not in any manner, directly or indirectly, sought by agreement, communication or conference with any one to fix the bid price of said bidder or of any other bidder, or to fix any overhead, profit, or cost element of such bid price, or of that of any other bidder, or to secure any advantage against the public body awarding the contract or any one interested in the proposed contract; that all statement contained in such bid are true; and, further, that said bidder has not, directly or indirectly, submitted his bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid and will not pay any fee in connection therewith, to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof, or to any other individual except to such persons as have a partnership or other financial interest with said bidder in his general business.

_____
(Name of Company or Corporation)

_____
(Street Address)

_____
(City, State, ZIP)

By: _____
(Signature)

_____
(Printed Name)

_____
(Title)

Sworn to before me and subscribed in my presence this _____ day of

_____, 20 ____.

_____
(Notary Public)

My commission expires:

_____

**NONDISCRIMINATION AGREEMENT**

**O.R.C. 153.59**

STATE OF OHIO

TO: Defiance County Commissioners
Defiance, Ohio 43512

The undersigned, being first duly sworn, having authority to agree on behalf of the above named contractor, and having bid on a contract by you for

_____
(Name of Project)

do hereby understand and agree:

A) That, in compliance with the provision of Chapter 153.59, Ohio Revised Code, the hiring of employees for the performance of work under this Contract or any subcontract shall not discriminate by reason of race, creed, sex, handicap, color, or age against any person qualified to perform the work herein concerned.

B) That no contractor, subcontractor, or any person on his behalf shall, in any manner, discriminate against or intimidate any employee hired for the performance of work under this contract on account of race, creed, sex, handicap, color, or age.

_____
(Name of Company or Corporation)

_____
(Street Address)

_____
(City, State, ZIP)

By: _____
(Signature)

_____
(Printed Name)

_____
(Title)

Sworn to before me and subscribed in my presence this _____ day of _____, 20 ____.

_____
(Notary Public)

My commission expires:

_____

**CONTRACT BOND**
(O.R.C. § 153.57)

| |
|---|
| INSTRUCTIONS: The Contract Bond form is to be used ONLY by a bidder that is determined to be the lowest responsible bidder and that submits a form of bid guaranty other than the combined Bid Guaranty and Contract Bond with its bid. If a bidder submits a combined Bid Guaranty and Contract Bond, then the bid guaranty becomes the contract bond when the contract is awarded. |

KNOW ALL PERSONS BY THESE PRESENTS, that we, the undersigned, _____

_____
(Name and Address of Contractor)

as Principal and _____
(Name of Surety)

as Surety, are hereby held and firmly bound unto the Board of Defiance County Commissioners, as Obligee, in the penal sum of _____

_____ Dollars ($_____),
for the payment of which well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors, and assigns.

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH, that whereas the above named Principal did on the _____ day of _____, 20___, enter into a contract with the Board of Defiance County Commissioners for the construction of The Blake House Addition and Alterations, which said contract is made a part of this bond the same as though set forth herein;

Now, if the said Contractor shall well and faithfully do and perform the things agreed by the Contractor to be done and performed according to the terms of said contract; and shall pay all lawful claims of subcontractors, materialmen, and laborers, for labor performed and materials furnished in the carrying forward, performing, or completing of said contract; we agreeing and assenting that this undertaking shall be for the benefit of any materialman or laborer having a just claim, as well as for the Obligee herein; then this obligation shall be void; otherwise the same shall remain in full force and effect; it being expressly understood and agreed that the liability of the surety for any and all claims hereunder shall in no event exceed the penal amount of this obligation as herein stated.

The said Surety hereby stipulates and agrees that no modifications, omissions, or additions, in or to the terms of said contract or in or to the plans and specifications therefor shall in any wise affect the obligations of said Surety on its bond, and does hereby waive notice of any such modifications, omissions or additions to the terms of the contract or to the work or to the specifications.

SIGNED AND SEALED this _____ day of _____ , _____ .

PRINCIPAL:

_____
(Name of Company or Corporation)

_____
(Street Address)

_____
(City, State, ZIP)

By: _____
(Signature)

_____
(Printed Name)

_____
(Title)

SURETY:

_____
(Name of Company or Corporation)

_____
(Street Address)

_____
(City, State, ZIP)

By: _____
(Signature of Attorney-in-Fact)

_____
(Printed Name)

_____
(Agency Name)

_____
(Street Address)

_____
(City, State, ZIP)

_____
(Telephone Number)

_____
(Fax Number)

_____
(Email)

**AFFIDAVIT OF CONTRACTOR OR SUPPLIER ON NON-DELINQUENCY OF PERSONAL PROPERTY TAX**

**O.R.C. 5719.042**

STATE OF OHIO

TO: Defiance County Commissioners
Defiance, Ohio 43512

The undersigned, being first duly sworn, having bid on a contract by you for

_____
(Name of Project)

hereby states that we are not charged at the time the bid was submitted with any delinquent personal property taxes on the general tax list of personal property of any county in which you as a taxing district have territory and that we were not charged with delinquent personal property taxes on any such tax list.

In consideration of the award of the above contract, the above statement is incorporated in said contract as a covenant of the undersigned.

_____
(Name of Company or Corporation)

_____
(Street Address)

_____
(City, State, ZIP)

By: _____
(Signature)

_____
(Printed Name)

_____
(Title)

Sworn to before me and subscribed in my presence this _____ day of _____, 20 ____.

_____
(Notary Public)

My commission expires:

_____

Ohio | Department of Taxation
tax.ohio.gov

STEC CC
Rev. 11/14

# Sales and Use Tax
# Construction Contract Exemption Certificate

**Identification of Contract:**

Contractee's (owner's) name: Defiance County Commissioners

Exact location of job/project: 6621 Evansport Road, Defiance OH 43512

Name of job/project as it appears on contract documentation: The Blake House Addition and Alterations

The undersigned hereby certifies that the tangible personal property purchased under this exemption certificate was purchased for incorporation into:

| | | | |
|---|---|---|---|
| ☐ | A building used exclusively for charitable purposes by a nonprofit organization operated exclusively for charitable purposes as defined in Ohio Revised Code (R.C.) section 5739.02(B)(12); | ☐ | Real property that is owned, or will be accepted for ownership at the time of completion, by the United States government, its agencies, the state of Ohio or an Ohio political subdivision; |
| ☑ | Real property under a construction contract with the United States government, its agencies, the state of Ohio or an Ohio political subdivision; | ☐ | A computer data center entitled to exemption under R.C. 122.175; |
| ☐ | A horticulture structure or livestock structure for a person engaged in the business of horticulture or producing livestock; | ☐ | A building under a construction contract with an organization exempt from taxation under section 501(c)(3) of the Internal Revenue Code of 1986 when the building is to be used exclusively for the organization's exempt purposes; |
| ☐ | A house of public worship or religious education; | | |
| ☐ | The original construction of a sports facility under R.C. section 307.696; | ☐ | A hospital facility entitled to exemption under R.C. section 140.08; |
| ☐ | Real property outside this state if such materials and services, when sold to a construction contractor in the state in which the real property is located for incorporation into real property in that state, would be exempt from a tax on sales levied by that state; | ☐ | Building and construction materials and services sold for incorporation into real property comprising a convention center that qualifies for property tax exemption under R.C. 5709.084 (until one calendar year after the construction is completed). |

The original of this certificate must be signed by the owner/contractee and/or government official and must be retained by the prime contractor. Copies must be maintained by the owner/contractee and all subcontractors. When copies are issued to suppliers when purchasing materials, each copy must be signed by the contractor or subcontractor making the purchase.

**Prime Contractor**
Name
Signed by
Title
Street address
City, state, ZIP code
Date

**Owner/Contractee**
Name: Defiance County Commissioners
Signed by
Title
Street address: 500 Court Street, Suite A
City, state, ZIP code: Defiance OH 43512
Date

**Subcontractor**
Name
Signed by
Title
Street address
City, state, ZIP code
Date

**Political Subdivision**
Name: same as Owner
Signed by
Title
Street address
City, state, ZIP code
Date

# CONTRACTOR'S AFFIDAVIT OF PAYMENT OF DEBTS AND CLAIMS AND RELEASE OF LIENS

| | | | |
|---|---|---|---|
| OWNER: | **Defiance County Commissioners**<br>**500 Court Street, Suite A**<br>**Defiance, OH 43512** | PROJECT: | **The Blake House Addition and Alterations** |
| | | ARCHITECT'S PROJECT NO: | **C0-4665** |
| | | CONTRACT FOR: | |
| ATTN: | | CONTRACT DATE: | |

STATE OF: _____

COUNTY OF: _____

The undersigned hereby certifies that, except as listed below, payment has been made in full and all obligations have otherwise been satisfied for all materials and equipment furnished, for all work, labor, and services performed, and for all known indebtedness and claims against the Contractor for damages arising in any manner in connection with the performance of the Contract referenced above for which the Owner or Owner's property might in any way be held responsible or encumbered.

EXCEPTIONS:

The undersigned hereby futher certifies that to the best of the undersigned's knowledge, information and belief, except as listed below, the Releases or Waivers of Lien attached hereto include the Contractor, all Subcontractors, all suppliers of materials and equipment, and all performers of Work, labor or services who have or may have liens or encumbrances or the right to assert liens or encumbrances against any property of the Owner arising in any manner out of the performance of the Contract referenced above.

EXCEPTIONS:

SUPPORTING DOCUMENTS ATTACHED HERETO:

- ❑ Consent of Surety to Final Payment (required whenever Surety is involved) on AIA Document G707, Consent of Surety, or equivalent.
- ❑ Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.
- ❑ Separate Releases or Waivers of Liens from Subcontractors and material and equipment suppliers, to the extent required in accordance with Section 01 2900.

CONTRACTOR:
*(name and address)*

By: _____
*(signature of authorized representative)*

_____
*(printed name and title)*

Subscribed and sworn to before me on: _____
*(date)*

Notary Public: _____

My Commission Expires: _____

## GENERAL CONDITIONS

A. AIA Document A201-2017, General Conditions of the Contract for Construction, hereinafter referred to as "General Conditions," is hereby made part of the Contract Documents, as if attached hereto or repeated herein. Bidders and Contractors shall consult this document and become thoroughly familiar with its contents before submitting bids or proposals. Copies are available for purchase from the American Institute of Architects, www.aiacontracts.org, phone 800-942-7732.

B. AIA General Conditions are hereinafter supplemented and amended by Supplementary Conditions. All supplementary provisions shall be considered as added thereto. Where any article is amended, deleted or superseded hereby, unaltered provisions of such article shall remain in effect.

C. In case of conflict, Supplementary Conditions shall take precedence.

END OF DOCUMENT

# SUPPLEMENTARY CONDITIONS

## 1. MODIFICATIONS TO GENERAL CONDITIONS

A. These Supplementary Conditions supplement, modify, change, delete from, or add to the General Conditions. Where a portion of the General Conditions is modified or deleted by Supplementary Conditions, the unaltered portions of the General Conditions remain in effect.

## 2. ARTICLE 1 – GENERAL PROVISIONS

### A. 1.1 Basic Definitions

1. Revise the last sentence of 1.1.1 to read as follows: Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, sample forms, or other information furnished by the Owner in anticipation of receiving bids or proposals.

2. Add the following at the end of 1.1.2: The Contractor acknowledges and agrees that the Contract Documents are sufficient to provide for the completion of the Work and include all Work, whether or not shown or described, which reasonably may be inferred to be required or useful for the completion of the Work in accordance with all applicable laws, codes, and professional standards.

3. Modify 1.1.5 – The Drawings: Add the following:
   a. Refer to the List of Drawings for a listing of Drawings issued.
   b. The word "Plans" shall be construed to include all Drawings, except in the context of a horizontal section view of the Project or a specific portion thereof.

4. Modify 1.1.6 – The Specifications: Add the following:
   a. The requirements of each Section of Division 01 apply to all Specification Sections.

5. Add the following definitions:
   a. 1.1.9 – Project Manual: The Project Manual is the written document assembled for the Work which may include Procurement and Contracting Requirements, Conditions of the Contract, and Specifications. Refer to the Project Manual Contents for a complete listing.
   b. 1.1.10 – Architect: The Architect is Beilharz Architects, Inc., 701½ West First Street, Defiance, Ohio 43512, phone 419-782-6211.
   c. 1.1.11 – Owner: The Owner is the Board of Defiance County Commissioners, 500 Court Street, Defiance, Ohio 43512.
   d. 1.1.12 – Tenant: The Tenant is the Defiance/Paulding County Department of Job and Family Services, 06879 Evansport Road, Suite A, Defiance, Ohio 43512.

e. 1.1.13 – Contractor: Inasmuch as this Project is bid on a single prime contract basis, the terms "General Contractor," "Plumbing Contractor," "HVAC Contractor," "Electrical Contractor," etc. shall mean "the Contractor." Responsibility for completion of all portions of the Project, except where specifically noted otherwise, shall be borne by the Contractor. The Contractor may use the reference to separate contracts, and to Plumbing, Electrical and other contractors, as an aid in establishing major subcontract responsibilities, but by so doing shall in no way relieve himself of the final responsibility for proper completion of the Work.

**B. 1.2 Correlation and Intent of the Contract Documents**

1. Modify 1.2.2 by replacing the period at the end of the paragraph with a comma and adding the following: "nor shall the Architect by reason thereof become an arbiter to establish subcontract limits between Subcontractors of any Prime Contractor. Where responsibility for particular work is assigned to a particular trade or contract, that trade or contract shall not be released from that responsibility by reason of the location of the assigning of responsibility. The Contractor shall be responsible for all work assigned to him, even though that responsibility may be shown only in that portion of the Contract Documents typically pertaining to another contract or trade."

2. Add the following after 1.2.3:
   a. 1.2.3.1 – Furnish, Install, Provide: Wherever the words "furnish," "install," "provide," or equivalent words are used, without further limitation, they shall be construed to mean the responsibility to supply and place in position for use the devices, equipment or material named, together with all associated devices, equipment, materials, wiring, piping, and related components as may be required for a complete and operating installation.
   b. 1.2.3.2 – Warranty and Guarantee: The words "warranty" and "guarantee" shall have the same meaning and shall be defined as "legally enforceable assurance of the duration of satisfactory performance or quality of a product or work."

3. Add 1.2.4 – Complete sets of Contract Documents are intended, and the Contract will include all documents referenced in the List of Drawings and Project Manual Contents. It is the Contractor's responsibility to request missing documents from the Architect in writing before submitting a bid.

4. Add 1.2.5 – Reference to standards, codes, or specifications, or to manufacturer's specifications, instructions, recommendations, requirements or directions, require that the Contractor become fully and adequately informed of the contents of such documents, and shall properly apply the information therein so that the best possible intended use of the item, material or technique is achieved.

**C. 1.7 Digital Data Use and Transmission**

1. Modify 1.7 by inserting "or equivalent" after the title of the AIA Document.

**D. 1.8 Building Information Models Use and Reliance**

1. Modify 1.8 by inserting "or equivalent" after the title of each AIA Document.

## 3. ARTICLE 2 – OWNER

**A. 2.1 General**

1. Revise 2.1.2 to read as follows: The Owner will prepare a Notice of Commencement for the Project in accordance with the Ohio Revised Code and furnish a copy to the Contractor or a subcontractor or supplier within a reasonable time upon receipt of a written request. The Contractor shall furnish a copy of the Notice of Commencement to a Subcontractor or supplier within fifteen days after receipt of a written request.

**B. 2.2 Evidence of the Owner's Financial Arrangements**

1. Replace 2.2.1 through 2.2.4 with the following: The Owner shall attach to the Agreement with the Contractor, the certificate of available resources required by Ohio Revised Code Section 5705.41, as evidence of available funds to fulfill the Owner's obligations under the Contract.

**C. 2.3 Information and Services Required of the Owner**

1. Add the following at the end of 2.3.6: The Contractor may purchase additional copies of the Contract Documents at the cost of reproduction and delivery.

**D. 2.5 Owner's Right to Carry Out the Work**

1. Add 2.5.1 – Notwithstanding anything to the contrary in the Contract and without limiting Owner's rights and remedies, it is agreed and understood by the Contractor that if there is a work stoppage or delay of Contractor's work, directly or indirectly, involving Contractor's employees, and if any such work stoppage or delay is not resolved to the satisfaction of the Owner within seven calendar days from the commencement of said work stoppage or delay, the Owner may terminate the Contract for cause as provided in Section 14.2.

## 4. ARTICLE 3 – CONTRACTOR

**A. 3.2 Review of Contract Documents and Field Conditions by Contractor**

1. Modify 3.2.2, 3.2.3, and 3.2.4; change "request for information" to "request for interpretation."
2. Add 3.2.5 – If, in the Contractor's opinion, any portion of the Work is indicated or specified in a manner that makes it impossible to produce work of the required quality, the Contractor shall report this to the Architect as a request for interpretation in such form as the Architect may require, before proceeding with that portion of the Work. If Contractor fails to make such request, no excuse will be entertained for failure to carry out that portion of the Work in a satisfactory manner.

3. Add 3.2.6 – If the Contract Documents disagree as to the quality or quantity of Work required, the better quality or greater quantity shall be provided, but not before referring the points in question to the Architect for approval.

**B. 3.3 Supervision and Construction Procedures**

1. Add 3.3.4 – Contractor shall not erect vertically and independently to a height greater than one scaffold from the foundation, masonry walls, structural steel, or any other building feature dependent on connection with other portions of the structure for support or anchorage without sufficient bracing, tying, or other approved method. The Contractor shall be responsible for the design and erection of all bracing, shoring, and sheathing as required for safety and the proper execution of the work, and shall remove such components when the work is completed.

**C. 3.10 Contractor's Construction and Submittal Schedules**

1. Modify 3.10.3; change "submitted to" to "approved by."

**D. 3.11 Documents and Samples at the Site**

1. Modify 3.11; delete the word "field" from the phrase "indicate field changes."

**E. 3.12 Shop Drawings, Product Data and Samples**

1. Add the following at the end of 3.12.7: Work commenced by Contractor prior to final approval of the Shop Drawings or other submittals is at the risk that no payment will be approved or made by the Owner for such Work.
2. Add the following at the end of 3.12.10: The Contractor shall defend, indemnify and hold harmless the Owner, Architect, and Architect's consultants from and against all claims, losses, liabilities and damages arising out of or resulting from any professional services rendered by or on behalf of the Contractor, or failure to render such services. The Contractor shall require that any design professionals retained to provide such services provide similar indemnities in favor of the Owner, Architect, and Architect's consultants.

**F. 3.13 Use of Site**

1. Add 3.13.1 – Before commencing work, Contractor shall verify with Owner and receive Owner's permission to use areas in the immediate vicinity of construction for storage of materials and for activities related to construction. Contractor shall confine construction activities to these agreed areas.

**G. Add 3.19 Workmanship**

1. Add 3.19.1 – Work shall be of the specified quality and conform to normal industry standards. Work of substandard quality (as determined by the Architect or inspecting authorities) shall be removed and replaced to conform to the quality standards of the trades concerned, or otherwise corrected to the satisfaction of the complainant, at Contractor's expense.

## 5. ARTICLE 4 – ARCHITECT

### A. 4.2 Administration of the Contract

1. Add 4.2.2.1 – The Owner is entitled to reimbursement from the Contractor for amounts paid to the Architect for site visits made necessary by the fault of the Contractor or by defects and deficiencies in the Work.
2. Modify 4.2.14; change "request for information" to "request for interpretation" at both locations.

## 6. ARTICLE 5 – SUBCONTRACTORS

### A. 5.3 Subcontractual Relations

1. Add 5.3.1 – Nothing contained in the Contract Documents shall be construed as creating any contractual relationship between any Subcontractor and the Owner. The Divisions and Sections of the Specifications are not intended to control the Contractor in dividing the Work among Subcontractors or to limit the work performed by any trade. The Contractor shall be as fully responsible to the Owner for the acts and omissions of Subcontractors and of persons employed by them, as for the acts and omissions of persons directly employed by the Contractor. The Contractor shall be responsible for the coordination of the trades, Subcontractors and Suppliers, and persons engaged upon the Contractor's work. The Contractor shall, without additional expense to the Owner, utilize the services of specialty Subcontractors on those parts of the work which are required by the Contract Documents to be performed by specialty Subcontractors. The Owner or Architect shall not undertake to settle any differences between the Contractor and Subcontractors, or between Subcontractors. The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the work to give the Contractor the same power as regarding termination of any subcontract that the Owner may exercise over the Contractor under any provisions of the Contract Documents.
2. Add 5.3.2 – If any Contractor, Subcontractor, or Sub-subcontractor desires to obtain the services of any other Contractor, Subcontractor or Sub-subcontractor, the party hired to do the work shall become a Subcontractor or Sub-subcontractor under the party hiring them, and shall be subject to all provisions of the Contract Documents which pertain to Subcontractors and Sub-subcontractors, as applicable.

## 7. ARTICLE 7 – CHANGES IN THE WORK

### A. 7.2 Change Orders

1. Add 7.2.2 – Agreement on any Change Order shall constitute a final settlement of all matters related to the change in the Work that is the subject of the Change Order, including, but not limited to, all direct and indirect costs and cumulative

impact associated with such change, and all adjustments to the Contract Sum and the Contract Time.

## 8. ARTICLE 8 – TIME

### A. 8.2 Progress and Completion

1. Add 8.2.4 – The Contractor shall obtain insurance and permits, file documents and notices as required and necessary, and perform other duties required under the Contract Documents, in a timely manner so as not to impede progress of the Work.

### B. 8.3 Delays and Extensions of Time

1. Modify 8.3.3 by replacing the period at the end of the paragraph with a comma and adding the following: "except that extensions of time arising from adjustments to the Construction Schedule affecting multiple Contractors, and not made primarily for the convenience of the Owner, shall not be grounds for claims for Consequential Damages as defined in Section 15.1.7."

## 9. ARTICLE 9 – PAYMENTS AND COMPLETION

### A. 9.9 Partial Occupancy or Use

1. Add 9.9.4 – If it becomes necessary at any time during construction to move materials which are to enter into the construction, or equipment which has been temporarily placed, the Contractor furnishing said materials or equipment shall, when directed by the Owner, move them or cause them to be moved without charge to Owner. Once such materials and equipment are stored at the site they may not be removed from the site without the Owner's permission.

## 10. ARTICLE 10 – PROTECTION OF PERSONS AND PROPERTY

### A. 10.2 Safety of Persons and Property

1. Revise 10.2.1 by renumbering .3 to .4 and adding a new .3: materials, equipment, and completed Work of Separate Contractors; and

### B. 10.3 Hazardous Materials and Substances

1. Add the following at the end of 10.3.1: Hazardous substance shall mean any substance that is toxic, ignitable, reactive, or corrosive and that is regulated by any local, state, or federal government agency or entity; any and all material or substance that is defined as "hazardous waste", "extremely hazardous waste", or a "hazardous substance" under any local, state, or federal law or regulation; and all petroleum products.
2. Add the following at the end of 10.3.5 – Contractor shall not cause or permit any hazardous substance, including those necessary for execution of the Work, to be used, stored, generated, or disposed of on or in the site without first obtaining

Owner's written consent. Regardless of whether Contractor has obtained Owner's written consent, if any contamination of any kind whatsoever occurs during Contractor's use of the site, or if Contractor violates any local, state, or federal law or regulation relating to hazardous substances or environmental contamination, Contractor shall indemnify and hold harmless the Owner from any and all claims, damages, fines, judgments, penalties, costs, liabilities, or losses, including without limitation, any and all sums paid for settlement of claims, attorney's fees, consultant fees, and expert fees arising during or after the Contract period.

3. Add 10.3.7 – Contractor shall have no liability for environmental damages resulting from hazardous materials not addressed in the Contract Documents which were present at the site prior to the date of commencement of the Work.

4. Add 10.3.8 – Upon request of the Owner, the Contractor and each direct Subcontractor to the Contractor shall certify that all materials are free of asbestos fibers and other hazardous carcinogenic ingredients.

**C. 10.4 Emergencies**

1. Revise 10.4 to read as follows: In case of an emergency which threatens loss or injury of property and/or safety of life, the Contractor shall act, in the absence of previous instructions from the Owner or the Architect, as the situation may warrant, and shall notify the Architect immediately thereafter of the nature of the emergency and the action taken. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 7 and Article 15.

**D. Add 10.5 Contractor Responsibilities**

1. Add 10.5.1 – The Contractor shall be the custodian of the building and premises and shall (1) provide protection as required against rain, wind, and storms to maintain work free from damage by same; (2) provide temporary closures to protect against intrusion of building once enclosure is attained; and (3) furnish and maintain temporary stairs, ladders, ramps, and similar access facilities, as required for safe and proper execution of the work of all trades.

2. Add 10.5.2 – The Contractor shall be fully responsible for initiating and maintaining all procedures necessary to prevent damage to physical property or personnel. Contractor shall be especially careful to maintain optimum fire safety programs at all times, including control of rubbish, fire watches, fire-fighting equipment, maintenance of exit ways and alarm systems, and all other techniques necessary.

3. Add 10.5.3 – The Contractor shall comply with all applicable provisions of the Occupational Safety and Health Act, and shall be responsible for fines and costs incurred as a result of violations or alleged violations.

4. Add 10.5.4 – The Contractor shall provide and maintain protection of approved type for all floors, passageways, and other surfaces subject to damage, involved in the execution of the work.
5. Add 10.5.5 – The Contractor shall provide and maintain suitable temporary walks, passageways, barricades, fences, railings, and similar facilities, and all necessary lights, signs, and warnings, as required by law and necessary for the protection of the public and others having access to the site.
6. Add 10.5.6 – The Contractor shall make good any such loss or damage without expense to Owner.
7. Add 10.5.7 – The Contractor shall make good any loss or damage due to water leakage caused by the Contractor's and Subcontractors' work without expense to the Owner.
8. Add 10.5.8 – Methods of protection shall be subject to the approval of the Architect and protection shall be maintained until the completion of the Work or until removal is directed by the Architect.
9. Add 10.5.9 – The Contractor shall post warning signs at each entrance to the construction site prohibiting anyone from entering upon the premises with firearms or concealed firearms, and shall enforce this prohibition with respect to its employees, Subcontractors, Suppliers, and other parties under its control.

## 11. ARTICLE 13 – MISCELLANEOUS PROVISIONS

### A. 13.4 Tests and Inspections

1. Add 13.4.7 – When any work is being performed away from the site, the Contractor shall notify the Architect, within a reasonable time in advance, of the location where such work is being done, and when it will be ready for inspection, so that the Architect may inspect the same from time to time prior to delivery, at Owner's request.
2. Add 13.4.8 – The Contractor shall not be relieved of responsibility for proper completion of the Work in accordance with the Contract Documents due to the Architect's observation of faulty Work or Work not in accordance with the Contract Documents.

## 12. ARTICLE 15 – CLAIMS AND DISPUTES

### A. 15.2 Initial Decision

1. Replace 15.2.6 with the following: When a written decision of the Initial Decision Maker states that the decision is final but subject to mediation or binding dispute resolution, failure to demand mediation or to file an action in the Court of Common Pleas for the county in which the Project is located, within 30 days after the date on which the party making the demand receives the written decision, shall result in the decision becoming final and binding upon the Owner and the

Contractor, unless in conflict with applicable law. If the Initial Decision Maker renders a decision after mediation or binding dispute resolution has been initiated, such decision may be entered as evidence, but shall not supersede the proceedings, unless the decision is acceptable to all parties concerned.

**B. 15.4 Arbitration**

1. Delete Section 15.4 in its entirety.
2. Delete references to arbitration wherever they occur in the General Conditions.

END OF DOCUMENT

# Defiance County
# Board of Commissioners

***Ryan Mack, Michael Pocratsky, and Gary Plotts***


This contract is subject to Ohio Prevailing Wage Laws, Chapter 4115 of the Ohio Revised Code and the Contractor and all subcontractors shall comply with all provisions contained therein or as otherwise provided in this note. The Contractor guarantees that the prevailing wage scale to be paid to all laborers and mechanics employed on this contract shall be in accordance with the schedule of the prevailing hourly wage and fringe benefits as determined by the Ohio Department of Commerce for the County in which the work is being performed. The failure to pay prevailing wages to all laborers and mechanics employed on this project shall be considered a breach of contract. Such a failure may result in the revocation of the contractor's and/or subcontractor's certificate of qualification and debarment. A schedule of the most current prevailing wage rates may be accessed by registering with the Ohio Department of Commerce, Labor and Worker Safety Division, Wage and Hour Bureau at the following web address: http://www.com.ohio.gov/laws/Default.aspx.

**If you are unable to obtain a copy of the most current prevailing wage rates, you may obtain a copy at the Defiance County Commissioners' Office, 500 Court Street, Suite A, Defiance, Ohio 43512.**

**The Contractor and all subcontractors shall compensate the employees on this contract at a pay rate of not less than the hourly wage and fringe rate listed on the website noted above, for the applicable job classification or as modified by the Ohio Department of Commerce, Division of Labor and Worker Safety Wage and Hour Bureau, when new prevailing wage rates are established.**

Overtime shall be paid at one and one-half times the basic hourly rate for any hours worked beyond forty (40) hours during a pay week. The Contractor and all subcontractors shall pay all compensation by company check to the worker and fringe benefit program.

The wage and fringe rates determined for this project or as may be later modified, shall be posted by the Contractor in a prominent and accessible place on the project, field office or equipment yard where they can be easily read by the workers or otherwise made available to the workers. On the first pay date of contract work the Contractor and all subcontractors shall furnish each employee covered by prevailing wage a completed form whpw1512 in accordance with section 4115.05 Ohio Revised Code, showing the classification, hourly pay rate, fringes, and identifying District Prevailing Wage Coordinator (DPWC), if such employees are not covered by a collective bargaining agreement or understanding between employers and bona fide organizations of labor. These forms shall be signed by the Contractor or subcontractor and the employee and kept in the Contractor's or subcontractor's payroll files.

The Contractor and all subcontractors shall submit to the DPWC or other designated Department representative, certified payrolls on form whpw1509 or equivalent, in accordance with sections 4115.07 and 4115.071(C) of the Ohio Revised Code, three weeks after the start of work and every subsequent week until the completion of the contract. Additionally, a copy of the "Apprentice Certification" obtained from the USDOL, Bureau of Apprenticeship and Training, must accompany, the first certified payroll submitted for all apprentices working on this project. Upon completion of the contract and before the final payment, the Contractor shall submit to the DPWC a final wage affidavit in accordance with section 4115.07 of the Ohio Revised Code stating that wages have been paid in conformance with the minimum rates set forth in the contract. Please be aware that it is ultimately the responsibility of the prime Contractor to ensure that all laws relating to prevailing wages in Chapter 4115 of the Ohio Revised Code are strictly adhered to by all subcontractors.

The Contractor and all subcontractors shall make all of its payroll records available for inspection, copying or transcription by any authorized representative of the contracting agency. Additionally, the Contractor and all subcontractors shall permit such representatives to interview any employees during working hours while the employee is on the job.

If the Contractor or any subcontractor fails to comply with any of the provisions contained in this proposal note, the Department may terminated the contract, debar the Contractor or subcontractor and/or withhold or suspend pay estimates after written notice and a reasonable opportunity to comply has been provided.


**500 Court Street, Suite A**
**Defiance, Ohio 43512**
**Email: commissioners@defiance-county.com**

**Phone: 419-782-4761**
**Fax: 419-782-8449**
**www.defiance-county.com**

## SECTION 01 1000 – SUMMARY OF WORK

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Contract description.
   2. Project estimate.
   3. Contract time schedule.
   4. Liquidated damages.
   5. Work by Owner.
   6. Owner-supplied Products.
   7. Work restrictions.
   8. Use of site.

1.02 CONTRACT DESCRIPTION:

A. Award of Contracts: Contracts will be written with a single Prime Contractor.

B. Form of Contract: Document A101-2017, Standard Form of Agreement Between Owner and Contractor.

   1. Binding Dispute Resolution: Arbitration will not be selected as the method of binding dispute resolution in Article 6 of the Agreement.

   2. Insurance: Insurance requirements will be included in the Agreement using AIA Document A101-2017 Exhibit A.
      a. Commercial General Liability and all other liability coverage shall have policy limits of not less than $1,000,000 per each occurrence, accident, employee, or claim, $1,000,000 in the aggregate, and $1,000,000 aggregate for products-completed operations hazard.
         (1) The Commercial General Liability insurance shall include coverage for property damage resulting from defective work of Contractor and Subcontractors.
      b. The Contractor shall purchase and maintain insurance for physical damage to property while it is in storage and in transit to the construction site on an "all-risks" completed value form.

1.03 PROJECT ESTIMATE:

A. In accordance with Section 153.12, ORC, the estimate of construction cost for this project, for the prime contracts described above, is $343,226.

1.04 CONTRACT TIME SCHEDULE:

A. Schedule of Completion Dates:

1. Award of Contract: Owner intends to award contracts within 30 days after receipt of bids. Contract awards made later than 60 days after receipt of bids are subject to consent of the Contractor.

2. Notice to Proceed: Upon award of contract.

3. Substantial Completion: April 24, 2021.

4. Final Completion: 7 days after Substantial Completion.

B. Description of Completion Dates:

1. Award of Contract: The date that Contractor is notified of Owner's intent to enter into contract. At this time, the Contractor shall begin generating all required submittals and ordering long lead-time materials.

2. Notice to Proceed: The date that Contractor is allowed to commence work in the subject area. Notification shall be made by separate communication from the above Schedule.

3. Substantial Completion: The date by which the subject area is sufficiently completed to be fully occupied by the Owner. The Architect will perform a walk-through review of the work and compile an itemized punch list of non-conforming or unsatisfactory work.
   a. The Contractor shall obtain the Certificate of Occupancy from local governing authorities by this date.

4. Final Completion: The date by which all punch list items and any other required work in subject area is 100% complete. Contractor's superintendent for the subject area may not leave until this date.
   a. For a work item to be considered complete, all contract closeout submittals must be received by the Architect. If necessary, and only if actual work has been completed on items, seven additional calendar days will be allowed for contract closeout submittals.
   b. In the event the date of Substantial Completion is modified by Change Order, the date of Final Completion shall be correspondingly modified by the same number of days unless specifically provided otherwise.

1.05 LIQUIDATED DAMAGES:

A. In the event the Contractor has failed to achieve Substantial Completion by the specified date, the Owner shall be entitled to retain or recover from the Contractor as liquidated damages, and not as a penalty, the amount scheduled below for each day until Substantial Completion has been achieved or until the specified date for Final Completion, whichever occurs first.
   1. Subject Area: 0.067% of the Contract Sum per calendar day (annual rate of 24%); minimum $25 per calendar day.

B. In the event Substantial Completion has not been achieved by the date specified for Final Completion, liquidated damages for Substantial Completion as specified above shall accrue for the period between the specified dates for Substantial Completion and Final Completion. Beginning with the specified date for Final Completion, the Owner shall be entitled to retain or recover from the Contractor as liquidated damages, and not as a penalty, the amount scheduled below for each day until Final Completion has been achieved.
   1. Subject Area: 0.115% of the Contract Sum per calendar day (annual rate of 42%); minimum $50 per calendar day.

C. In the event Substantial Completion has been achieved by the specified date, but Final Completion has not been achieved by the specified date, the Owner shall be entitled to retain or recover from the Contractor as liquidated damages, and not as a penalty, the amount scheduled below for each day until Final Completion has been achieved.
   1. Subject Area: 0.115% of the Contract Sum per calendar day (annual rate of 42%); minimum $50 per calendar day.

D. Completion Date Conflicts:
   1. Bids shall be based solely on the Contract Time Schedule indicated. Do not include any anticipated liquidated damages costs in the Base Bid price.
   2. If, in any bidder's opinion, the Contract Time Schedule dates do not seem obtainable, such bidder may submit a proposal for revised completion dates, along with any cost adjustments necessary, on a separate sheet attached to the Bid Form.

**PART 2 PRODUCTS**

2.01 WORK BY OWNER:

A. The following work will be performed by others under separate contract and shall not be included under this contract.
   1. Testing and inspecting services identified in Section 01 4520.

2.02 OWNER-SUPPLIED PRODUCTS:

A. The following items will be furnished by others under separate contract, and material costs shall not be included in this contract. Receive and unload Products at site; inspect for completeness or damage, jointly with Owner. Handle, store, install, and finish Products. Furnish and install the indicated accessories and related items as

required for complete installation, including structural framing, backing, and support. Coordinate installation requirements with the supplier as required.

1. Toilet paper holders and towel bars.

## PART 3 EXECUTION

3.01 WORK RESTRICTIONS:

A. Schedule, coordinate and perform all Work to minimize disruption to Owner's activities.
   1. Keep driveways and entrances serving the premises clear and available to the Owner, the Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.

B. Except as otherwise limited in the Contract Documents, the Contractor shall have full use of the premises for construction operations. The Owner's right to perform work or to retain other Contractors on portions of the Project limits Contractor's use of the premises.

3.02 USE OF SITE:

A. The Contractor shall prepare a proposed Project Use Site Plan, also referred to as a Site Logistics Plan, for approval by Architect and Owner.

B. Confine operations at the site to areas within the boundaries indicated and approved on the Project Use Site Plan, and as permitted by law, ordinances, and permits. Site shall not be unreasonably encumbered with materials, products, or construction equipment.

C. The Project Use Site Plan shall include access to proposed buildings for construction purposes, storage of materials and products, employee parking, temporary facilities including offices, storage, and workshop sheds or portable trailers, and unloading space.

D. Where a temporary fence is to be provided, show any additional area needed in the Contractor's use of the site beyond that which may be indicated on the Drawings. Where additional fencing is required, such fencing shall be included at no additional cost to the Owner.

E. The Owner will designate which portions of existing site areas can be used for construction activities. Damage to existing paved and unpaved areas, or other existing site features shall be repaired at the expense of the Contractor responsible for damage.

END OF SECTION

## SECTION 01 2900 – PAYMENT PROCEDURES

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Contract modification procedures.
   2. Schedule of values.
   3. Notices of commencement and furnishing.
   4. Application for payment.

B. Related Requirements:
   1. Section 01 7700 – Closeout Requirements.

1.02 CONTRACT MODIFICATION PROCEDURES:

A. The Owner shall have the right at any time, with reasonable notice to Contractor and resulting adjustment to Contract Sum or Contract Time, if any, to require alterations, additions to or deductions from the Work described in the Contract Documents.

B. Architect will advise of minor changes in the Work not involving an adjustment to Contract Sum or Contract Time by issuing an Order for Minor Changes.

C. Architect may issue a Request for Proposal which includes a detailed description of a proposed change with supplementary or revised Drawings and specifications. Contractor shall promptly prepare and submit a detailed itemized proposal for revising the Contract Sum or Contract Time, or both, to incorporate the proposed change. Do not proceed with the proposed changes until a Construction Change Directive or Change Order is issued.

D. Architect may issue a Construction Change Directive approved by the Owner, instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work, and designate method of determining any change in Contract Sum or Contract Time. Promptly execute the change.
   1. Maintain detailed records of work performed. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.

E. Contractor may propose changes by submitting a request for change to the Architect, describing the proposed change and its full effect on the Work. Include a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation, and a statement describing the effect on Work by separate or other Contractors. Document any requested substitutions in accordance with Section 01 6000. Architect and Owner reserve the right to accept or reject such proposed changes, or to request modifications thereto.

F. Accompany all proposals, whether Contractor initiated or in response to a Request for Proposal or Construction Change Directive, with a detailed itemized breakdown including the following:
   1. Materials: Indicate quantities and unit costs.
   2. Labor: Indicate man hours of labor and hourly rates for each classification of labor involved.
   3. Direct Costs: Fuel, supplies, scaffolding, construction equipment, insurance, taxes and related items.
   4. Overhead and Profit: In no case will a rate greater than 10 percent of the sum of the above items be approved for an amount to include overhead, profit, insurance, and bonds.
      a. For deduct change orders, the rate shall be a minimum of 5 percent of the sum of the above items, but need not exceed the rate charged for add change orders.

G. Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

1.03 SCHEDULE OF VALUES:

A. Submit Schedule of Values within 15 days after Notice to Proceed. Revise and resubmit as required by Architect prior to initial Application for Payment.

B. Submit on forms attached to this Section. Electronic copies of the form are available from the Architect on request. Utilize the Table of Contents of this Project Manual. Identify each line item with the number and title of the specification Section.

C. Include separate line items for each of the following: General Requirements, bonds, insurance, submittals, progress cleaning, final cleaning, punch list work, project record submittals, and specified training.

D. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including construction progress schedules, schedule of submittals, and lists of subcontractors, products, principal suppliers and fabricators.

E. Obtain itemized quotations from Subcontractors and suppliers performing work under multiple Sections. “Package bids” will not release Contractor from the responsibility of furnishing values for each Section of the Work.

F. Revise schedule with each Application for Payment to list approved Change Orders.

G. Architect reserves the right to use the Schedule of Values for guidance in evaluating Change Order proposals and claims submitted by the Contractor.

1.04 NOTICES OF COMMENCEMENT AND FURNISHING:

A. Architect will prepare a Notice of Commencement (NOC) in accordance with the Ohio Mechanics’ Lien Law (Section 1311 O.R.C.) and deliver a copy to the Contractor.

B. Contractor shall post the NOC at the job site adjacent to the building permit, plan approval certificate, or zoning permit, and shall distribute copies upon request to Subcontractors and suppliers.

C. If the Contractor has not received an NOC within 10 days after construction begins, the Contractor shall deliver to the Owner a written request for a Notice of Commencement.

D. Prior to submitting each Application for Payment, deliver to the Owner a written request for a list of all parties who have requested NOCs from the Owner or delivered Notices of Furnishing to the Owner.

1.05 APPLICATION FOR PAYMENT:

A. Submit each Application for Payment to the Architect on the forms attached to this Section. No other Application for Payment document will be processed. Electronic copies of the form are available from the Architect on request.

B. Submit sequentially numbered typewritten and notarized applications. Electronic submittal in PDF format is preferred. For hard copy applications, submit one original and two copies, keeping embossed seals away from areas intended for Architect's signature and notations.

C. Content and Format: Rounding to whole dollar amounts is preferred.
   1. Value of labor, materials, and equipment incorporated in the Work or delivered and stored at the site. Utilize Schedule of Values for listing items of Work.
   2. Deduction of retainage.
   3. Deduction of all previously approved payments.
   4. New amount applied for.

D. Contractor shall pay for transportation, services, materials, tools, expendables, and Subcontractor work. Each payment shall be in an amount equal to the percentage of completion allowed to the Contractor for each item or category, less the percentage retained from payments to the Contractor. Contractor shall make payments to Subcontractors.

E. Change Orders for additional work may be included in progress payments after approval by all parties.

F. Payment Period: Progress payments will be made at monthly intervals, from the date of the Notice to Proceed to the date specified for Substantial Completion. Each monthly payment shall be in an amount determined in accordance with Paragraph 9.3 of the General Conditions and the Supplementary Conditions.
   1. After the payment of the last scheduled progress payment, no further progress payments will be made until the Certificate of Substantial Completion has been issued. In the event that changes in the work result in an extension of time, the number of scheduled progress payments may be changed in accordance with the extension of time granted by Change Order.

2. After Substantial Completion, no further payment will be made until the final Application for Payment is approved.

G. Retainage: In making progress payments, 8 percent of the total labor performed to date, and 8 percent of stored materials, will be retained.
   1. After the work is 50 percent complete, as evidenced by approved Applications for Payment of at least 50 percent of the Contract Sum, no additional labor retainage shall be made, and all funds retained in accordance with this Section pursuant to Sections 153.12 and 153.14 of the Ohio Revised Code shall be deposited in the escrow account designated in Section 153.63 of the Revised Code.
   2. At Substantial Completion, provided there exists no other reason to withhold retainage, the retained percentages held in connection with the partial payments shall be released from escrow and paid to the Contractor, withholding only that amount necessary to assure completion.
   3. Within 30 days of Final Completion, funds in escrow account not heretofore paid, with accumulated interest, shall be paid to the Contractor in accordance with Section 153.63 (A) (2) of the Ohio Revised Code.

H. Initial Application for Payment: Submittals that must precede or coincide with submittal of the first Application for Payment include the following:
   1. Certificates of insurance.
   2. Construction schedule in accordance with Section 01 3200.
   3. Submittal Schedule, List of Subcontractors, and List of Products in accordance with Section 01 3300.

I. Submit the following additional forms with each Application for Payment. Applications will not be processed without receipt of the proper forms.
   1. Updated construction progress schedule in accordance with Section 01 3200.
   2. Waivers of Lien on a form acceptable to Owner, for the Prime Contractor and each of the following:
      a. All parties who have filed Notices of Furnishing with the Contractor or Owner.
      b. All parties who have requested Notices of Commencement from the Contractor or Owner.
      c. All Subcontractors performing work or suppliers providing material during the period covered by the application.

J. Submit the following additional forms with final Application for Payment. Applications will not be processed without receipt of the proper forms.
   1. Waivers of Lien on a form acceptable to Owner, for the Prime Contractor and each of the following:
      a. All parties who have filed Notices of Furnishing with the Contractor or Owner.
      b. All parties who have requested Notices of Commencement from the Contractor or Owner.

c. All Subcontractors performing work or suppliers providing material during the 21 days preceding the date of the application.

2. Closeout submittals in accordance with Section 01 7700.

**PART 2 PRODUCTS**

Not Used

**PART 3 EXECUTION**

3.01 ATTACHMENTS:

A. Application and Certificate for Payment Form.

B. Schedule of Values Form.

END OF SECTION

# APPLICATION AND CERTIFICATE FOR PAYMENT

TO OWNER: **Defiance County Commissioners**
**500 Court Street, Suite A**
**Defiance, OH 43512**

PROJECT: **The Blake House Addition and Alterations**
**6621 Evansport Road**
**Defiance, OH 43512**

APPLICATION NO:
PERIOD TO:
ARCHITECT'S PROJECT NO: **C0-4665**

FROM CONTRACTOR:

VIA ARCHITECT: **Beilharz Architects, Inc.**
**701½ West First Street**
**Defiance, OH 43512**

CONTRACT FOR:
CONTRACT DATE:

## CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract.
Schedule of Values, Document G703, is attached.

1. **ORIGINAL CONTRACT SUM** $ _____
2. **CHANGE ORDERS**
   a. Changes Approved in Previous Months $ _____
      C.O. # _____
   b. Changes Approved This Month $ _____
      C.O. # _____
   c. **Net change by Change Orders** $ _____
3. **CONTRACT SUM TO DATE** (Line 1 + Line 2c) $ _____
4. **WORK COMPLETED TO DATE**
   a. Labor Completed to Date $ _____
   b. Material Completed to Date $ _____
   c. Stored Material $ _____
   d. **Total Completed and Stored to Date** $ _____
5. **RETAINAGE**
   a. Completed Labor (8% of Line 4a) $ _____
      (same as previous application if Line 6a on previous application is >50%)
   b. Stored Material (8% of Line 4c) $ _____
   c. **Total Retainage** $ _____
6. **TOTAL EARNED LESS RETAINAGE** $ _____
   (Line 4d less Line 5c)
   a. Percent Complete (Line 6/Line 3) _____ %
7. **LESS PREVIOUS CERTIFICATES FOR PAYMENT**
   (Line 6 from prior Certificate) $ _____
8. **CURRENT PAYMENT DUE**
   (Line 6 less Line 7) $ _____
9. **BALANCE TO FINISH, INCLUDING RETAINAGE**
   (Line 3 less Line 6) $ _____

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR:
By: _____ Date: _____
State of Ohio
County of: _____
Subscribed and sworn to before me
this _____ day of _____, 20_____

Notary Public:
My Commission expires:

## ARCHITECT'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising this application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

**AMOUNT CERTIFIED** $ _____
*(Attach explanation if amount certified differs from amount applied for. Initial all figures on this Application and on the Continuation Sheet that are changed to conform to the amount certified.)*

**Beilharz Architects, Inc.**

By: _____ Date: _____
This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

# SCHEDULE OF VALUES



CONTRACTOR:
CONTRACT FOR:

APPLICATION NO:
APPLICATION DATE:

PROJECT: **The Blake House Addition and Alterations**
ARCHITECT'S PROJECT NO: **C0-4665**

| LINE NO. | SECTION NO. | DESCRIPTION OF WORK | LABOR | | | | | MATERIALS | | | | | | TOTAL COMPLETED AND STORED TO DATE | % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SCHEDULED VALUE | WORK COMPLETED | | TOTAL COMPLETED TO DATE | % | SCHEDULED VALUE | WORK COMPLETED | | TOTAL COMPLETED TO DATE | % | MATERIALS PRESENTLY STORED | | |
| | | | | PREVIOUS APPLICATION | THIS PERIOD | | | | PREVIOUS APPLICATION | THIS PERIOD | | | | | |
| 1 | **00 6113** | **Bonds** | | | | | | | | | | | | | |
| 2 | **00 7200** | **Insurance** | | | | | | | | | | | | | |
| 3 | **01 1000** | **General Requirements** | | | | | | | | | | | | | |
| 4 | **01 3300** | **Submittals** | | | | | | | | | | | | | |
| 5 | **01 7000** | **Progress Cleaning** | | | | | | | | | | | | | |
| 6 | **01 7700** | **Final Cleaning** | | | | | | | | | | | | | |
| 7 | **01 7700** | **Punch List Work** | | | | | | | | | | | | | |
| 8 | **01 7700** | **Project Record Submittals** | | | | | | | | | | | | | |
| 9 | **01 7700** | **Training** | | | | | | | | | | | | | |
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| | | PROJECT TOTALS | | | | | | | | | | | | | |

# SCHEDULE OF VALUES



CONTRACTOR:
CONTRACT FOR:

APPLICATION NO:
APPLICATION DATE:

PROJECT: **The Blake House Addition and Alterations**
ARCHITECT'S PROJECT NO: **C0-4665**

| LINE NO. | SECTION NO. | DESCRIPTION OF WORK | LABOR | | | | | MATERIALS | | | | | | TOTAL COMPLETED AND STORED TO DATE | % |
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| | | | SCHEDULED VALUE | WORK COMPLETED | | TOTAL COMPLETED TO DATE | % | SCHEDULED VALUE | WORK COMPLETED | | TOTAL COMPLETED TO DATE | % | MATERIALS PRESENTLY STORED | | |
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| | | PROJECT TOTALS | | | | | | | | | | | | | |

## SECTION 01 3100 – PROJECT MANAGEMENT AND COORDINATION

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Project coordination.
   2. Requests for interpretation.
   3. Facility services coordination.
   4. Project meetings.
   5. Alteration project procedures.

1.02 PROJECT COORDINATION:

A. The Contractor shall assign one person who will be on site full-time and who will have authority to speak and act on behalf of the Contractor. This person shall supervise and direct the work using their best skill and attention, and shall coordinate all trades and Subcontractors and provide adequate labor, equipment and materials as needed.
   1. Communications to the Contractor's superintendent shall be as binding as if given directly to the Contractor.
   2. Upon Notice to Proceed, Contractor shall notify the Owner of the proposed superintendent, and if requested by the Owner shall also submit a summary of qualifications and experience, including references.
   3. Contractor shall not change their superintendent without prior written notice to the Owner, including justification for the change and identification and qualifications of the proposed replacement.
   4. Owner reserves the right to reject proposed superintendents within 30 days, in which case Contractor shall provide an acceptable replacement without adjustment of Contract Sum or Contract Time.

B. Maintain a constant check on the progress of the Project; coordinate and sequence work with that of others to facilitate progress of the Project; provide reasonable advance notification to all parties concerned of any special provisions regarding the placing, setting, or preparation of work that will affect the work of others; afford others every reasonable opportunity for installation and execution of their work and storage of their materials.

C. Alterations to work already placed and necessitated by failure to properly coordinate work shall be accomplished at the expense of the negligent party.

D. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to assure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

E. Before installing any work, and before purchasing any equipment, carefully check Contract Documents for conflicts or lack of coordination between or among required

Work, Contract Documents, and job conditions; immediately report same to Architect in writing.

1. In the event of failure to bring such lack of coordination between or among Contract Documents, work of other trades, and job conditions to Architect's attention in writing before work is performed or before equipment is purchased, resulting conflicts shall be corrected as directed by the Architect, without adjustment of Contract Sum or Contract Time.

F. Coordinate completion and clean up of Work of separate sections in preparation for Substantial Completion.

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.

1.03 REQUESTS FOR INTERPRETATION (RFI):

A. In the event the Contractor determines that some portion of the Contract Documents requires clarification or interpretation, submit a Request for Interpretation in writing on forms approved by the Architect.

B. Each RFI shall clearly and concisely set forth the issue for which clarification or interpretation is sought and why a response is needed, the date by which a response is requested, and shall include his interpretation or understanding of the contract requirements along with reasons why such an understanding was reached.

C. RFIs shall be submitted by the Prime Contractor only and shall not be used for routine project communication, to transmit submittals, to request substitutions, or for other correspondence. Documents which are not RFIs will be returned for resubmittal on the proper form.

D. Minor detail items related to shop drawing submittals shall be highlighted on the shop drawings and do not require an RFI.

E. Submit each RFI in sufficient time to avoid delaying the project, allowing minimum one week for Architect's response. If the Architect determines that a longer time is necessary to provide an adequate response, the Architect will advise of the anticipated response time within one week of receipt of the RFI. Adjustment of Contract Time will not be granted due to the Architect's response time.

F. Responses to RFIs shall be considered interpretations and clarifications of the contract requirements and do not change the Contract Documents. If the Contractor believes that a response constitutes a change to the Contract Documents, Contractor shall promptly give written notice.

G. In the event of an excessive number of RFIs where the requested information is available from the Contract Documents, field observations, or prior Project correspondence or documentation, the Owner shall be entitled to deduct from the

Contract Sum all reasonable costs charged by the Architect to the Owner for additional services required for the processing of such RFIs.

1.04 FACILITY SERVICES COORDINATION:

A. Contract Documents: Facility Services work (Plumbing, HVAC, Electrical, and Electronic Safety and Security) may be shown throughout the Drawings. Information required for proper coordination of the work may be contained in specifications of other trades. Become thoroughly familiar with all documents referenced in the Project Manual Contents and List of Drawings and coordinate the Work with all provisions thereof.

B. System Layout: Facility Services drawings are diagrammatic and are intended to show the approximate locations of components. Field verify dimensions shown on the Drawings. Do not scale drawings to obtain exact dimensions.
   1. Coordinate space requirements and installation of work indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
   2. The exact location of items not located by dimensions on the Drawings shall be determined in the field with consideration given to appearance, clearances, and potential conflicts, and is subject to approval by the Architect.
   3. Before beginning installation, verify required clearances for the erection of walls, casework, and other structural and architectural work shown on the Drawings. If any work is installed and it later develops that the architectural design cannot be followed, make such changes as the Architect may direct to facilitate completion of the architectural work in accordance with the Contract Documents.
   4. Report actual and potential interferences and conflicts among Facility Services work and the work of other trades to the Architect as soon as they are discovered. The Architect's decision shall be final in regard to the rearrangement of conflicting work, regardless of which was first installed.
   5. Field verify exact locations of apparatus, fixtures, and equipment supplied by the Owner and others, and install the work accordingly. If the installer fails to ascertain such locations before proceeding with the work, the work shall be changed at the installer's expense when so ordered.
   6. Throughout the course of the work, up to the time of roughing-in and installation, minor changes and adjustments to the installation may be requested by the Architect. Make such adjustments without modification to the Contract Sum or Contract Time, where such adjustments are necessary to facilitate proper installation and operation within the intent of the Contract Documents. This does not include work already completed.
   7. Position fixtures, equipment, devices, switches, outlets, and related components, to avoid interferences with and to assure proper coordination with work of other trades, walls, cabinets, counters, and architectural features. Coordinate recessed devices and fixtures with wall, floor and ceiling patterns.

8. Equipment and piping shall not be installed or run above electrical panelboards, nor in or above the access space in the immediate vicinity of the electrical panelboards, in accordance with the applicable electrical code. Failure to notify the Architect of conflict and to provide adequate coordination will result in costs incurred at the expense of the negligent party.
9. Maintain service access clearances to equipment as indicated on submittals. Verify that filter replacement, scheduled maintenance, and repair parts replacement can be performed without obstruction by other systems or components.
10. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

C. Utility Coordination: Contact each utility company providing service to the project and determine or verify their requirements.
   1. Make all arrangements with each utility company and pay all service charges associated with temporary or new services or modifications to existing services.
   2. Utility tie-ins shall be arranged with local utility company and other involved parties for minimum interruption of service.

D. Equipment Requirements: Verify utility requirements and characteristics of 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.
   1. The current to building for light and power will be 60 cycle, A.C. Verify voltage, amperage, and phase requirements for the work with the service available at the building.
   2. Prior to ordering electrically operated items, verify requirements so that they will operate on the voltage, amperage, and phase provided for them.
   3. Prior to ordering gas fired items, verify requirements so that they will operate on the type of gas and available pressure provided for them.
   4. Any item delivered to the job which will not operate on the current or fuel provided will be rejected or the Contractor will stand the expense of changing the wiring or piping to accommodate the equipment.
   5. Verify equipment can be installed and removed through permanent building openings. Where necessary, provide modular components which can be disassembled and reassembled. Bring exceptions to the attention of the Architect and provide lintels, knockout panels, and other construction as directed to facilitate installation and future removal of equipment.

E. Structural Supports: Except as otherwise noted, furnish the main supporting structure and provide floor, wall, and roof openings, as shown on the structural Drawings.
   1. Coordinate requirements for floor, wall, and roof openings, including openings not shown on the Drawings, before the structure is erected. Perform cutting and patching, where required, in accordance with Section 01 7000.
   2. Where equipment is supported by the building structure, the structural Drawings indicate supports and other design considerations which are based on the use of the

scheduled equipment. Where products of another listed manufacturer are supplied, or where substitutions are approved, coordinate dimensions, clearances, structural supports, and other conditions as required for proper installation.

3. Provide supplemental framing, rods, supports, and hangers required to install or mount equipment indicated, and as necessary to provide a complete working system. Do not support equipment, piping, conduit, or any other components from open web framing members at any locations other than panel points.
4. Provide cross bracing for suspended equipment to prevent swaying.

F. Access Panels: Where valves, traps, water hammer arresters, dampers, or other specialties are concealed in construction or behind a wall or ceiling surface, furnish and install an access panel of adequate size to permit adjustment or service of concealed device.
   1. Access panels shall be of a design suitable for installation in the material forming the finished surface in which each is mounted. Where doors are installed in fire-rated construction, they shall have the appropriate required rating.
   2. Each access panel shall have a flush metal frame and flush hinged steel door with flush screwdriver-operated latch.
   3. Coordinate access panel locations with the work of other trades. Wherever practicable, group components requiring access to be accessible from a single panel and eliminate as many access panels as possible.

G. Identification and Labeling: Where room numbers are used for identification of Facility Services components, utilize the Owner's final room names and numbers, which may vary from room names and numbers on the Drawings. Coordinate with interior signage and other permanent room identification.

1.05 PROJECT MEETINGS:

A. Preconstruction Meeting: Architect will schedule a meeting after Notice of Award.
   1. Attendance Required: Owner, Architect, and Contractor.
   2. Agenda:
      a. Execution of Owner-Contractor Agreement.
      b. Submission of executed bonds and insurance certificates.
      c. Distribution of Contract Documents.
      d. Submission of list of Subcontractors, list of Products, schedule of values, and project schedule.
      e. Designation of personnel representing the parties in Contract, and the Architect.
      f. Procedures and processing of field decisions, submittals, substitutions, applications for payment, change procedures, and contract closeout procedures.
      g. Use of premises by Owner and Contractor.
      h. Construction facilities, controls, and temporary utilities provided by Owner.
      i. Security and housekeeping procedures.
      j. Procedures for maintaining record documents.
      k. Scheduling.

3. Record minutes and distribute copies within two days after meeting to Architect, Owner, participants, and those affected by decisions made.

B. Progress Meetings: Schedule and administer meetings throughout progress of the Work at maximum monthly intervals, scheduled to coordinate with preparation of payment requests. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings. Notify parties, including Architect, at least four days in advance.

1. Attendance Required: Representatives of Contractor, major Subcontractors and suppliers, as appropriate to agenda topics for each meeting.

2. Agenda:
   a. Review minutes of previous meetings.
   b. Review of Work progress.
   c. Field observations, problems, and decisions.
   d. Identification of problems which impede planned progress.
   e. Review of submittals schedule and status of submittals.
   f. Review of off-site fabrication and delivery schedules.
   g. Maintenance of progress schedule.
   h. Corrective measures to regain projected schedules.
   i. Planned progress during succeeding work period.
   j. Coordination of projected progress.
   k. Maintenance of quality and work standards.
   l. Effect of proposed changes on progress schedule and coordination.
   m. Other business relating to Work.

3. Record minutes and distribute copies within two days after meeting to Architect, Owner, participants, and those affected by decisions made.

C. Preinstallation Meetings: When required in individual specification sections, convene a preinstallation meeting prior to commencing work of the section.

1. Require attendance of parties directly affecting, or affected by, work of the specific section.

2. Notify Architect four days in advance of meeting date.

3. Prepare agenda and preside at meeting:
   a. Review conditions of installation, preparation and installation procedures.
   b. Review coordination with related work.

4. Record minutes and distribute copies within two days after meeting to Architect, Owner, participants, and those affected by decisions made.

1.06 ALTERATION PROJECT PROCEDURES:

A. Existing Conditions: Existing equipment, sewers, piping, ducts, conduit, and other existing items in place shown or noted on the Drawings, may be relied upon only for general layout. Field verify all measurements, grades, relative elevations and locations,

and obtain additional information as necessary to assure the proper fit and coordination of new work with existing.

B. Where there are alterations or additions to an existing structure, remove, reroute, or replace existing facilities and services as may be necessary to permit installation of new work or alterations to old work.
   1. Where building systems or utility services must be disrupted to permit connections and modifications, notify Architect in advance and coordinate scheduling with Owner to cause the least possible inconvenience and shortest delay.
   2. Where existing equipment, piping, or miscellaneous related items are permanently abandoned, each component exposed to view or accessible in concealed locations shall be removed completely. Concealed inaccessible piping and conduit shall be plugged or capped at a point well behind the proposed new finished closures or surfaces.

C. Existing Hazardous Materials: If the existence of asbestos, mold, or other hazardous material in the structure or building is observed during the course of construction or work, promptly notify the Owner. The Owner will consult with their consultant regarding removal or encapsulation of the material. Do not perform any work which may affect the hazardous material prior to receipt of special instructions from the Owner.

D. Materials: As specified in Product sections; match existing Products and work for patching and extending work.

E. Employ skilled and experienced installer to perform cutting and patching in accordance with Section 01 7000.

F. Close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity.

G. Remove, cut, and patch Work in a manner to minimize damage and to provide a means of restoring Products and finishes to original or specified condition.

H. Refinish existing visible surfaces to remain in renovated rooms and spaces, to renewed condition for each material, with a neat transition to adjacent finishes.

I. Where new Work abuts or aligns with existing, provide a smooth and even transition. Patch Work to match existing adjacent Work in texture and appearance.

J. When finished surfaces are cut so that a smooth transition with new Work is not possible, terminate existing surface along a straight line at a natural line of division and submit recommendation to Architect for review.

K. Where a change of plane of ¼ inch or more occurs, submit recommendation for providing a smooth transition to Architect for review.

L. Patch or replace portions of existing surfaces which are damaged, lifted, discolored, or showing other imperfections.

M. Finish surfaces as specified in individual Product sections.

## PART 2 PRODUCTS

Not Used

## PART 3 EXECUTION

Not Used

END OF SECTION

## SECTION 01 3200 – CONSTRUCTION PROGRESS DOCUMENTATION

### PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Construction progress documentation.

1.02 CONSTRUCTION PROGRESS DOCUMENTATION:

A. Submit initial construction schedule in triplicate within 15 days after date of Notice of Award.

B. Revise and resubmit as required.

C. Submit revised schedules with each Application for Payment, identifying changes since previous version.

D. Submit a horizontal bar chart with separate line for each section of Work, identifying first work day of each week. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, critical path, float dates, and duration.

E. Indicate estimated percentage of completion for each item of Work at each submission.

F. Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates, including those furnished by Owner and required by Allowances.

G. Schedule shall begin with Notice to Proceed and conclude with the date of final completion of the project. Float or slack time within the construction schedule is not for the exclusive use or benefit of either the Owner or Contractor but is a jointly owned, expiring project resource available to both parties as needed to meet contract milestones and the contract completion date.

H. No time extensions will be granted nor delay damages paid until a delay occurs that impacts the project's critical path, consumes all available float or contingency time, and extends the work beyond the contract completion date.

   1. Delays arising from multiple causes which may have concurrent or interrelated effects on the progress of the Work shall be combined into a single unit for the purposes of determining the appropriate time extension, if any.

### PART 2 PRODUCTS

Not Used

## PART 3 EXECUTION

Not Used

END OF SECTION

## SECTION 01 3300 – SUBMITTAL PROCEDURES

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. General requirements for submittals.
   2. List of subcontractors and products.
   3. Shop drawings, product data and samples.
   4. Manufacturer's installation instructions and certificates.

B. Related Requirements:
   1. Section 01 6000 – Product Requirements: Submittals for substitutions.
   2. Section 01 7700 – Closeout Requirements: Contract warranties, operation and maintenance data, and closeout submittals.

1.02 GENERAL REQUIREMENTS FOR SUBMITTALS:

A. Electronic Submittals: Submittals (except samples, color selectors, and submittals requiring certification by a registered professional) shall be submitted in electronic format.
   1. Only PDF files will be accepted, unless otherwise approved in advance.
   2. For submittals to be reviewed by Architect's consultants, confirm in advance that electronic submittals will be accepted.
   3. For submittals to be distributed to governing authorities, electronic submittals shall be used for review by Architect and Architect's consultants. If requested, provide the number of paper submittals required for use by authorities having jurisdiction.
   4. Submittals shall be accompanied by a statement from the submitter indicating approval.
   5. Submittals will be returned in electronic format. Architect's notations may be included in the submittal file or in a separate document, and shall be distributed with all copies of the reviewed submittals.

B. Paper Submittals:
   1. Transmit each submittal with Transmittal Letter, AIA Form G810 or equivalent. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.
   2. Apply Contractor's stamp, signed or initialed, indicating approval.
   3. Submit three copies, unless individual specification sections require a greater number of copies. One copy will be returned to the Contractor. Additional copies will not be processed or returned.

C. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, date, and specification section number, as appropriate.

D. Use standard letter, tabloid, and architectural page sizes only. Provide space on first page for Architect, and professional subconsultant review stamps, minimum 1½ x 3 inch each space.

E. Where items are identified in the Contract Documents by number, letter or similar mark, include the same identification on submittals. Arrange items within the submittal in the same sequence as the identification in the Contract Documents, unless another sequence is approved in advance by the Architect.

F. By approving and submitting submittals, the Contractor represents that he has reviewed and verified field dimensions, quantities, adjacent construction Work, field construction criteria, materials, catalog numbers, specified design requirements and performance requirements, and similar data, and coordinated information in accordance with the requirements of the Work and Contract Documents.

G. Submittals stamped "For Approval Only" or "Not For Construction" will not be accepted.

H. Where individual specification sections require submittals to be prepared under the supervision of a Professional Engineer or other registered professional, apply the registered professional's seal and signature to such submittals.

I. All responsibility for the submittal shall be that of the submitter. The contractual relationship, duties, and responsibilities of the parties in Contract nor those of the Architect shall not be altered from the Contract Documents by mention or inference otherwise in any submittal.

J. Identify deviations from Contract Documents, and Product or system limitations which may be detrimental to successful performance of the completed Work.

K. Correct returned submittals marked "Revise and Resubmit" or "Not Approved"; identify all changes made since previous submission. Review of revised submittals will be limited to previously noted items, unless other changes are specifically called out. Direct specific attention in writing on resubmittals to revisions other than the corrections requested on previous submissions.

L. Distribute copies of reviewed submittals as appropriate, including distribution to separate Contractors whose work connects to or interfaces with the submittal item. Instruct parties to promptly report any inability to comply with provisions.

M. Submittals not requested will not be acknowledged or processed.

N. Submittals for Review: Architect's review of submittals is limited to conformance with the design concept and to compliance with requirements of the Contract Documents.
   1. Architect's review of submittals is a gratuitous assistance, and the Architect's action does not relieve the submitter of responsibility for deviations from the requirements of the Contract Documents unless the Architect has been informed in writing of the deviation at the time of submission and has given written approval to the specific deviation, nor shall the Architect's action relieve the

submitter from responsibility for errors or omissions in the submittals. Such errors, omissions, or deviations shall be made good by the submitter, irrespective of the receipt, checking, review, or approval of submittals by the Architect, and even though the Work is performed in accordance with approved submittals.

2. Contractor retains all responsibility for quantities, field dimensions, fabrication, installation, construction means, methods, techniques, sequences, procedures, safety precautions and programs, and coordination with Work by others. The content of the submittal and wording of the Contractor's review stamp shall not serve to limit responsibility for the above items.
3. For submittals requiring approval by governing authorities, Architect's approval of the submittal is contingent upon and subject to approval by authorities having jurisdiction.
4. Architect's notations and remarks added to submittals are to ensure compliance with Contract Documents and do not constitute, imply or require a contract modification.
5. The Architect's review of an individual item does not indicate review of an assembly in which the item is included.

O. Submittals for Information: The following categories of submittals, and additional submittals identified in individual specification sections, will not be approved by the Architect or returned to the Contractor, but will be retained for record purposes. When requested by Contractor, Architect will acknowledge receipt. Submittals may be rejected for not complying with requirements.

1. Manufacturer certificates, material certificates, material safety data sheets, and material test reports.
2. Manufacturer's guide specifications.
3. Installer certificates, welding certificates, and installer qualification data.
4. Work plans, waste management plans, storm water pollution prevention plans, and similar representations of construction means, methods, sequences, and procedures.
5. Insurance certificates and bonds.
6. Test reports.
7. Environmental product declarations.
8. Engineering calculations.
9. Installation instructions and maintenance recommendations.
10. Manufacturer's field reports.
11. Construction photographs.

1.03 SUBMITTAL SCHEDULE:

A. Prepare a complete schedule of submittals within 10 days of Notice to Proceed.

1. Coordinate Submittal Schedule with the list of subcontracts, Schedule of Values, and the list of products as well as the Construction Schedule.

2. Organize the schedule by Project Manual Contents. Provide the following information for each specification Section:
   a. Scheduled date for the first submittal.
   b. Name of Subcontractor.
   c. For each submittal for review, including revised submittals, allow 15 working days excluding delivery time.
3. Allow time for review by Architect and Architect's consultants, including delivery time. Allow time for one resubmittal after the initial submittal without delaying the Construction Schedule.
4. Review of submittals and resubmittals will be prioritized by date indicated on the Submittal Schedule.
5. Alterations or additional work required because of Contractor's failure to make timely submittals shall be corrected without additions to the Contract Sum.

B. Prioritize the submittal of critical schedule items, long lead items, and items requiring coordination between trades.

1.04 LIST OF SUBCONTRACTORS:

A. Within 15 days after date of Notice to Proceed, submit list of Subcontractors proposed for use, with postal addresses, email addresses, and telephone numbers. Indicate all sections of Work to be performed by each Subcontractor.

B. Sections of Work for which a Subcontractor is not listed will be construed to be done by the Prime Contractor.

C. Notify the Architect in writing in advance of any proposed changes to the list of Subcontractors.

1.05 LIST OF PRODUCTS:

A. Within 15 days after date of Notice to Proceed, submit list of major Products proposed for use, with name of manufacturer, trade name, and model number of each Product.

B. For Products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

C. Notify the Architect in writing in advance of any proposed changes to the list of Products.

1.06 SHOP DRAWINGS:

A. Prepare neat, legible, accurate drawings at scales adequate to fully illustrate all pertinent data. Where applicable, include plan, elevation, and section views complete with dimensions, notes, and other data sufficient to demonstrate compliance with

requirements of Contract Documents and to show relationships and connections to adjacent materials and related work by others.

B. Base drawings will be available from the Architect in PDF format only.

C. Submit for review. After review, produce copies and distribute as required for fabrication and construction, and for record documents purposes as described in Section 01 7700.

D. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

E. Structural Calculations: State specific loads on which calculations are based. References to code requirements without listing specific loads are not sufficient.

F. Wiring Diagrams: When specified in individual specification sections, submit detailed point-to-point wiring diagrams indicating each component, locations and quantities, and interconnecting wiring between components. Manufacturer's generic system layouts are not normally sufficient without modification to indicate specific Project requirements.

1.07 PRODUCT DATA:

A. Identify applicable products, models, options, and other data. Supplement manufacturer's standard data to provide information unique to this Project.

B. Submit for review. After review, distribute as required for fabrication and construction, and for record documents purposes as described in Section 01 7700.

C. Indicate electrical characteristics, including voltage, amperage, and phase.

D. Indicate special utility characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

1.08 SAMPLES:

A. Submit samples to illustrate functional and aesthetic characteristics of the Product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work so that adjacent or coordinating materials may be reviewed together.

B. Submit samples of the precise article proposed to be furnished.

C. Submit samples whenever a choice of color or pattern is available in a specified material or Product. Include the full range of manufacturer's standard colors, textures, and patterns for selection.

D. Include identification on each sample, with full Project information.

E. Submit the number of samples specified in individual specification sections, or two samples where not otherwise specified; one of which may be retained by Architect.

F. Reviewed samples which may be used in the Work are indicated in individual specification sections.

1.09 MANUFACTURER'S INSTALLATION INSTRUCTIONS:

A. Maintain on site one printed or electronic copy of manufacturer's instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing.

B. When specified in individual specification sections, or upon request, submit instructions to Architect for information.

C. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.10 MANUFACTURER CERTIFICATES:

A. When specified in individual specification sections, or upon request, submit certification by manufacturer to Architect.

B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Architect.

**PART 2 PRODUCTS**

Not Used

**PART 3 EXECUTION**

Not Used

END OF SECTION

## SECTION 01 4000 – QUALITY REQUIREMENTS

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Regulatory requirements.
   2. References.
   3. Quality assurance and control.

B. Related Requirements:
   1. Section 01 3300 – Submittal Procedures: Submittals of manufacturer's instructions and certificates.
   2. Section 01 6000 – Product Requirements: Requirements for material and product quality.

1.02 REGULATORY REQUIREMENTS:

A. General Requirements:
   1. Perform Work in conformance with the codes and standards listed in this Section, and with the requirements of federal, state and local authorities having jurisdiction.
   2. Become familiar with all regulatory requirements which may affect the Work.
   3. Standards which apply to specific portions of the Work are listed in individual specification sections.
   4. Comply with regulatory requirements in effect on the date for receiving bids, or on date of Contract Documents if there were no bids, except where a specific date is established.
   5. In the event of conflict between regulatory requirements and the Contract Documents, comply with regulatory requirements, but not before referring the points in question to the Architect for approval.

B. Codes and Regulations:
   1. Building Code: Ohio Building Code.
   2. Handicapped Accessibility Code: ICC A117.1.
   3. Mechanical Code: Ohio Mechanical Code.
   4. Plumbing Code: Ohio Plumbing Code.
   5. Electrical Code: National Electrical Code, NFPA 70.
   6. All work involving refrigerants, including servicing of and modifications to existing systems, shall comply with the Clean Air Act and current Amendments, and applicable EPA regulations.

C. Standards: Ensure products and installation are in conformance with applicable recommendations and requirements of the following:

1. Factory Mutual Engineering.
2. Owner's insurance underwriter.
3. Americans with Disabilities Act (ADA) Standards for Accessible Design.
4. National Electrical Manufacturers Association (NEMA).
5. National Fire Protection Association (NFPA).
6. Occupational Safety and Health Administration (OSHA).
7. Underwriters Laboratories (UL).
8. Local utility companies.
9. Products requiring electrical connection shall be listed and classified by Underwriters Laboratories, Inc., or other testing firm acceptable to the authority having jurisdiction, as suitable for the purpose specified and indicated.

D. Taxes:

1. Bidders and Contractors shall be responsible for informing themselves of tax laws, requirements, regulations, and interpretations as they apply to this project.
2. The Owner is a political subdivision of the State of Ohio. Building materials purchased for incorporation into the improvements will be exempt from the state sales and use taxes, if the Contractor provides a properly completed and executed sales tax exemption certificate to the vendors or Suppliers at the time of the acquisition of the materials. The Owner will execute properly completed certificates on request.
   a. Contractor shall not charge Owner, and Owner shall not be liable for payment of, taxes from which Owner is exempt by law.
   b. Purchases of expendable items such as form lumber, tools, oils, fuel, or equipment rentals are subject to the application of the Ohio Sales or Use Tax.
3. Contractor shall pay all income taxes and payroll taxes required by local jurisdictions.

E. Permits and Fees: Contractor shall procure from the proper authorities and pay all fees for permits, taps, licenses, inspections, and other charges applicable to their Work, as required by state laws, city and county ordinances, and regulations pertaining to the work.

1. Arrange for inspections to be performed, giving notice to inspecting authorities in ample time so that work can be inspected and approved as it progresses.
2. Do not cover or conceal work requiring inspection until inspection has been performed.
3. At the conclusion of the installation, secure a certificate of final inspection and approval by enforcement authorities.

1.03 REFERENCES:

A. For Products or workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except where more rigid requirements are indicated in the Contract Documents or are required by applicable codes.

B. Conform to edition of reference standard current on date of Contract Documents, except where a specific edition is established by code.

C. Obtain copies of standards where required by product specification sections.

D. Submit one copy of any referenced standard when requested by Architect.

E. The contractual relationship, duties, and responsibilities of the parties in Contract nor those of the Architect shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.04 QUALITY ASSURANCE AND CONTROL:

A. General Requirements:

1. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.

2. Comply with manufacturer's instructions, including each step in sequence.

3. If manufacturer's instructions conflict with Contract Documents, request clarification from Architect before proceeding.

4. 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.

5. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

6. Coordinate with Owner for procedures to mitigate risk of infectious diseases according to current regulatory requirements, and recommendations of the Centers for Disease Control and Prevention.

B. Personnel:

1. Perform work by persons qualified to produce workmanship of specified quality.

2. The Owner may direct the removal and replacement of personnel for the following:
   a. Consistently poor workmanship or production of low quality work.
   b. Failure to actively cooperate with the Owner, Architect, or other Contractors in the construction effort.
   c. Theft, vandalism or fraudulent acts.
   d. Dangerous or unsafe practices.
   e. Use of alcohol or drugs; possession or sale of illegal substance of any kind.

f. Any activity in, on, or about the premises, or in connection with the work, that violates any ordinance, statute, or other regulation of any governmental body having jurisdiction over the premises.

3. Upon receipt of a written directive from the Owner requiring removal of an employee for one of the above causes, immediately remove the employee from the Project. The removal or replacement of an employee for the above causes shall not be cause for additional compensation. Any such dismissed worker shall not be reemployed in any other capacity for work on the Project.

C. Tolerances:

1. Monitor tolerance control of installed Products to produce acceptable Work. Do not permit tolerances to accumulate.

2. Comply with manufacturer's tolerances. Should manufacturer's tolerances conflict with Contract Documents, request clarification from Architect before proceeding.

3. Adjust Products to appropriate dimensions; position before securing Products in place.

D. Manufacturers' Field Services and Reports:

1. 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, adjustment and balancing of equipment, as applicable, and to initiate instructions when necessary.

2. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3. Submit report in duplicate within 30 days of observation to Architect for information.

E. Mockups:

1. When specified in individual specification sections, construct full-size representations of construction, materials, and finishes to demonstrate aesthetic effects, quality of workmanship, and coordination of elements.

2. Build mockups in locations and size indicated, or if not indicated, as directed by Architect.

3. Notify Architect minimum 7 days in advance of scheduled date for construction of mockup.

4. Construct mockup using workers to be employed for the construction illustrated by the mockup, and under the direction of the supervisory personnel who will direct the work.

5. Demonstrate the proposed range of aesthetic effects and workmanship.

6. Obtain Architect's approval of mockups before starting fabrication or construction of the work, allowing minimum 7 days for initial review and each subsequent review of each mockup.
7. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.

**PART 2 PRODUCTS**

Not Used

**PART 3 EXECUTION**

Not Used

END OF SECTION

## SECTION 01 4210 – ABBREVIATIONS

## PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Definition of abbreviations used in the Contract Documents.

1.02 ABBREVIATIONS – TERMS:

A. Listed below are terms and abbreviations which may be found in the Contract Documents. Common English language terms have not been included. Refer also to Drawings and individual specification Sections for terms and abbreviations specific to those documents. Acronyms used to refer to associations and organizations are listed separately below. Where multiple definitions are listed for an abbreviation, refer to the context for the intended meaning. For abbreviations not listed, and where the intended meaning is not obvious, request interpretation from the Architect.

| | |
|---|---|
| AC | air conditioning; alternating current |
| A.B. | anchor bolt |
| ACC. | accessible |
| ACOUST. | Acoustical |
| ADA | Americans with Disabilities Act, Standards for Accessible Design |
| ADJ. | adjacent; adjustable |
| A.F.F. | above finished floor |
| A.F.G. | above finished grade |
| AFUE | annual fuel utilization efficiency |
| AHU | air handling unit |
| ALT. | alternate |
| ALUM. | aluminum |
| AMP | ampere |
| ANOD. | anodized |
| APPROX. | approximate |
| ARCH. | Architect |
| ASSY. | assembly |
| ATTN. | attention |
| AUTO. | automatic |
| AUX. | auxiliary |
| AWG | American wire gauge |
| B&B | balled and burlapped |
| BD. | board |
| B.F.F. | below finished floor |
| BHP | brake horsepower |
| BLDG. | building |
| BLKG. | blocking |
| BLKHD. | bulkhead |
| BM | beam; benchmark |
| BN | bullnose |
| BOT. | bottom |
| BRG. | bearing |
| BSMT. | basement |
| BTU | British thermal unit |
| BTUH | British thermal unit per hour |
| C | Celsius; channel |
| CAB. | cabinet |
| CAP. | capacity |
| CAT. | catalog |
| CATV | community antenna (cable) television |
| CAV. | cavity |
| CB | catch basin; cementitious (backer) board |
| CCF | hundred cubic feet |
| CFM | cubic feet per minute |
| CHW | chilled water; circulating hot water |
| CI | cast iron; curb inlet |
| CJ | construction joint; control joint |
| CKT. | circuit |
| CL | center line; class |
| CLG. | ceiling; cooling |
| CLOS. | closet; closure |
| CMU | concrete masonry unit |
| CO | cased opening; cleanout; company |
| COEFF. | coefficient |
| COL. | column |
| CONC. | concrete; concentric |
| COND. | condenser; condensate |
| CONF. | conference |
| CONN. | connection |
| CONT. | continue; continuous |
| CONTR. | contract; contractor |
| CONV. | convert; conventional |
| COORD. | coordinate |
| CORR. | corridor; correct |

| | |
|---|---|
| CPT | carpet |
| CPVC | chlorinated polyvinyl chloride |
| CT | ceramic tile; countertop; current transformer |
| CTR. | center |
| CU | cubic; copper; coefficient of utilization |
| CUH | cabinet unit heater |
| CW | cold water |
| CYL. | cylinder |
| D | deep; depth; penny (nail) |
| DAT. | datum |
| DB | decibel; dry bulb |
| DBL. | double |
| DC | direct current |
| DDC | direct digital control |
| DEG. | degree |
| DEL. | delete; deliver |
| DEPT. | department |
| DET. | detail |
| DF | drinking fountain |
| DI | ductile iron |
| DIA. | diameter |
| DIAG. | diagonal; diagram |
| DIFF. | difference; diffuser |
| DIM. | dimension |
| DISC. | disconnect |
| DISP. | dispenser; disposal |
| DIST. | distance; district; distribution |
| DL | dead load |
| DOC. | document |
| D.P. | down pipe |
| DR. | door |
| DW | dishwasher |
| DWG. | drawing |
| DWV | drain, waste and vent |
| EA. | each |
| E.C. | Electrical Contractor |
| EIFS | exterior insulation and finish system |
| EJ | expansion joint |
| EL. | elevation |
| ELEC. | electric |
| ELEV. | elevator |
| EP | edge of paving; electrical panel |
| EPDM | ethylene propylene diene monomer |
| EPS | expanded polystyrene |
| EQUIP. | equipment |
| EQUIV. | equivalent |
| ESMT. | easement |
| ESP | external static pressure |
| EST. | estimate |
| EW | each way |
| EWC | electric water cooler |
| EXH. | exhaust; exhibit |
| EXIST. | existing |
| EXP. | expansion; exposed |
| EXT. | exterior; extinguisher |
| F | Fahrenheit; female |
| FACP | fire alarm control panel |
| FC | footcandle |
| FCO | floor cleanout |
| FD | floor drain |
| FDN. | foundation |
| FE | fire extinguisher |
| FFE | finish floor elevation |
| FH | fire hydrant |
| FHMS | flat head metal screw |
| FIG. | figure |
| FIN. | finish |
| FIXT. | fixture |
| FL | flow line |
| FLA | full load amps |
| FLG. | flange; flashing |
| FLR. | floor |
| FLUOR. | fluorescent |
| FOUND. | foundation |
| FP | fire protection |
| FR | fire rating |
| FRP | fiber reinforced polyester |
| FRTW | fire retardant treated wood |
| FS | Federal Specification |
| FT | feet; foot |
| FTG. | footing |
| FURN. | furnace; furnish; furniture |
| FXT. | fixture |
| GA | gage |
| GAL. | gallons |
| GALV. | Galvanized |
| GBF | granular backfill |
| G.C. | General Contractor |
| GCO | grade cleanout |
| GF | gas furnace |
| GFCI | ground fault circuit interrupter |
| GL | glass |
| GLULAM | glued laminated wood |
| GPM | gallons per minute |
| GYP. | gypsum |
| H | height |
| HB | hose bibb |
| HC | HVAC Contractor; hollow core |
| HDO | high density overlay |
| HDW. | hardware |
| HID | high intensity discharge |
| HM | hollow metal |
| HORIZ. | horizontal |
| HP | high pressure; horsepower |

| | |
|---|---|
| HPS | high pressure sodium |
| HT. | height |
| HVAC | heating, ventilating and air conditioning |
| HW | hot water |
| ID | inside diameter; identification |
| IN. | inches |
| INCAND. | incandescent |
| INCL. | included |
| INSUL. | insulation |
| INT. | interior |
| INV. | invert |
| IPS | international pipe standard; iron pipe size |
| IR | infrared |
| JAN. | janitor |
| JST. | joist |
| JT | joint |
| KD | kiln dried; knocked down |
| KIT. | kitchen |
| KO | knockout |
| KSF | thousand square feet |
| KVA | kilovolt amperes |
| KW | kilowatt |
| L | angle; liter |
| LAM. | laminate |
| LAV | lavatory |
| LB | pound; load bearing |
| LDG. | landing; loading |
| LED | light emitting diode |
| LF | linear feet (foot) |
| LH | left hand |
| LL | live load; lead lined |
| LLH | long leg horizontal |
| LLV | long leg vertical |
| LONG. | longitudinal |
| LPG | liquid petroleum gas |
| LRA | locked rotor amps |
| LTWT | lightweight |
| LTG. | lighting |
| MAINT. | maintenance |
| MAN. | manual |
| MATL. | material |
| MAX. | maximum |
| MBH | thousand BTU per hour |
| M.C. | HVAC Contractor; moisture content |
| MCA | minimum circuit amps |
| MDO | medium density overlay |
| MECH. | mechanical |
| MED. | medium; medical |
| MFR. | manufacturer |
| MH | manhole |
| MIN. | minimum; minute |
| MISC. | miscellaneous |
| MLDG. | molding |
| M.O. | masonry opening; motor operated |
| MOD | motor operated damper |
| MON. | monument |
| MSB | mop service basin |
| MT. | mount |
| MTD. | mounted |
| MTG. | mounting |
| MTL. | metal |
| NC | noise criteria; normally closed |
| NEC | National Electrical Code (NFPA 70) |
| NIC | not in contract; noise isolation class |
| NO | number; normally open |
| NOC | notice of commencement |
| NRC | noise reduction coefficient |
| N.T.S. | not to scale |
| OA | outside air; overall |
| OAI | outside air intake |
| OC | on center |
| OCC. | occupant |
| OD | outside diameter |
| OH | overhead |
| OPG. | opening |
| OPP. | opposite |
| OPT. | optional; optimum |
| OZ. | ounce |
| P | pole |
| PART. | partial |
| PC | Plumbing Contractor; point of curve |
| PEND. | pendant |
| PERF. | perforated |
| PERIM. | perimeter |
| PERM. | permanent |
| PERP. | perpendicular |
| PH | phase |
| PI | point of intersection |
| PIV | post indicator valve |
| PKG | package; parking |
| PL | plate; property line |
| P. LAM. | plastic laminate |
| PLBG. | plumbing |
| PLYWD. | plywood |
| PNL. | panel |
| PORC. | porcelain |
| PORT. | portable |
| POS | positive; position |
| PREF. | preference |
| PREFAB. | prefabricated |
| PREFIN. | prefinished |
| PRELIM. | preliminary |
| PREV. | previous |
| PROJ. | project |

| | |
|---|---|
| PSF | pounds per square foot |
| PT | preservative treated |
| PVC | polyvinyl chloride |
| QT | quarry tile |
| QTY. | quantity |
| R | radius; thermal resistance |
| RA | return air |
| RCB | rubber cove base |
| RD | roof drain |
| REBAR | reinforcing steel bars |
| RECIRC. | recirculation |
| RECEPT. | reception; receptacle |
| RECT. | rectangular |
| REF. | reference; refrigerator |
| REFL. | reflected |
| REINF. | reinforcing; reinforced |
| REQD. | required |
| RESIL. | resilient |
| REV. | revision |
| RH | right hand; relative humidity |
| RM. | room |
| R.O. | rough opening |
| RPM | revolutions per minute |
| RS | rough sawn; rapid start |
| RSB | rubber straight base |
| RTU | rooftop unit |
| R/W | right of way |
| S4S | surfaced four sides |
| SA | supply air |
| SAN. | sanitary |
| SAT | suspended acoustical tile |
| SC | Site Contractor; solid core; shading coefficient |
| SCHED. | schedule |
| SCWD | solid core wood |
| SENS | sensible |
| SF | square feet (foot) |
| SGFT | structural glazed facing tile |
| SHT. | sheet |
| SIM. | similar |
| SM. | small |
| SP | static pressure |
| SPKR. | speaker |
| SQ. | square |
| SS | service sink; stainless steel |
| ST | storm |
| STC | sound transmission class |
| STD. | standard |
| STL. | steel |
| STOR. | storage |
| STRUCT. | structural |
| SURF. | surface |
| SUSP. | suspended |
| SV | sheet vinyl |
| SW | switch |
| SWR. | sewer |
| SYM. | symbol; symmetrical |
| SYS. | system |
| T&G | tongue and groove |
| TAN. | tangent |
| TB | through bolt; test boring |
| TC | top of curb |
| TEL. | telephone |
| TEMP. | temporary; temperature; tempered |
| TERM. | terminal |
| THK. | thickness |
| TOIL. | toilet |
| TP | top of pavement; telephone pole; toilet paper |
| TRANS. | transparent; transverse; transom |
| TS | tube steel |
| TYP. | typical |
| U | heat transfer coefficient |
| UC | under cabinet |
| UG | underground |
| UH | unit heater |
| UNO | unless noted otherwise |
| UR. | urinal |
| UTIL. | utility |
| UV | unit ventilator; ultraviolet |
| V | volt |
| V.B. | vapor barrier |
| VCT | vinyl composition tile |
| VERT. | vertical |
| VFY. | verify |
| VNR | veneer |
| VOC | volatile organic compound |
| VOL. | volume |
| VTR | vent through roof |
| VWC | vinyl wall covering |
| W | watt; width; west; wall |
| W/ | with |
| W/O | without |
| WC | water closet; water column |
| WCO | wall cleanout |
| WD | wood |
| WDW. | window |
| WH | wall hydrant; water heater |
| WOLM. | preservative treated |
| WT | weight |
| WWF | welded wire fabric |
| XFMR | transformer |
| XFR | transfer |
| XPS | extruded polystyrene |
| YD | yard |

## 1.03 ABBREVIATIONS – ASSOCIATIONS AND ORGANIZATIONS:

| | |
|---|---|
| AAMA | American Architectural Manufacturers Association |
| AASHTO | American Association of State Highway and Transportation Officials |
| ABAA | Air Barrier Association of America |
| ACI | American Concrete Institute |
| ADC | Air Diffusion Council |
| AFPA | American Forest and Paper Association |
| AGA | American Gas Association |
| AHA | American Hardboard Association |
| AHRI | Air Conditioning, Heating, and Refrigeration Institute |
| AISC | American Institute of Steel Construction |
| AISI | American Iron and Steel Institute |
| ALA | American Laminators Association |
| ALSC | American Lumber Standards Committee |
| ANSI | American National Standards Institute |
| APA | The Engineered Wood Association |
| ASHRAE | American Society of Heating, Refrigerating and Air-Conditioning Engineers |
| ASME | American Society of Mechanical Engineers |
| ASSE | American Society of Sanitary Engineering |
| ASTM | American Society for Testing and Materials |
| AWI | Architectural Woodwork Institute |
| AWPA | American Wood Protection Association |
| AWS | American Welding Society |
| AWWA | American Water Works Association |
| BHMA | Builder's Hardware Manufacturer's Association |
| BIA | Brick Institute of America |
| BICSI | Building Industry Consulting Service International |
| CDHS | California Department of Health Services |
| CISCA | Ceilings and Interior Systems Contractors Association |
| CISPI | Cast Iron Soil Pipe Institute |
| CPSC | Consumer Products Safety Commission |
| CRSI | Concrete Reinforcing Steel Institute |
| CSI | Construction Specifications Institute |
| DHI | Door Hardware Institute |
| DIN | Deutsches Institut für Normung |
| DOC | Department of Commerce |
| ECIA | Electronic Components Industry Association |
| EPA | Environmental Protection Agency |
| FCC | Federal Communications Commission |
| FM | Factory Mutual Engineering Corporation |
| FSC | Forest Stewardship Council |
| GA | Gypsum Association |
| HMMA | Hollow Metal Manufacturers Association |
| HPVA | Hardwood Plywood and Veneer Association |
| IAPMO | International Association of Plumbing and Mechanical Officials |
| ICC | International Code Council |
| ICC-ES | International Code Council Evaluation Service |
| ICEA | Insulated Cable Engineers Association |
| IEC | International Electrotechnical Commission |
| IEEE | Institute of Electrical and Electronics Engineers |
| IES | Illuminating Engineering Society |
| IETF | Internet Engineering Task Force |

| | |
|---|---|
| ISO | International Organization for Standardization |
| MBMA | Metal Building Manufacturers Association |
| MIC | Masonry Industry Council |
| MSS | Manufacturers Standardization Society of the Valve and Fittings Industry |
| NAAMM | National Association of Architectural Metal Manufacturers |
| NCMA | National Concrete Masonry Association |
| NCPWB | National Certified Pipe Welding Bureau |
| NECA | National Electrical Contractors Association |
| NEMA | National Electrical Manufacturers Association |
| NFPA | National Fire Protection Association |
| NFRC | National Fenestration Rating Council |
| NFSHSA | National Federation of State High School Associations |
| NHLA | National Hardwood Lumber Association |
| NJATC | National Joint Apprenticeship and Training Committee for the Electrical Industry |
| NLGA | National Lumber Grades Authority |
| NRCA | National Roofing Contractors Association |
| NSF | National Sanitation Foundation |
| NSI | Natural Stone Institute |
| NTMA | National Terrazzo & Mosaic Association |
| NWWDA | National Wood Window and Door Association |
| OBC | Ohio Building Code |
| ODOT | Ohio Department of Transportation |
| OSHA | Occupational Safety and Health Administration |
| PCA | Portland Cement Association |
| PDI | Plumbing and Drainage Institute |
| PS | Product Standards |
| RFCI | Resilient Floor Covering Institute |
| SDI | Steel Deck Institute |
| SDI | Steel Door Institute |
| SJI | Steel Joist Institute |
| SMACNA | Sheet Metal and Air Conditioning Contractors National Association |
| SPIB | Southern Pine Inspection Bureau |
| SPRI | Single Ply Roofing Industry |
| SSPC | Society for Protective Coatings |
| TCNA | Tile Council of North America |
| TIA | Telecommunications Industry Association |
| TPS | Technical Preservation Services, National Park Service |
| UBC | Uniform Building Code |
| UL | Underwriters Laboratories |
| USC | University of Southern California |
| USGBC | U. S. Green Building Council |
| WDMA | Window and Door Manufacturers Association |

## PART 2 PRODUCTS

Not Used

## PART 3 EXECUTION

Not Used

END OF SECTION

## SECTION 01 4520 – TESTING AND INSPECTING SERVICES

## PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Testing and inspecting services.

1.02 TESTING AND INSPECTING SERVICES:

A. Coordinate inspection and testing work with independent testing firm employed by Owner. The testing firm will perform inspections, tests, and other services scheduled in this Section and as required by the Architect.
   1. At Owner's option, more than one firm may be employed.
   2. Testing required by individual specification Sections and not scheduled below, shall be performed at the Contractor's expense by a qualified independent testing firm acceptable to Architect and Owner.

B. Inspecting, testing, and source quality control may occur on or off the project site. Perform off-site inspecting or testing as required by the Architect.

C. The testing firm shall promptly submit reports indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.
   1. Non-compliance of any portion of Work with Contract Document requirements shall be cause for rejection of that portion of Work.
   2. Retesting required because of non-conformance to specified requirements shall be performed by the same testing firm at Contractor's expense on instructions from the Architect.
   3. The testing firm is not authorized to revoke, alter, relax, enlarge, or release any requirement of the Contract Documents.

D. Cooperate with testing firm; furnish samples of materials, design mix, manufacturer or supplier certifications, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
   1. Notify Architect and testing firm 48 hours prior to expected time for operations requiring services.
   2. Make arrangements with testing firm and pay for additional samples and tests required for Contractor's use.

E. Testing or inspecting does not relieve Contractor from performing work in full compliance with Contract Documents.

1.03 SUBMITTALS:

A. The testing firm shall distribute copies of each test report to the Architect and Contractor.

B. The first copy of each type of report, and all test reports indicating non-compliance with specified requirements, shall be submitted promptly, but not more than 72 hours after test results are available.

C. Remaining test reports shall be submitted at maximum monthly intervals.

## PART 2 PRODUCTS

Not Used

## PART 3 EXECUTION

3.01 SCHEDULE OF TESTING AND INSPECTING SERVICES:

A. Except for code required special inspections, scope of testing work is subject to modification at the discretion of the Owner. Provide periodic special inspections except where continuous special inspection is specifically indicated or required by code.

B. Earthwork Testing: Site and Building Excavating and Backfilling.

1. Testing firm shall employ a full-time Soils Engineer and Soils Laboratory qualified in soils testing and evaluation to observe site grading, placement of fill, and excavation and backfill for building pad and site utilities, and perform the activities scheduled below.

2. Analyze native and imported fill and backfill material and top soil proposed for use to determine suitability for use and compliance with Contract Documents.
   a. Test fill and backfill material to determine soil classification, plasticity index, optimum moisture content, and dry density.

3. Field test natural grades to be retained, areas of cut, and areas of controlled fill and backfill to determine moisture content, percent of compaction and compliance with specified values. Provide minimum one test, with additional tests as scheduled below, and at the discretion of the Soils Engineer.
   a. Building Area: One test for every 500 cubic yards of fill and backfill, or in areas of natural grade or cut one test for every 10,000 square feet, located to give equal coverage to all portions of the building subgrade.

4. Observe building foundation excavation and subgrade preparation; confirm size, depth, and suitability of the excavated areas; test soil bearing capacity to verify compliance with specified values; test porous fill to determine soil classification, depth, and percent of compaction.
   a. Test soil bearing capacity of every 100 lineal feet of wall foundation. Test results must indicate in-place soil bearing capacity.

C. Concrete Testing:

1. Testing firm shall test all building concrete. The firm's personnel shall obtain samples and adequately protect all samples during storage and transporting.
   a. Check batching and mixing operation periodically for compliance with the Contract Documents.
   b. Review the manufacturer's mill test certificate for each shipment of cement and reinforcing steel, or conduct laboratory tests or spot checks of these materials as received.
   c. Mold and test concrete field cylinders as scheduled.

2. Observe placement of reinforcing bars and mesh; verify size, spacing, lap dimensions, chairs and supports, concrete cover and surface condition of reinforcing is as specified; verify adequacy of formwork and ties to prevent movement during concrete placement.

3. Test concrete materials as follows:
   a. Aggregate: ASTM C33.
   b. Cement: ASTM C150; accompany all cement used on the job with a testing agency certificate indicating compliance of cement with all tests.

4. Test concrete for slump and strength as follows:
   a. Secure composite samples in accordance with ASTM C172 from each mix design placed in any one day, or from each 100 cubic yards of concrete placed in continuous pours, whichever is less.
   b. Cast cylinder specimens from each sample; cure cylinders in accordance with ASTM C39. Test cylinders for 7-day and 28-day strength. Test reports shall include temperature of air and concrete at site, mix proportions and all data necessary to determine compliance with Contract Documents.
   c. Determine slump of the concrete for each sample and whenever consistency of concrete appears to vary; test in accordance with ASTM C143.
   d. Test a portion of the air-entrained concrete samples to determine the amount of entrained air, in accordance with either ASTM C231 or ASTM C173.
      (1) If these tests indicate at any time that air content is not within specified limits, the Contractor at his expense shall modify the materials as necessary to achieve compliance.

5. If the average strength of test cylinders for any portion of the structure constitutes a failure as defined in ACI 318, or if slump is beyond tolerances, the Architect may require changes in the concrete mix proportions at the Contractor's expense, may require additional testing in accordance with ASTM C42, or may declare all concrete work, of which the non-complying cylinders are representative samples, in violation of the Contract Documents.

6. If the work is in violation of the Contract Documents, or if there is a likelihood of the concrete having been frozen, the Contractor shall make loading tests at his expense, if so directed by the Architect. If the unit area or member under

consideration fails to pass the loading test or shows evident signs of failure, the Contractor shall remove and rebuild the defective construction at his expense, or shall provide at his expense such additional construction as the Architect considers necessary to make the structure sound.

a. Conduct loading tests in the presence of representatives of the Owner and Architect in accordance with Chapter 20 of ACI 318.

END OF SECTION

## SECTION 01 5000 – TEMPORARY FACILITIES AND CONTROLS

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Temporary Utilities: Electricity; lighting; heat and ventilation; telephone and internet; water.
   2. Construction Facilities: Temporary buildings; sanitary facilities.
   3. Access facilities.
   4. Temporary barriers, enclosures, fencing, and security.
   5. Temporary Controls: Fire protection; snow removal; water control.

B. Related Requirements:
   1. Section 01 7000 – Execution Requirements: Progress cleaning, waste management and disposal; protecting installed construction.
   2. Section 01 7700 – Closeout Requirements: Final cleaning.

1.02 REGULATORY REQUIREMENTS:

A. Comply with industry standards and applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:
   1. Building code requirements.
   2. Health and safety regulations.
   3. Utility company regulations.
   4. Police, fire department, and rescue squad rules.
   5. Environmental protection regulations.

B. Engage the appropriate local utility company to install temporary service or connect to existing service. Where utility company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with utility company recommendations.
   1. Arrange with company and existing users for a time when service can be interrupted.
   2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked in services.

C. Provide plan approvals and permits for temporary buildings, where required by authorities having jurisdiction.

D. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.03 PROJECT CONDITIONS:

A. Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Relocate temporary services and facilities as the work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire prevention measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on site.

B. Prepare a schedule indicating dates for implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to the Owner, change over from use of temporary service to use of permanent service.

1.04 TEMPORARY ELECTRICITY:

A. Connect to Owner's existing power service. Do not disrupt Owner's need for continuous service. Exercise measures to conserve energy.

B. Provide grounding and ground fault circuit protection as required.

C. Permanent convenience receptacles may not be utilized during construction without written approval.

D. Provide adequate distribution equipment, wiring, and outlets to provide circuits for power and lighting.
   1. Provide 20 ampere duplex outlets on single phase branch circuits for power tools and fractional horsepower motors for every 2500 sq ft of active work area, located so that extension cords need not exceed 100 feet. Install outlets in outlet boxes with cover plates.
   2. Provide 20 ampere single phase branch circuits for lighting.
   3. Provide temporary service to field offices.

E. Use of temporary electrical power system for welding operations is prohibited.

F. Electrical Power Cords: Grounded extension cords; hard service type where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length voltage ratio.

G. Upon changeover to permanent electrical service, remove portions of the temporary electrical service no longer needed, including power and lighting distribution and utilization equipment and wiring.

1.05 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES:

A. Provide and maintain lighting for construction operations to achieve a minimum lighting level of 5 footcandles. Provide additional lighting for performance of tasks.
   1. At corridors, provide minimum one 3400 lumen fixture at 20 foot maximum spacing.
   2. Provide lighting at each fire extinguisher, electric panel, mechanical equipment location, corridor and building entrance.

B. Provide and maintain lighting to exterior staging and storage areas after dark for security purposes to achieve a minimum lighting level of 1 footcandle.

C. Provide and maintain lighting to interior work areas after dark for security purposes to achieve a minimum lighting level of 0.25 footcandles.

D. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.

E. Provide guard cages or tempered glass enclosures where exposed to breakage. Provide wet location rated fixtures where exposed to moisture.

F. Maintain lighting and provide routine repairs. Relocate temporary lighting as required during progress of the work.

G. Permanent lighting may be utilized during construction. Relamp as necessary so that all lighting is operable at Substantial Completion.

1.06 TEMPORARY HEAT AND VENTILATION:

A. Utilize Owner's existing HVAC equipment, extend and supplement with temporary heating and ventilation equipment as needed to maintain specified conditions for construction operations. Owner will pay cost of energy used. Exercise measures to conserve energy.

B. Maintain temperature and humidity as required by specific construction activities, as specified in individual specification sections.

C. Provide temporary heat where needed for performance of the work, for curing or drying of recently installed work, and for protection of work in place from adverse effects of low temperatures or high humidity.

1. After building enclosure, maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress and 60 degrees F in areas where finished work has been installed.

D. Ventilate enclosed areas to assist curing of materials, to dissipate humidity, to attain and maintain specified moisture levels, to prevent accumulation of dust, fumes, vapors, or gases, and to prevent temperatures of enclosed areas from exceeding ambient outdoor temperatures by more than 10 degrees F when ambient outdoor temperatures are above 70 degrees F.

1. Extend and supplement equipment with temporary fan units as required to maintain clean air for construction operations.

E. Temporary Heat Prior to Building Enclosure:

1. The facility is not considered enclosed until the permanent building shell is essentially completed with exterior openings, windows, and doors closed by permanent or temporary closures.

2. Until the facility is enclosed, provide heating for materials to prevent damage from frost or freezing and to permit construction to continue and progress uninterrupted.
3. Provide, maintain, and supervise the operation of UL approved portable direct fired heaters, fired with LP gas, kerosene, #1, or #2 fuel oil. Salamanders and electric heaters will not be permitted. Observe necessary safety precautions; do not use LP gas fired heaters in low places of construction, such as pits, tunnels, etc., which can collect heavier than air gas or fumes.
4. Do not use equipment producing carbon monoxide where fumes can contact freshly placed concrete or mortar.

F. Temporary Heat and Ventilation After Building Enclosure: Provide equipment with capacity to maintain minimum 50 degrees F space temperature, and to maintain minimum 60 degrees F space temperature once the space temperature has been raised above 60 degrees F, using one or more of the following methods:

1. Existing System: Extend and supplement existing HVAC equipment with portable units and new HVAC equipment as scheduled. Utilize and maintain existing controls, venting, power and fuel connections, and necessary ductwork and piping for safe and proper operation.
   a. Provide and pay for maintenance, lubrication, regular replacement of filters, and replacement of worn or consumed parts as necessary.
   b. Prior to Substantial Completion, install new filters; clean and restore equipment to previously existing condition except for ordinary wear.
2. Portable Units: Provide, maintain, and supervise the operation of approved temporary portable units, such as oil or gas fired unit heaters, furnaces, direct fired make-up air units, or similar equipment. Salamanders and electric heaters will not be permitted. Utilize natural gas fired units when natural gas is available. Units shall be properly vented, piped, and wired. Provide thermostat for temperature control and all required safety controls.
3. Permanent System Components: Assemble and set in place permanent HVAC system components.
   a. Install each unit complete with safety controls, filters, venting, power and fuel connections, room thermostat and necessary ductwork and piping for safe and proper operation.
   b. Supplement permanent system components with portable units as necessary to maintain required temperature and humidity.
   c. Where necessary, relocate equipment during construction to prevent interference with performance of the work.
   d. Provide and pay for operation, maintenance, lubrication, frequent and regular replacement of filters, and replacement of worn or consumed parts as necessary.
   e. Prior to Substantial Completion, install permanent filters; clean and restore equipment to new conditions except for ordinary wear.

f. Provide warranty coverage for the specified time period beginning on the Date of Substantial Completion. Confirm that temporary use of equipment does not compromise specified warranties. Provide extended warranty coverage where necessary.

G. Temporary Dehumidification: Provide temporary dehumidification equipment where equipment used for temporary heat and ventilation is not adequate to maintain specified humidity, and where necessary to achieve specified moisture emissions rates in flooring substrates prior to finish flooring application. Provide, maintain, and supervise the operation of portable dessicant dehumidifiers, mechanical dehumidifiers, or similar equipment; equip with high volume blowers and inflatable plastic ducts. Adjust equipment and duct locations daily to assure even dehumidification.

1.07 TEMPORARY TELEPHONE AND INTERNET SERVICE:

A. Provide, maintain, and pay for telephone service where required in connection with the work. Use of Owner's existing telephone service is not permitted. Use of cellular mobile phone system is acceptable, if adequate reception can be maintained.

B. Provide, maintain, and pay for internet service where required in connection with the work. Use of Owner's internet service is not permitted. Use of cellular data system is acceptable, if adequate reception can be maintained.

C. Post a list of emergency telephone numbers at a clearly marked location accessible to all construction personnel, including but not limited to fire, police, ambulance, poison control, and each utility company providing service to the site.

D. Contractor and each subcontractor shall provide cell phone service with minimum one phone for the on-site superintendent.

1.08 TEMPORARY WATER SERVICE:

A. Provide and maintain suitable quality water service for construction operations, temporary toilets, wash facilities, and drinking water. Connect to Owner's existing water system. Owner will pay cost of water used. Exercise measures to conserve water.

B. Provide temporary piping system of sufficient capacity to meet needs of construction operations, with minimum 1 inch piping and vacuum breakers. Comply with local utility regulations. Sterilize temporary water piping prior to use.

C. Extend branch piping with outlets located so water is available in areas where work is in progress, using maximum 100 ft hoses with threaded connections.

D. Water Hoses: Minimum ¾ inch, heavy duty, abrasion resistant, flexible rubber hoses 100 feet long, with pressure rating greater than the maximum pressure of the water distribution system. Provide adjustable shutoff nozzles at hose discharge.

E. Provide temporary pipe insulation to prevent freezing. Replace piping and hoses damaged by freezing or other causes.

1.09 TEMPORARY BUILDINGS:

A. Temporary construction offices may be located in the existing building. Schedule work and relocate offices as required to avoid disruption of office activities. At Contractor's option, prefabricated mobile office units may be provided.
   1. Offices: Prefabricated mobile units; weather tight, with lighting, electrical outlets, heating and cooling equipment, equipped with sturdy furniture, drawing rack, shelving, bulletin board, and drawing display table with minimum 36 x 48 inch top. Provide space for project meetings with table and chairs to accommodate minimum one representative of the Architect, Owner, Contractor, and each major Subcontractor. Provide first aid kit and portable fire extinguisher.

B. Sheds: Weather tight, substantial, of sufficient size to hold on-site materials which are subject to weather damage. Raise floors minimum 6 inches above ground on heavy joists or sleepers.

C. Locate temporary buildings in approved locations, a minimum distance of 30 ft from existing and new structures.

D. Provide walks for access to office from parking areas and from building.

1.10 TEMPORARY SANITARY FACILITIES:

A. Provide and maintain temporary toilets in quantity and location required by applicable codes and regulations.

B. Existing facility use is not permitted.

C. Maintain facilities daily in clean and sanitary condition. Provide toiletry supplies.

1.11 ACCESS FACILITIES:

A. Construct and maintain culverts, ramps, steps, platforms, scaffolds, and other means of access so that no portion of the Work is delayed or handicapped due to a lack of such facilities.

B. Where traffic must cross open trenches, provide steel plates of suitable strength, thickness and anchorage to permit traffic to cross trench. Shore and brace trench to prevent damage to traffic and utilities installed in trench.

C. Vehicular Access and Parking:
   1. Limit construction traffic on existing on-site roads to designated routes.
   2. Limit parking for private vehicles of Contractor and Subcontractor personnel to designated areas.
   3. Construct and maintain temporary gravel parking areas to accommodate construction personnel.
   4. When site space is not adequate, provide additional off-site parking.

D. Staging Areas and Material Storage: Construct and maintain temporary gravel areas to accommodate staging and outdoor storage of construction materials.

E. At lawn areas, remove gravel from site after parking or material storage is no longer required; finish grade and seed areas in accordance with Sections 31 2000 and 32 9200.

1.12 TEMPORARY BARRIERS:

A. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Provide barricades and public walkways required by governing authorities for public rights-of-way and for public access to existing buildings.

C. Provide protection for plant life designated to remain. Replace damaged plant life.

D. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

E. Provide and maintain barrels with reflective tape and battery operated flashers to direct vehicular traffic away from work areas.

F. Provide barriers as required by applicable regulations at edges of openings and other hazards, painted with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard being protected against.

1.13 EXTERIOR ENCLOSURES:

A. Provide temporary insulated weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

B. Close openings of 25 square feet or less with plywood or similar materials. Close larger openings with plywood or fire retardant reinforced polyethylene securely attached to fire retardant treated wood framing.

C. Close openings through floors, roofs, and horizontal surfaces with load bearing, wood framed construction.

D. Maintain required exits for protection of life and property.

1.14 TEMPORARY FENCING:

A. Construction: Plastic fencing with steel posts.

B. Provide 6 ft high fence around construction area and material storage areas; equip with vehicular and pedestrian gates with locks.

C. Where required due to construction operations and sequence, relocate or remove and reinstall temporary fencing. Repair damaged fencing.

D. Where construction sequence requires multiple relocations of temporary fencing, relocatable sections of fencing in maximum 12 foot lengths may be used, subject to approval.

1.15 SECURITY:

A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

B. Limit entry into construction areas to the following:
   1. Contractor, including employees and Subcontractors.
   2. Architect, Owner, and persons authorized by them.
   3. Regulatory agency personnel legally entitled to inspect the project.

C. Limit construction personnel to designated construction areas and access routes.
   1. Limit construction activities to Owner's property, street and highway rights-of-way, and permanent easements.
   2. Do not enter on or occupy with workers, tools, equipment, or material any ground outside the designated construction areas without written consent of the Owner of such property.
   3. Provide approved temporary signage as required to provide directional information to construction personnel and visitors.

1.16 TEMPORARY FIRE PROTECTION:

A. Provide and maintain portable fire extinguishers, readily accessible throughout areas where work is in progress, in accordance with applicable fire code and local fire department regulations. At minimum, provide one 20 lb. ABC extinguisher for each 3000 square feet of floor area.

B. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell. Provide additional extinguishers at locations where hazardous work is in progress, including but not limited to painting, welding, or using torches or open flames for heating or cutting.

C. Store combustible materials in containers in fire safe locations.

D. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways, and access routes for fighting fires.

E. Prohibit smoking in hazardous fire exposure areas.

F. Provide supervision of welding operations, combustion type temporary heating units, and similar sources of fire ignition.

G. At the earliest feasible date in each area of the project, complete installation of permanent fire protection facilities, including connected services, and place into operation and use. Instruct key personnel on use of facilities.

1.17 SNOW REMOVAL:

A. Remove snow from construction roads and parking areas, work areas, material storage areas and field offices as required.

B. Do not allow the accumulation or drifting of snow on roof areas in excess of design loads.

1.18 WATER CONTROL:

A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment. Architect reserves the right to require additional pumping equipment without adjustment of Contract Sum.

B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion. Provide temporary soil erosion and sediment control in accordance with ODOT SS 832.

C. Control surface drainage at all areas to limit runoff onto adjacent properties to existing locations and quantities.

1.19 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS:

A. Maintain temporary utilities, equipment, and facilities as long as needed for safe and proper completion of the Work.

B. Relocate temporary utilities, equipment, and facilities as necessary to correct interference with permanent construction or to facilitate operations of other trades.

C. Remove temporary utilities, equipment, facilities, and materials as rapidly as progress of the Work allows. Perform final removal prior to Final Application for Payment.

D. Remove underground installations to a minimum depth of 3 ft. Grade site as indicated.

E. Clean and repair damage caused by installation or use of temporary work.

F. Restore existing facilities to original condition. Restore permanent facilities used during construction to specified condition. Repair damage to existing pavement and roads caused by construction operations.

**PART 2 PRODUCTS**

Not Used

**PART 3 EXECUTION**

Not Used

END OF SECTION

## SECTION 01 6000 – PRODUCT REQUIREMENTS

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Basic product requirements.
   2. Product options.
   3. Substitution procedures.
   4. Product delivery requirements.
   5. Product storage and handling requirements.

1.02 BASIC PRODUCT REQUIREMENTS:

A. Provide new equipment and materials meeting quality standards of the manufacturer. Defective, damaged, reconditioned, or substandard equipment and materials are not acceptable. Remove unacceptable materials incorporated in the Work, replace with sound materials meeting specified criteria, and perform related corrective work to meet approval of Architect.

B. Provide all equipment and materials required for complete assemblies and systems. Omissions of specific reference to incidental parts or accessories required does not constitute a release from furnishing such items.

C. Products of the same type shall be provided by the same manufacturer unless specifically approved by the Architect.

D. Products requiring electrical connection shall be listed and classified by Underwriters Laboratories, Inc., or other testing firm acceptable to the authority having jurisdiction, as suitable for the purpose specified and indicated.

E. Do not use materials containing asbestos.

F. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.

G. Provide interchangeable components of the same manufacture, for components being replaced.

H. Finishes:
   1. Where multiple colors, patterns, or finishes are available, selection will be made from manufacturer's standard range unless specifically indicated otherwise. Submit samples for selection under the provisions of Section 01 3300.
   2. If not otherwise specified, provide equipment with manufacturer's standard baked enamel finish or equal. Do not field paint equipment unless specifically noted in the Contract Documents.

1.03 PRODUCT OPTIONS:

A. Products Specified by Reference Standards or by Description Only: Any Product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers, Fabricators, or Installers: Products of manufacturers, fabricators, or installers named and meeting specified criteria, standards and description. Submit a request for substitution in accordance with the following article for any manufacturer, fabricator, or installer not named.
   1. Where a manufacturer is listed by name only without model numbers or specific product reference, a request for substitution is not required. Where products of another manufacturer are listed by model number, provide the closest equivalent product meeting the specified requirements.
   2. All Products must meet specified criteria, standards and descriptions. For manufacturers listed by name only without model numbers or specific product reference, standard products may require modifications and accessories, which shall be included.
   3. Drawings and details incorporate design parameters specific to the products of manufacturers listed by model number in the specifications and schedules. Where equivalent products of other listed manufacturers are provided, coordinate related work and the work of other trades with the requirements of the products provided. Items requiring coordination include, but are not limited to, unit dimensions and clearances, roof openings and curbs, unit weight and structural supports, housekeeping pad dimensions, piping, venting, electrical requirements, controls, panelboard and light fixture dimensions and clearances, motor controls and connections, and equipment connections.
   4. Where a product listed by model number or specific product reference has been superseded or replaced by a different Product from the same manufacturer, provide the replacement Product, but not before submitting product data in accordance with Section 01 3300 for approval, specifically indicating all differences between the specified Product and the replacement Product.

C. The phrase "or equal" or similar language does not exempt substitutions from compliance with the following Substitution Procedures. No substitutions are permitted unless specifically approved in writing for this Work by the Architect.

1.04 SUBSTITUTION PROCEDURES:

A. Architect will consider requests for Substitutions only prior to receipt of bids or within 15 days after date of Notice to Proceed. Due to time constraints, requests made later than 5 business days prior to the scheduled bid opening may not be reviewed. Submit request for Substitution to the Architect.

B. Requests for Substitutions may be made by Prime Bidders/Contractors only. Requests made by others will not be considered unless made jointly with a Prime Bidder/Contractor.

C. Bids shall include specified Products only, unless Substitution is approved by Addendum issued prior to receipt of bids.

D. Substitutions requested more than 15 days after date of Notice to Proceed may be considered or rejected without consideration, at the discretion of the Architect, and are limited to the following circumstances:

   1. Specified Products become unavailable through no fault of the Contractor. Such Substitutions shall not result in additions to the Contract Sum or Contract Time.

   2. The Substitution offers the Owner a substantial advantage in initial cost, life cycle cost, time, energy conservation, sustainable design, or other considerations, after deducting costs for redesign and coordination. Requests for such Substitutions shall include detailed information on the changes to the Contract Sum and Contract Time, including that of separate Contractors.

   3. None of the specified Products can meet the requirements of the Contract Documents, or receive necessary approval by a governing authority, and the Contractor certifies that the Substitution will meet the requirements. Such Substitutions shall not result in additions to the Contract Sum or Contract Time, except to the extent caused by regulatory requirements enacted or modified after the bid date.

E. 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.

F. Substitutions will be reviewed for general conformance with the intent of the Contract Documents but not for detailed compliance with all specified requirements. Approval of substitutions does not relieve the Contractor of the responsibility to comply with the Contract Documents, unless the variation is specifically identified in the substitution request.

G. Substitutions incorporated in the Work without Architect's approval shall be removed and replaced with specified Products without additions to the Contract Sum or Contract Time.

H. Substitution Submittal Procedure: Submit Substitution Request Form attached, or provide a cover letter with equivalent information. Limit each request to one proposed Substitution.

   1. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents. Documentation shall specifically note variations from specified Products in function, dimensions, weight, appearance, quality, code compliance, durability, availability of service and parts, and interfaces with related construction.

   2. Submit product data, certified test results, and other supporting data sufficient to demonstrate the proposed Product equivalence. Burden of proof is on proposer.

At Architect's option, installation references and samples of actual products may be required.

3. For products specified to receive warranty coverage, Substitution request shall include a preliminary copy of the specific warranty.
4. Submittal of a Substitution request, or incorporation in the Work of an approved Substitution, constitutes a representation that the submitter:
   a. Has personally investigated proposed Product and determined that it meets or exceeds the function, appearance, sustainable design requirements, and quality level of the specified Product.
   b. Will provide the same warranty for the Substitution as for the specified Product.
   c. Will coordinate installation and make changes to other Work, including the Work of separate Contractors, which may be required for the Work to be complete without additions to the total Contract Sum or Contract Time.
   d. Waives claims for additional costs or time extension which may subsequently become apparent.
   e. Will reimburse Owner and Architect for review or redesign services if re-approval by authorities is required.
5. Architect will notify submitter of decision to accept or reject request. Architect's decision is final.
6. Architect reserves the right to reject requests not containing sufficient information to enable Architect to completely evaluate the request without delay in the scheduled bid opening.

1.05 PRODUCT DELIVERY REQUIREMENTS:

A. Schedule deliveries to coordinate with installation schedule, to minimize long term storage at site and to minimize possibility of damage, deterioration, theft and other losses.

B. Transport and handle Products in accordance with manufacturer's instructions.

C. Accept Products at site, including unloading and uncrating. Promptly inspect shipments to ensure that Products comply with requirements, quantities are correct, and Products are undamaged.

1.06 PRODUCT STORAGE AND HANDLING REQUIREMENTS:

A. Store and protect Products in accordance with manufacturer's instructions, with seals and labels intact and legible.

B. Store sensitive Products in weather tight, climate controlled enclosures.

C. For exterior storage of fabricated Products, place on sloped supports, above ground.

D. Provide off-site storage and protection when site does not permit on-site storage or protection.

E. Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation or potential degradation of Product.

F. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

G. Provide equipment and personnel to store and handle Products by methods to prevent soiling, disfigurement, or damage.

H. Arrange storage of Products to prevent overcrowding and to permit access for inspection. Periodically inspect to verify Products are undamaged and are maintained in acceptable condition.

I. Do not exceed manufacturer's shelf life limitations. Discard and replace Products not installed prior to stated expiration date.

## PART 2 PRODUCTS

Not Used

## PART 3 EXECUTION

3.01 ATTACHMENTS:

A. Substitution Request Form.

END OF SECTION

## SUBSTITUTION REQUEST FORM

**Specified Product:**

| _____ | _____ | _____ |
|---|---|---|
| Section | Paragraph | Description |

**Proposed Substitution:** _____

**Attachments:** _____

The undersigned requests consideration of this Substitution and certifies that the attached product data and other supporting information indicates all variations from the specified Product, in accordance with the requirements and representations of Section 01 6000, and that the following statements are correct unless modified by attachments:

1. The Prime Bidder/Contractor has personally investigated proposed Product and determined that it meets or exceeds the function, appearance, sustainable design requirements, and quality level of the specified Product.
2. The same warranty will be provided for the Substitution as for the specified Product.
3. Installation will be coordinated with other Work, including the Work of separate Contractors, without additions to the total Contract Sum or Contract Time.
4. The Prime Bidder/Contractor will pay for changes to the building design if additional design or detailing is required to properly integrate the Substitution into the Work, and for additional services required to obtain the approval of governing authorities.

**SUBMITTER:**
**(if other than Prime Bidder/Contractor)**

_____
Name of Company or Corporation

_____
Phone

_____
email

By: _____
Signature

_____
Printed Name

**PRIME BIDDER/CONTRACTOR:**
**(must be completed)**

_____
Name of Company or Corporation

_____
Phone

_____
email

By: _____
Signature

_____
Printed Name

**ARCHITECT'S RESPONSE:**

___ Addendum or contract modification to be issued
___ Additional information needed
___ Not approved
___ Received too late

By: _____ Date: _____

Notes: _____

## SECTION 01 7000 – EXECUTION REQUIREMENTS

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Examination.
   2. Preparation.
   3. Field engineering.
   4. Execution.
   5. Progress cleaning.
   6. Construction waste management and disposal.
   7. Protecting installed construction.

B. Related Requirements:
   1. Section 01 7700 – Closeout Requirements: Final cleaning.
   2. Section 02 4119 – Selective Demolition.

1.02 SUBMITTALS FOR INFORMATION: In accordance with Section 01 3300.

A. Construction Waste Management Plan: Identify material types and estimated quantities for recycling, reuse, or sorting. Describe separation requirements, on-site storage requirements, destinations and transportation methods for each type of material. For waste that cannot be recycled, identify disposal locations and methods.
   1. Provide copy of construction waste management plan to each worker, subcontractor, and supplier when they first begin work on site. Provide periodic training and enforcement as necessary.

1.03 EXAMINATION:

A. Verify that existing site conditions, field measurements, and substrate surfaces are acceptable for subsequent Work. Beginning new Work indicates acceptance of existing conditions.

B. Verify that existing substrate is capable of structural attachment of new Work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Verify that utility services are available, of the correct characteristics, and in the correct location.

1.04 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 new material or substance in contact or bond.

1.05 FIELD ENGINEERING:

A. Locate and preserve survey control and reference points, and establish elevations, lines and levels, under the supervision of experienced engineering and surveying personnel utilizing recognized engineering survey practices.

B. Where existing survey control points are indicated on Drawings, verify locations prior to starting work. Protect and maintain survey control points at all times; preserve permanent reference points during construction.

C. Arrange for replacement of dislocated or destroyed survey control points, or relocation required by changes in grade or other reasons, based on original survey control. Permanent points removed or destroyed during progress of the Work shall be reinstalled at the expense of the party responsible for their removal.

D. Verify setbacks and easements; confirm Drawing dimensions and elevations.

1.06 EXECUTION:

A. Install, erect, and apply Products in accordance with manufacturer's instructions and recommendations. In the event of conflict with requirements of the Contract Documents, request resolution in accordance with Section 01 3100.

B. Cutting and Patching:

1. New Construction: Provide chases, openings, and recesses in new construction, where required by the work of each trade; provide and set in place all boxes, sleeves, inserts, and similar components.

2. Existing Walls, Floors and Ceilings: Work shall be done by persons skilled and experienced in the applicable trade. Finish work shall match material and quality of adjacent construction to the approval of the Architect.

3. Existing Roofs: Where cutting and patching is required in existing roofing, such work shall be done by the Roofing Installer as part of his work, and shall be included in his bid. Curbs, sleeves, and related items shall be furnished by the Contractor requiring same.

   a. For work affecting existing roofing covered by a manufacturer's warranty, the manufacturer shall approve the Roofing Installer. Maintain existing warranty coverage.

4. Slabs, Walks, and Pavements: Saw cut existing materials to provide a neat joint at removal limits, except where removal terminates at an existing joint. Pin new concrete to existing with #5 bars, minimum 24 inches long, spaced at 18 inches o.c. and embedded minimum 12 inches into existing concrete.

5. Submit written request in advance of cutting or altering elements which may affect:
   a. Structural integrity of element.
   b. Integrity of weather-exposed or moisture-resistant elements.
   c. Efficiency, performance, maintenance, useful life, or safety of element.
   d. Visual qualities of elements exposed to view.
   e. Work of Owner or separate Contractor.
6. Execute cutting, fitting, and patching, including excavation and fill, to complete Work, and to:
   a. Fit the several parts together, to integrate with other Work.
   b. Uncover work to install or correct ill-timed Work.
   c. Remove and replace defective and non-conforming Work.
   d. Remove samples of installed Work for testing.
   e. Provide openings in elements of Work for penetrations of mechanical and electrical Work.
7. Execute work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
8. Cut masonry and concrete materials using masonry saw or core drill.
9. Restore Work with new Products in accordance with requirements of Contract Documents.
10. Refinish surfaces to match adjacent finishes in all respects, including color, size and texture. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.
11. Identify hazardous substances and conditions exposed during the Work to the Architect for decision or remedy.

C. Items Removed for Reinstallation:
   1. Items removed which are to be relocated, reused, or reinstalled in existing locations, shall be stored on site in approved locations until progress of the work permits reinstallation.
   2. Contractor removing the items shall be responsible for their storage and protection.

1.07 PROGRESS CLEANING:

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

B. Clean dirt, debris, and mud from on-site locations as directed. Clean and wash down construction vehicles prior to leaving the site as required to minimize tracking of dirt, debris, and mud onto public roads. Clean dirt, debris, and mud from public roads as directed.

C. Remove debris and rubbish from attics, trenches, and other limited access or remote spaces, prior to enclosing the space.

D. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust. Clean surfaces of installed products in accordance with manufacturer's instructions.

E. Collect non-hazardous waste materials, debris, packaging materials, and rubbish daily and place in dumpsters or approved locations for recycling or salvage.

F. Clean and organize work areas daily. Maintain cleanliness in all work areas to assist other Contractors, suppliers, and the Owner in the timely installation of equipment and implementation and completion of concurrent responsibilities.

1.08 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL:

A. Provide and maintain containers of adequate size to receive scrap construction materials, packaging and debris generated by performance of the work.
   1. Do not dispose of construction waste materials in trash receptacles or recycling containers designated for Owner's use.
   2. Do not allow waste materials to accumulate on site. Change out loaded containers for empty containers as demand requires.
   3. Remove and promptly dispose of contaminated or vermin infested materials.
   4. Post approved temporary signage at waste collection areas to assist workers in achieving waste management goals.

B. Recyclable and Recoverable Material: Materials may be separated, stored, protected, and handled at the project site, or transported off-site for separation. Arrange for regular collection, transport, and delivery to respective approved recycling centers to keep site clear and prevent contamination of materials.

C. Salvaged Materials: Temporarily store on site in approved locations, neatly stacked and arranged; remove from the Owner's property promptly. Salvaged material shall not be sold on site.

D. Hazardous Substances: Collect and remove from site daily, and dispose of off-site in a legal location and manner, all hazardous substances in aerosol cans, tubes, pails, buckets, barrels, canisters or other factory packaged containers. Do not dispose of hazardous substances on-site or in containers for materials to be recycled, salvaged, or disposed of in landfills.

1.09 PROTECTING INSTALLED CONSTRUCTION:

A. Protect equipment and materials from damage during installation. Replace or repair equipment, material or facilities damaged by the Contractor during, or due to, or in the performance of the Work, as directed by the Architect.

B. Protect installed Work; provide special protection where specified in individual specification sections.
   1. Provide temporary and removable protection for installed Products. Control activity in immediate work area to prevent damage.

2. At the end of each work day, protect all work likely to be damaged from weather, rain, wind, storms, frost, heat, and other causes of injury or damage.
3. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
4. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
5. Upon installation of finish materials and construction exposed to view, and where existing work and finish materials are not indicated to be removed or modified by the work of this project, protect such construction against damage or injury, using materials that may be easily removed without leaving residue or permanent stains.
6. During construction, cap, plug, or cover open ends of ducts, piping, and conduit, and equipment openings, to prevent entry of foreign material.

C. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, follow recommendations for protection from waterproofing or roofing material manufacturer.

D. Prohibit traffic from landscaped areas.

E. Properly and carefully repair materials and finishes which are cut, damaged, disturbed or interfered with to match adjacent and surrounding surfaces, to the approval of the Architect. If repairs cannot be made satisfactorily, replace or refinish with new materials.

**PART 2 PRODUCTS**

Not Used

**PART 3 EXECUTION**

Not Used

END OF SECTION

## SECTION 01 7700 – CLOSEOUT REQUIREMENTS

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Final cleaning.
   2. Training and demonstration.
   3. Closeout procedures.
   4. Project record documents.
   5. Operation and maintenance data.
   6. Warranties.
   7. Spare parts and maintenance materials.

B. Related Requirements:
   1. Section 01 2900 – Payment Procedures.
   2. Section 01 3100 – Project Management and Coordination.
   3. Section 01 7000 – Execution Requirements: Progress cleaning.

1.02 FINAL CLEANING:

A. Execute final cleaning prior to final project assessment. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit of work to the condition expected from a commercial cleaning and maintenance program. Comply with manufacturer's instructions.

B. Upon completion of the work, remove debris, tools, machines, construction equipment, and other items pertaining to the work.

C. The following are examples, but not by way of limitation, of cleaning levels required.
   1. Remove labels not required as permanent labels.
   2. Clean transparent and reflective materials, including glass (both sides) and mirrors, to a polished condition; remove vision-obscuring materials and substances. Replace broken glass and damaged materials. Restore reflective surfaces to original reflective condition.
   3. Clean exposed hard-surfaced materials to a dirt-free condition, free of dust, stains, films, and noticeable distracting substances.
   4. Except as otherwise indicated, avoid disturbance of natural weathering of exterior surfaces.
   5. Wipe surfaces of mechanical and electrical equipment clean; remove excess lubrication and other substances.
   6. Remove spatters or other deposits of paint, plaster, mortar, concrete, adhesives, roofing, dirt, soil, oil, or any other material foreign to the surface involved.
   7. Vacuum clean carpeted and soft surfaces.

8. Clean plumbing fixtures to a sanitary condition, free of stains, including those resulting from water exposure.
9. Clean light fixtures to function with full efficiency.
10. Wet mop hard surface floors. Clean concrete floors in unfinished spaces broom clean.
11. Replace filters of operating equipment.
12. Clean debris from roofs, gutters, down pipes, and drainage systems.
13. Clean site, including landscaped and developed areas, free from litter and foreign substances; sweep paved areas broom clean, remove stains, petrochemical spills, and other foreign deposits; rake clean ground surfaces not landscaped or paved, to a smooth, even textured surface.
14. Remove waste and surplus materials, rubbish, and construction facilities from the site; dispose of lawfully.

D. Removal of Protection: Remove temporary protection and facilities installed during construction to protect previously completed installations during the remainder of the construction period.

E. Comply with governing regulations and safety standards for cleaning operations.

F. Additional cleaning required after final cleaning due to punch list work and warranty repairs shall be performed by the Contractor responsible for the additional work.

1.03 TRAINING AND DEMONSTRATION:

A. Where specified in individual Sections, require manufacturer to provide authorized representative to demonstrate operation of equipment and systems and instruct Owner's personnel.

B. Training and demonstration sessions shall be held at the project site, or in suitable facilities elsewhere provided by the Owner. Online or distance learning is subject to Owner approval, and is limited to software, programming, and similar subject matter not requiring physical access to equipment.

C. Minimum two weeks in advance of each training session, submit the following to the Architect for Owner's approval:
1. Preliminary schedule listing dates and times for each session. Owner will provide list of personnel to receive instructions, and will coordinate their attendance at the approved times.
2. List of personnel providing training, including a summary of credentials and experience for each presenter.
3. Outline syllabus of training sessions, including list of topics and approximate time allocations.
4. Completed operation and maintenance manuals for the applicable equipment or system. Owner will make these available for reference during training sessions.
5. Certification that equipment or system has been inspected and is fully operational, and all specified testing, adjusting and balancing has been performed.

D. Where the number of hours of training is specified, this is a minimum requirement and shall be extended if necessary for adequate coverage of the subject matter in accordance with the approved syllabus and specified requirements.
   1. Initial training and demonstration must be completed prior to Substantial Completion. For equipment requiring seasonal operation, a portion of the training and demonstration may be delayed up to 6 months subject to Owner's approval.
   2. With Owner approval, training may be suspended prior to completion of the specified number of hours, with the remaining hours available on Owner request up to one year after Substantial Completion or throughout the warranty period, whichever is longer.

E. Use operation and maintenance manuals as the basis of instruction; review contents with personnel in full detail. Prepare and insert additional data in manuals when need for additional data becomes apparent during instructions. Provide all materials required for instruction.

F. Demonstrate start-up, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each major component or subsystem as applicable.

G. Record training and demonstration sessions, and provide minimum two copies to Owner on digital media in approved video format. Label and organize media for convenient storage and reference.

H. Within one week after completion, submit report listing date and time of each session, number of hours, and name of each person in attendance.

1.04 CLOSEOUT PROCEDURES:

A. At Substantial Completion, submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents (except for punch list items attached to certification) and ready for Architect's review.

B. Submit the following to Architect. Final Application for Payment will not be processed until all submittals are received.
   1. Reports of training and demonstration sessions in accordance with this Section.
   2. Closeout Submittals in accordance with this Section, including project record documents, operation and maintenance data, and warranties.
   3. Receipt signed by Owner, acknowledging delivery of spare parts and maintenance materials. List specific items and quantities.
   4. Copy of Certificate of Plan Approval, Certificate of Occupancy, and other required regulatory approvals, with signatures of all inspectors. Originals shall remain on site; obtain receipt from Owner.
   5. Affidavit of Payment of Debts and Claims (00 6520).
   6. Consent of Surety to Final Payment (AIA Document G707).
   7. Final Waiver of Lien from each subcontractor.
   8. Certificates of Insurance for Prime Contractor and each subcontractor.

9. Prevailing Wage Affidavit of Compliance.

C. Submit final Application for Payment in accordance with Section 01 2900.

1.05 PROJECT RECORD DOCUMENTS:

A. Maintain one set of the following record documents on site; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Reviewed submittals including shop drawings and product data.
   6. Manufacturer's instructions for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction. Label each document "Project Record Documents" in stamped or printed letters, on front cover or other conspicuous place.

D. Record information concurrent with construction progress, before internal or hidden construction is concealed.

E. Make documents available to Architect at all times.

F. Record Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:
   1. Manufacturer's name, product model and number, and supplier.
   2. Product substitutions or alternates utilized.
   3. Changes made by Addenda and modifications.

G. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Measured depths of foundations in relation to finish floor datum.
   2. Measured horizontal and vertical location 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. Changes made by Addenda and modifications.
   5. Field changes of dimension and detail.
   6. Details not on original Contract drawings.

H. Record Submittals: Approved product data and manufacturer's installation instructions, marked to record field changes.

I. Remove Architect title block and seal from all documents.

J. Submit to Architect prior to or together with final Application for Payment.

1.06 OPERATION AND MAINTENANCE DATA:

A. General Requirements:

1. Submit to Architect for review; allow sufficient time for review and revision prior to final Application for Payment. Upon approval, submit final copies to Owner and Architect.

2. Submittals to Architect and Owner shall be in electronic format. At Owner's option, also submit up to two hard copy sets.

3. Electronic Submittals: Data submitted in electronic format shall be limited to PDF files on DVD or USB drive, unless otherwise approved in advance by Architect.

4. Hard Copy Submittals:
   a. Submit data bound in 8½ x 11 inch format, organized in three-ring binders with durable rigid covers. Provide multiple volumes where appropriate; organized and labeled in a coordinated set with matching appearance.
   b. Prepare binder cover with printed title of manual and title of project. Identify subject matter of binder on cover and spine.
   c. Include a Table of Contents for each volume.
   d. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titles clearly printed under reinforced plastic tabs.

B. Operation and Maintenance Manuals:

1. Directory: List names, addresses, and telephone numbers of Architect, Contractor, Subcontractors, suppliers, and maintenance providers.

2. Operation and Maintenance Instructions: Arrange by system and subdivide by specification section. For each category, identify the following as applicable to the Product or system:
   a. Significant design criteria.
   b. List of products, clearly identifying specific product or part installed, with options and accessory items indicated.
   c. Schematic drawings, wiring diagrams, and flow diagrams for each system, with parts list for each component.
   d. Step-by-step procedures for start-up, seasonal changeover, and shut-down of each system and piece of equipment.
   e. Operating instructions.
   f. Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
   g. Maintenance instructions for equipment and systems, including lubrication and filter replacement requirements, recommended service intervals, and troubleshooting procedures.
   h. Information required for reordering specially manufactured products.

3. Project Documents and Certificates: Include the following:
   a. Test reports for each item with specified field or laboratory testing.
   b. Warranty documents in accordance with this Section. Indicate names, addresses, telephone numbers, and procedures for filing a claim and obtaining warranty services.
   c. HVAC testing and balancing reports in accordance with Section 23 0593.

1.07 WARRANTIES:

A. General Requirements:
   1. Execute and assemble transferable warranty documents from subcontractors, suppliers, and manufacturers. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of warranty on Work that incorporates products.
   2. Include in Operation and Maintenance Manuals.
   3. For items of Work delayed beyond date of Substantial Completion, provide updated submittal prior to or together with final Application for Payment, listing date of actual completion as start of warranty period.
   4. Written warranties made to Owner are in addition to contractual, implied, and expressed warranties, and shall not limit duties, obligations, rights and remedies otherwise required by Contract Documents and available under law.
   5. Warranty claims shall be resolved in the same venue and using the same dispute resolution method as provided for the Prime Contract.

B. Contractor's Warranty: Contractor shall provide warranties, and shall correct nonconforming Work, in accordance with the General Conditions.

C. Specific Warranties: Provide written documentation for each warranty specified in individual specification sections.
   1. At the time of shop drawing and product data submittal, submit a preliminary copy of each specific warranty for review in accordance with Section 01 3300.
   2. Provide full warranty for parts and labor, without dollar amount limitation or proration based on period of use, unless specifically indicated in individual specification sections.
   3. Warranty periods begin on the Date of Substantial Completion, unless specifically indicated in individual specification sections. Where manufacturer warranties begin at an earlier date, such as the date of shipment or installation, coordinate procurement and scheduling so that specified warranty periods are not compromised. Provide extended warranty coverage where necessary.
      a. In the event that items of Work covered by a warranty havepunch list work remaining on the Date of Substantial Completion, the warranty period shall not begin until all such work is complete.
   4. Where Warranties from Subcontractors, suppliers or manufacturers are limited to material only, Contractor shall include warranty coverage for labor, shipping, equipment, and other costs required to remove defective Work and install replacement materials.

5. Warranty provisions requiring Owner to provide notice to manufacturer shall allow a minimum time period of 30 days for such notice.
6. If the terms of a warranty require Owner signature, registration, or other action prior to commencement of warranty coverage, Contractor shall take all necessary steps to ensure validity of the warranty, and shall indemnify Owner for loss of warranty coverage caused by failure to do so.

D. Manufacturer Warranties: Where a manufacturer provides a standard product warranty that exceeds the duration of the Contractor's warranty or a Specific Warranty, Contractor shall take all necessary actions to ensure that the manufacturer warranty remains in effect beyond the expiration of the shorter warranty periods.

1.08 SPARE PARTS AND MAINTENANCE MATERIALS:

A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual specification sections.

B. Extra materials shall be from the same lot as installed materials.

C. Provide protective covering for storage; identify with appropriate labels.

D. Deliver to project site and place in location as directed.

**PART 2 PRODUCTS**

Not Used

**PART 3 EXECUTION**

Not Used

END OF SECTION

## SECTION 02 4119 – SELECTIVE DEMOLITION

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes: Minor demolition and removal for remodeling.

B. Related Requirements:
   1. Section 01 3100 – Project Management and Coordination: Alteration project procedures.
   2. Section 01 5000 – Temporary Facilities and Controls: Temporary enclosures.
   3. Section 01 7000 – Execution Requirements: Cutting and patching; items removed for reinstallation; progress cleaning; construction waste management and disposal.

1.02 REGULATORY REQUIREMENTS:

A. Comply with all applicable codes and regulations in addition to being responsible for the prevention of any damage to the adjoining materials and site.

B. Permits: Secure and pay for all necessary permits required for this portion of the work.

C. Do not close or obstruct egress width to any building or site exit unless approved in writing.

D. Do not disable or disrupt building fire or life safety systems without 3 days prior written notice to Owner.

E. Comply with requirements of Ohio Environmental Protection Agency and U.S. EPA.
   1. If notification of demolition or renovation is required, provide all required documentation to the appropriate agency.
   2. If testing, inspection, or analysis of potential asbestos-containing material is required, employ a certified Asbestos Hazard Evaluation Specialist to perform such work.
      a. The amount of regulated asbestos-containing material (RACM) to be removed or disturbed, if any, is anticipated to be less than the quantity regulated by the National Emission Standards for asbestos.
      b. If testing, inspection, or analysis reveals quantities of RACM sufficient to subject the project to the requirements of the National Emission Standards for asbestos, promptly notify the Architect and the Owner, and do not disturb any materials identified as RACM. The Owner will issue special instructions relating to the disposition of such material. The Owner reserves the right to contract independently for the removal of any or all hazardous materials.
   3. If required to do so, employ an individual trained in the provisions of the National Emission Standards for asbestos. This individual shall be on site at all times during the removal of RACM.

1.03 PROJECT CONDITIONS:

A. Provide labor, materials, equipment, insurance and services necessary for the proper and entire completion of the demolition work required for the project.

B. Visit the site prior to bidding and ascertain pertinent local conditions such as location, accessibility and general character of the site, the character and extent of the existing work within or adjacent to the site, and any other work being performed thereon at the time.

C. Include the removal and disposition (or the incorporation in the new work, as the case may be) of all existing portions of the work which are indicated as being removed, or when it becomes necessary to remove such in order to properly complete the new work as shown.

D. Maintain adequate safety measures at all times to protect the existing building, adjacent buildings, their occupants, employees, pedestrians and anyone who may have occasion to frequent the premises in the course of maintaining normal operations. There shall be complete cooperation among Architect, Owner and Contractors to see that all safety requirements are carried out.

E. Where adjoining construction or site improvements are in a condition that might be misconstrued as damage caused by demolition operations, prepare photographs or video of sufficient detail to document existing conditions; deliver to Architect prior to beginning demolition.

F. Furnish all necessary shoring, signs, barricades, dust curtains, etc., to ensure the safety of persons in adjacent areas and other workers in same area.

G. During working hours the Contractor shall be on the job personally or shall be represented by a competent superintendent. The Contractor shall coordinate all trades and subcontractors and provide adequate labor, equipment and materials as needed.

H. Conduct demolition to minimize interference with occupied building areas.

I. Cease operations immediately if structure appears to be in danger; notify Architect. Do not resume operations until directed.

J. Ownership of Removed Materials:
   1. Salvageable and reusable equipment and materials removed are the property of Owner, and shall be delivered to the locations directed by Owner.
   2. Removed materials that are obviously not reusable shall be removed from the site and disposed of.
   3. Items in question shall be brought to the attention of the Owner's representative, who shall determine whether they are to be salvaged or removed from the site and disposed of.

1.04 SEQUENCING AND SCHEDULING:

A. Perform and complete demolition work in a timely manner so as not to disrupt adjacent activities any longer than necessary.

B. Coordinate scheduling of noisy, odor-producing and dusty work with Owner to minimize disruption of Owner's activities.

**PART 2 PRODUCTS**

2.01 MATERIALS:

A. Provide labor, materials, tools, and equipment as necessary to complete demolition work.

**PART 3 EXECUTION**

3.01 PREPARATION:

A. Provide, erect and maintain temporary barriers and partitions where indicated and where required to prevent spread of dust, odors and noise to occupied areas, in accordance with Section 01 5000.

B. Erect and maintain weatherproof closures for exterior openings in roofs, windows, and walls in accordance with Section 01 5000.

C. Protect existing materials and surfaces which are not to be demolished.

D. Prevent movement of structure; provide bracing and shoring.

E. Notify affected utility companies and utilities protection services at least two full working days before starting work; comply with their requirements. Mark site to indicate proposed excavation area.

F. Mark location and termination of utilities.

G. Provide appropriate temporary signage including signage for exit or building egress.

3.02 DEMOLITION:

A. Disconnect, remove, cap and identify designated utilities within demolition areas.

B. Demolish in an orderly and careful manner. Protect existing supporting structural members.

C. Removal of Site Construction: ODOT 202.

D. Removal of Slabs, Walks, and Pavements: Saw cut existing materials to provide a neat joint at removal limits, except where removal terminates at an existing joint.

E. Removal of Concrete and Masonry Walls: Saw cut existing materials to provide a neat joint at removal limits.
   1. Where wall to be removed is in plane with wall to remain, saw cut and remove material to nearest vertical masonry joint (minimum 8 inches) outside indicated limits of removal.
   2. Where new opening is to be provided at existing wall, saw cut vertical edge of new opening and remove material to nearest vertical masonry joint (minimum 8 inches) outside indicated limits of removal. Saw cut head and sill of new opening and remove material to first horizontal masonry course outside the indicated limits of removal.
   3. Where wall to be removed is perpendicular to wall to remain, saw cut block and remove material flush with surface to remain.
   4. Where concrete block is removed from existing floor slab to remain, fully remove bed joint material and leave concrete floor surface suitable for the installation of new floor material.

F. Removal of Ceiling Systems: Where suspended ceilings are indicated to be removed, removal shall include light fixtures, grilles and diffusers, suspension system, hanger wire, clips, anchors, hangers, and blocking.

G. Removal of Resilient Flooring: Where resilient tile or sheet flooring is indicated to be removed, removal shall include removal of mastics and adhesives in accordance with RFCI Recommended Work Practices.

H. Removal of Casework: Where casework is indicated to be removed, removal shall include countertops, plumbing fixtures, anchors, hangers, blocking, and backsplashes or sealant on adjacent surfaces.

I. Removal of Plumbing and HVAC Work:
   1. Verify that abandoned piping and ductwork serve only abandoned facilities.
   2. Disconnect piping and duct systems in walls, floors and ceilings scheduled for removal. Cap existing components to remain at point of disconnection.
   3. Reroute, extend, and reconnect existing systems to maintain integrity of branch or loop serving components not removed.
   4. In building areas to remain, remove abandoned systems to source of supply.
   5. Disconnect and remove abandoned equipment and components, including devices, fasteners, and support framing.
   6. Maintain access to existing equipment and components which remain active. Modify installation or provide access panel as appropriate.

J. Disposal: Remove demolished materials from site except items to be retained by Owner or reinstalled in the work, or as specifically noted otherwise. Do not burn or bury materials on site. Pay fees for transportation and disposal of removed materials.
   1. Dispose of materials removed from the site in a legal location and manner.
   2. Remove and dispose of mercury-containing switches and thermostats in accordance with EPA regulations. Transport in accordance with ODOT regulations.

3. Do not dispose of demolished materials, excavated materials, trees, brush, or other debris in wetlands, flood plains, stream corridors, environmentally sensitive areas, surface waters or storm sewers, even with the permission of the property owner.
4. Do not engage in open burning of debris removed from the project, except in compliance with the regulations of all authorities having jurisdiction, and with all required permits.

K. Remove materials as work progresses. Upon completion of work, leave areas in clean condition.

L. Remove temporary work.

3.03 MINOR ELECTRICAL DEMOLITION FOR REMODELING:

A. Examination:
1. Verify field measurements and circuiting arrangements are as shown on Drawings.
2. Verify that abandoned wiring and equipment serve only abandoned facilities.
3. Demolition drawings are based on superficial field observation and existing record documents, where available. Report discrepancies to Architect before disturbing existing installation.
4. Beginning of demolition means installer accepts existing conditions.

B. Preparation:
1. Disconnect electrical systems in walls, floors and ceilings scheduled for removal.
2. If electrical panels attached to surfaces to be demolished contain circuits serving equipment or devices to remain, relocate panel to approved location in area not affected by demolition; rewire circuits to new panel location.
3. Coordinate utility service outages with Utility Company and Owner.
4. Provide temporary wiring and connections to maintain existing systems in service during construction.
5. Where new systems are installed in place of existing systems, maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Obtain permission from Owner before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.

C. Demolition:
1. Remove, reroute, or replace existing facilities and services as required to permit installation of new work or alterations to old work.
2. Remove abandoned wiring to source of supply.
3. Remove exposed abandoned conduit, including abandoned conduit above accessible ceilings. Plug or cap conduit at a point well behind the proposed new finished closures or surfaces.
4. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned or removed. Provide blank cover for abandoned boxes which are not removed.

5. Where devices, luminaires, or equipment are removed, reconnect existing loads not removed, if any, to existing circuit; verify circuit integrity and operation.
6. Disconnect and remove abandoned panelboards and distribution equipment, including fasteners and support framing.
7. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
8. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers and other accessories.
   a. Remove and dispose of lamps and ballasts in accordance with EPA regulations. Transport in accordance with ODOT regulations. Ballasts labeled "Contains No PCBs" may be containerized and recycled.
9. Repair adjacent construction and finishes damaged during demolition work.
10. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.

D. Clean and repair existing materials and equipment which remain or are to be reused.
   1. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.
   2. Luminaires: Clean existing luminaires in place. Use mild detergent to clean all exterior and interior surfaces; rinse with clean water and wipe dry. Replace non-working lamps and ballasts, and broken electrical parts.

3.04 PROTECTION:

A. Exercise caution to avoid damage to existing surrounding materials and structures which are to remain.

B. Protect path of travel from demolition areas to waste collection areas to prevent damage to floor and wall finishes and other existing construction to remain.

C. Prevent damage to adjoining properties, existing buildings, pavement, sidewalks, landscaping, and similar features. Make all necessary repairs where required and do all patching to meet existing conditions.

END OF SECTION

## SECTION 03 1000 – CONCRETE FORMING

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes: Concrete forming and accessories.

B. Related Sections:
   1. Section 03 3000 – Cast-in-Place Concrete.
   2. Section 07 2100 – Thermal Insulation: Insulation for foundations and floor slabs.

1.02 QUALITY ASSURANCE:

A. Perform concrete work in accordance with ACI 301. Maintain one copy on site.

B. Perform formwork in accordance with ACI 347.

## PART 2 PRODUCTS

2.01 FORMING MATERIALS:

A. Wood Form Materials:
   1. Plywood for Surfaces Exposed to View: APA High Density Overlay Plyform Class I Exterior, thickness in accordance with APA V345; sound undamaged sheets with clean, true edges.
   2. Plywood for Surfaces Not Exposed to View: APA B-B Plyform Class I Exterior, thickness in accordance with APA V345; sound undamaged sheets with clean, true edges.
   3. Lumber: Kiln dried softwood; grade as required for loading conditions.

B. Prefabricated Forms: Preformed steel or glass fiber reinforced plastic; matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.

2.02 FORMING ACCESSORIES:

A. Form Ties: Metal snap-off type, free of defects that could leave holes larger than 1 inch in concrete surface.

B. Form Release Agent: Colorless mineral oil which will not stain concrete, absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.

   1. Manufacturers: In accordance with Section 01 6000.
      a. Euclid Chemical Company; Eucoslip VOX.
      b. Laticrete International; Debond Form Coating.
      c. Sonneborn Building Products; Cast-Off WB.

2. VOC Content: Maximum 340 gm/liter.

C. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

D. Waterstops: Polyvinyl chloride (PVC), minimum 1750 psi tensile strength, minimum 50 degrees F to 175 degrees F working temperature range, 6 inch wide, 3/8 inch web thickness, maximum possible lengths, split type with ribbed profile and center bulb, preformed corner sections, heat welded jointing.

1. Manufacturers: In accordance with Section 01 6000.
   a. Sika Corporation; Greenstreak No. 724.
   b. Paul Murphy Plastics Company; SR-6380.
   c. Vinylex Corporation; RSB6-38.

## PART 3 EXECUTION

3.01 EXAMINATION:

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

3.02 PREPARATION:

A. Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories.

3.03 FORMING:

A. Formwork Erection: Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.
   1. Earth forms are permitted only at footings and grade beams excavated from undisturbed soil, where soil conditions are sufficiently stable to eliminate the possibility of slide-in. Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.
   2. Construct formwork so that concrete members are of the correct size, shape, alignment, elevation, and position.
   3. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
   4. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
   5. Align joints and make watertight. Keep form joints to a minimum.
   6. Obtain approval before framing openings in structural members which are not indicated on Drawings.
   7. Coordinate formwork erection with work of other sections requiring attachment of components to formwork.
   8. If formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement, request instructions from Architect before proceeding.

B. Application of Form Release Agent:
   1. Apply form release agent on formwork in accordance with manufacturer's recommendations.
   2. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
   3. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings which are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

C. Inserts, Embedded Parts, and Openings:
   1. Provide formed openings where required for items to be embedded in or passing through concrete work.
   2. Locate and set in place items which will be cast directly into concrete.
   3. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, raceways, conduits, ducts, other inserts, and components of other Work.
   4. Install accessories in accordance with manufacturer's instructions, straight, level, and plumb. Ensure items are not disturbed during concrete placement.
   5. Install waterstops in accordance with manufacturer's instructions continuous without displacing reinforcement. Seal joints watertight.
   6. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow drainage.
   7. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted to joints which will not be apparent in exposed concrete surfaces.

D. Form Cleaning:
   1. Clean forms as erection proceeds, to remove foreign matter within forms.
   2. Clean formed cavities of debris prior to placing concrete.
   3. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
   4. 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.

E. Formwork Tolerances: ACI 301.

F. Form Removal:
   1. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
   2. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
   3. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

3.04 FIELD QUALITY CONTROL:

A. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.

END OF SECTION

## SECTION 03 3000 – CAST-IN-PLACE CONCRETE

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Cast-in-place concrete construction:
      a. Footings and foundation walls.
      b. Floors and slabs on grade.
      c. Control, expansion, and contraction joint devices associated with concrete work, including joint sealants.
   2. Concrete reinforcing.
   3. Concrete finishing.
   4. Concrete curing.

B. Products Installed But Not Furnished Under This Section:
   1. Divisions 22 through 28: Facility Services items for casting into concrete.

C. Related Requirements:
   1. Section 01 4520 – Testing and Inspecting Services.
   2. Section 03 1000 – Concrete Forming.
   3. Section 07 2100 – Thermal Insulation: Insulation for foundations and floor slabs.

1.02 SUBMITTALS: In accordance with Section 01 3300.

A. Product Data: Provide data on concrete mix designs, joint devices, attachment accessories, vapor retarders, and admixtures.

1.03 QUALITY ASSURANCE:

A. Perform concrete work in accordance with ACI 301.

B. Perform steel reinforcement in accordance with ACI SP-66 and CRSI 63, 65, and Manual of Practice.

C. Acquire cement and aggregate from same source for all work.

1.04 DELIVERY, STORAGE AND HANDLING: In accordance with Section 01 6000.

A. Deliver packaged materials in manufacturer's packaging including application instructions.

1.05 ENVIRONMENTAL REQUIREMENTS:

A. Conform to ACI 305R when concreting during hot weather. Provide precautions against plastic shrinkage where indicated by air temperature, relative humidity, concrete temperature, and wind velocity.

B. Conform to ACI 306R when concreting during cold weather.

C. During concrete floor finishing, provide temporary heat to maintain ambient temperature of minimum 50 degrees F; provide ventilation sufficient to prevent injurious gases from temporary heat or other sources affecting concrete.

## PART 2 PRODUCTS

2.01 REINFORCING:

A. Reinforcing Steel: ASTM A615, 60 ksi yield grade; deformed billet steel bars, unfinished.

B. Welded Steel Wire Fabric: ASTM A1064, Plain Type; in flat sheets; unfinished.

2.02 REINFORCING ACCESSORIES:

A. Tie Wire: Minimum 16 gauge annealed type.

B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions, including load bearing pad on bottom to prevent vapor retarder puncture. Metal accessories shall be galvanized.

C. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic coated steel type; size and shape as required.

2.03 REINFORCING FABRICATION:

A. Fabricate concrete reinforcing in accordance with ASTM A184, CRSI Manual of Practice, and ACI SP-66.

B. Locate reinforcing splices not indicated on drawings, at point of minimum stress.

C. Remove rust scale and coatings which may reduce bond from reinforcing prior to fabrication.

D. Cold bend reinforcing bars to minimum bend diameters in accordance with ACI 301.

E. Extend horizontal bars in walls and footings minimum 30 bar diameters or 18 inches around corners.

2.04 CONCRETE MATERIALS:

A. Cementitious Materials:

1. Portland Cement: ASTM C150, Type I – Normal.

2. Fly Ash: ASTM C618; Type C or Type F.
   a. Interior Concrete Slabs: Fly ash may be substituted for up to 15 percent of the cement content for each concrete mix.
   b. Other Locations: Fly ash may be substituted for up to 25 percent of the cement content for each concrete mix.

3. Ground Granulated Blast Furnace Slag (GGBFS): ASTM C989, Grade 100 minimum. GGBFS may be substituted for up to 35 percent of the cement content for each concrete mix.

B. Fine and Coarse Aggregates: ASTM C33.

C. Water: ASTM C1602; clean, potable and not detrimental to concrete.

2.05 ADMIXTURES:

A. Manufacturers: In accordance with Section 01 6000. Admixtures shall be the products of a single manufacturer.
   1. GCP Applied Technologies.
   2. Master Builders Solutions.
   3. Premiere Concrete Admixtures.
   4. Sika Corporation.

B. Air Entrainment: ASTM C260, neutralized vinsol resin.

C. Chemical: ASTM C494.
   1. Type A – Water Reducing.
   2. Type B – Retarding.
   3. Type C – Accelerating.
   4. Type D – Water Reducing and Retarding.
   5. Type E – Water Reducing and Accelerating.

D. Plasticizing: ASTM C1017.

E. Admixtures containing more than 0.1 percent chloride ions are not approved.

2.06 ACCESSORIES:

A. Vapor Retarder: ASTM E1745, Class B; minimum 10 mil thickness.
   1. Water Vapor Permeance: ASTM E154; maximum 0.025 perms.

B. Non-Shrink Grout for Dowels to Existing Concrete: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2400 psi in 48 hours and 7000 psi in 28 days.
   1. Manufacturers: In accordance with Section 01 6000.
      a. Master Builders; Set Grout.
      b. ChemMasters, Inc.; Conset Grout.
      c. Sonneborn Building Products; Sonogrout.
      d. Sika Corporation; Sika Grout 212.

C. Bonding Agent: Polymer resin emulsion.
   1. Manufacturers: In accordance with Section 01 6000.
      a. GCP Applied Technologies; Daraweld-C.

b. Master Builders Solutions; MasterEmaco A660.
c. Sika Corporation; Sika Bond.

2.07 JOINT DEVICES AND FILLER MATERIALS:

A. Joint Filler: One of the following at Contractor's option; ½ inch thick.

1. ASTM D994 or ASTM D1751; asphalt impregnated fiberboard or felt.

2. ASTM D4819; closed cell polyethylene.

3. ASTM D8139; closed cell polypropylene.

B. Bond Breaker: No. 15 asphalt saturated felt.

C. Construction Joint Devices: Galvanized steel with mill finish, minimum 20 gauge; 8 inch thick, formed to tongue and groove profile, knockout holes spaced at 6 inches, ribbed steel spikes with tongue to fit top screed edge.

1. Manufacturers: In accordance with Section 01 6000.
a. Heckmann Building Products, No. 95.

D. Joint Sealant: ASTM C920 Type M, Grade P, Class 25, Use T; cold applied two part polyurethane, self leveling; with corresponding primer.

1. Manufacturers: In accordance with Section 01 6000.
a. Master Builders Solutions; MasterSeal SL 2.
b. Quaker Sealants & Coatings Company; QSC-231.
c. Sika Corporation; Sikaflex-2c SL.
d. Tremco, Inc.; THC 901.

2.08 CONCRETE MIXES:

A. Mix concrete in accordance with ACI 304. Deliver concrete in accordance with ASTM C94. Do not mix concrete more than 90 minutes.

B. Select proportions for normal weight concrete in accordance with ACI 301 Method 1.

C. Provide concrete to the following criteria:

1. Foundation Walls, Exterior Concrete, and Concrete Exposed to Weather:
a. Compressive Strength (28 day): Minimum 4500 psi.
b. Air Entrained: In accordance with ACI 301.
c. Slump (plus or minus 1 inch): 3 inches.

2. Concrete Fill for Overexcavated Areas and Utility Trench Backfilling:
a. Compressive Strength (28 day): Minimum 1500 psi.
b. Aggregate Size (maximum): ½ inch.
c. Slump (maximum): 6 inches.

3. Footings and Interior Foundations:
a. Compressive Strength (28 day): 3500 psi.
b. Aggregate Size (maximum): 1½ inch.

c. Slump (plus or minus 1 inch): 3 inches.

4. Interior Concrete Slabs, and Concrete Work Not Otherwise Scheduled:
   a. Compressive Strength (28 day): 3500 psi.
   b. Aggregate Size (maximum): 1 inch.
   c. Slump (plus or minus 1 inch): 3 inches.

D. Maximum Size of Coarse Aggregate: In accordance with ACI 301 unless noted otherwise.

E. Use accelerating admixtures in cold weather only when approved by Architect. Use of admixtures will not relax cold weather placement requirements.

F. The use of calcium chloride is not permitted.

G. Use set retarding admixtures during hot weather only when approved by Architect.

H. Add air entraining agent to normal weight concrete mix for work exposed to exterior.

2.09 CURING MATERIALS:

A. Liquid Membrane Curing Compound: ASTM C309, Type I, Class B; dissipating type. Clean thoroughly with power scrubber and industrial strength detergents prior to installing floor coverings.

1. Manufacturers: In accordance with Section 01 6000.
   a. Euclid Chemical Co.; Kurez DR VOX.
   b. Laticrete International.
   c. Tamms Industries.
   d. W. R. Meadows, Inc.

B. Absorptive Mats: ASTM C171, burlap-polyethylene, minimum 8 oz/sq yd, or reinforced water-resistant laminated paper, bonded to prevent separation during handling and placing.

C. Water: Potable, not detrimental to concrete.

## PART 3 EXECUTION

3.01 EXAMINATION:

A. Verify that anchors, seats, plates, reinforcement, and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.

B. Verify that underslab construction, including mechanical and electrical work, is installed complete, backfilled, inspected, and approved.

3.02 PREPARATION:

A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.

B. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels, and pack solid with non-shrink grout.

C. Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories.

3.03 PLACING REINFORCING:

A. Verify that reinforcing is free of dirt and form release agents.

B. Place, support, and secure reinforcement against displacement. Do not deviate from required position.

C. Splice reinforcing bars minimum 12 inches and 36 bar diameters.

D. Place welded wire fabric in maximum lengths. Lap adjacent sheets minimum 6 inches; secure lapped edges together at maximum 48 inches o.c. Hold fabric back minimum 2 inches from construction joints and expansion joints.

E. Do not displace or damage vapor retarder.

F. Accommodate placement of formed openings.

G. Maintain concrete cover around reinforcing in accordance with ACI 318.

H. Maintain clear distance between reinforcing bars, minimum 1 inch and 1-1/3 times the maximum coarse aggregate size.

I. Tolerances: In accordance with ACI 301.

3.04 PLACING CONCRETE:

A. Place concrete in accordance with ACI 301.

B. Notify Architect minimum 48 hours prior to commencement of operations.

C. Ensure reinforcement, inserts, embedded parts, and joint devices are not disturbed during concrete placement.

D. Install vapor retarder under interior slabs on grade, in accordance with ASTM E1643. Lap joints minimum 6 inches and seal watertight by taping edges and ends.

   1. Seal overlapping joints, perimeter joints, openings and penetrations with continuous strip of vapor retarder tape. Seal perimeter to adjoining construction. Seal joints airtight at penetrations.

E. Repair vapor retarder damaged during placement of concrete reinforcing. Repair with vapor retarder material; lap over damaged areas minimum 6 inches and seal watertight.

F. Place slabs on grade and sidewalks in pattern indicated and as approved by Architect.

   1. Separate slabs from vertical surfaces with ½ inch thick joint filler.
      a. Place joint filler in slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.

b. Extend joint filler from bottom of slab to within ½ inch of finished slab surface.

2. Provide control joints in slabs at maximum 20 ft o.c. unless noted otherwise. Control joints may be tooled or saw cut at Contractor's option.

3. Install construction joint devices in coordination with slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete. Thicken slab to full depth of construction joint device.

G. Place concrete continuously between predetermined expansion and construction joints.

1. Install waterstops in construction joints located in foundation walls and footings.

H. Do not interrupt successive placement. Do not permit cold joints to occur. Do not permit horizontal joints in walls or piers.

I. Saw cut joints within 24 hours after placing. Use 3/16 inch thick blade, cut into ¼ depth of slab thickness.

J. Apply sealant to exposed exterior and interior joints in accordance with manufacturer's instructions.

K. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

L. Provide mechanical equipment for conveying concrete to assure a continuous flow of concrete at the delivery end. Provide runways for wheeled concrete conveying equipment from the concrete delivery point to the locations of final deposit. Keep interior surfaces of conveying equipment, including chutes, free of hardened concrete, debris, water, snow, ice, and other deleterious materials.

M. Cold Weather Placing: Do not use frozen materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials. Ascertain that forms, reinforcing steel, and adjacent concrete surfaces are entirely free of frost, snow, and ice before placing concrete.

N. Remove excess and unsuitable concrete from project site and dispose of in an acceptable location.

3.05 CONCRETE FINISHING:

A. Provide concrete surfaces with finishes in accordance with the definitions in ACI 301. Finish concrete flatwork surfaces in accordance with ACI 301 and ACI 302.
   1. Concealed Formed Concrete: Rough form finish.
   2. Exposed Formed Concrete: Smooth form finish.
   3. Interior Slabs: Troweled finish.

B. Tool exposed slab edges, expansion joints, and tooled control joints with ¼ inch radius edging tool.

C. Floor Finishing Tolerances:
   1. Maximum Variation of Surface Flatness: ¼ inch in 10 ft, ACI 301 Class B.

2. Correct defects by grinding or removal and replacement of the defective work. Re-measure corrected areas by the same process.

3.06 CURING AND PROTECTION:

A. Cure concrete surfaces in accordance with ACI 308.

B. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, excessive temperature changes, and mechanical injury.

C. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

D. Schedule of Curing Methods:
   1. Cure horizontal surfaces by ponding, spraying, absorptive mat, or membrane curing compound.
   2. Cure vertical surfaces by spraying or membrane curing compound.

E. Concrete Curing:
   1. Ponding: Maintain 100 percent coverage of water over floor slab areas continuously for 4 days.
   2. Spraying: Spray water over surfaces and maintain wet for 7 days.
   3. Absorptive Mat: Saturate material and place over floor slab areas, lapping ends and sides; maintain in place for 7 days.
   4. Membrane Curing Compound: Apply curing compound in accordance with manufacturer's instructions in two coats with second coat applied at right angles to first.

F. Protect finished concrete surfaces from damage by subsequent construction operations.

G. Do not permit traffic over unprotected surfaces.

3.07 FIELD QUALITY CONTROL:

A. Testing firm will perform concrete testing in accordance with Section 01 4520.
   1. Provide free access to Work and cooperate with testing firm.
   2. Submit proposed mix design of each class of concrete to testing firm for review prior to commencement of Work.
   3. Tests of cement and aggregates may be performed to ensure conformance with specified requirements.

B. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances, or specified requirements. Repair or replacement of defective concrete will be determined by the Architect.

3.08 PATCHING:

A. Allow Architect to inspect concrete surfaces upon removal of forms.

B. Excessive honeycomb, voids over ½ inch diameter, or embedded debris in concrete is not acceptable. Notify Architect upon discovery.

C. Patch imperfections and tie holes in concealed surfaces in accordance with ACI 301.

D. Patch, fill, touch-up, and repair surface defects as directed by Architect for each individual area.
   1. Repair exposed concrete surfaces containing defects which adversely affect the appearance of the finish. Remove and replace the concrete having defective surfaces if the defects cannot be repaired to the satisfaction of the Architect. Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, holes left by tie rods and bolts, fins and other projections on the surface, stains, and other discolorations that cannot be removed by cleaning.
   2. Repair concrete surfaces containing defects which may adversely affect the durability of the concrete. Remove and replace the concrete having defective surfaces if the defects cannot be repaired to the satisfaction of the Architect. Surface defects include cracks in excess of 0.01 inch wide, cracks of any width and other surface deficiencies which penetrate to the reinforcement or completely through non-reinforced sections, crazing, honeycomb, rock pockets, and spalls, except minor breakage at corners.

END OF SECTION

## SECTION 06 0573 – WOOD TREATMENT

### PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes: Preservative treatment of wood.

B. Related Requirements:
   1. Section 06 1100 – Wood Framing.

### PART 2 PRODUCTS

2.01 PRESERVATIVE TREATMENT:

A. Wood Preservative (Pressure Treatment): AWPA P5 and AWPA T1; water borne preservative with 0.25 percent retainage. Kiln dry after treatment to specified moisture content, maximum 19 percent.

B. Wood Preservative (Surface Application for Site Treatment and Touch-up): Clear type, compatible with pressure treatment preservative.

### PART 3 EXECUTION

3.01 SITE APPLIED WOOD TREATMENT:

A. Apply preservative treatment in accordance with manufacturer's instructions and AWPA M4.

B. Brush apply two coats of preservative treatment on wood in contact with cementitious materials, roofing, and metal flashings.

C. Treat site-sawn cuts in factory treated wood.

D. Allow preservative to dry prior to erecting members.

3.02 SCHEDULES:

A. Preservative Treated Wood Locations: Framing and blocking above grade in contact with cementitious materials, roofing, and metal flashings.
   1. Sill Plates on Concrete: AWPA Use Category UC2.
   2. Exterior and Roof Locations: AWPA Use Category UC3B.
   3. Applications Not Otherwise Scheduled: AWPA U1 Table 3-1.

END OF SECTION

## SECTION 06 1100 – WOOD FRAMING

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Structural wall and roof framing.
   2. Wall and roof sheathing.
   3. Miscellaneous framing and sheathing.
   4. Concealed wood blocking for support of door stops, toilet and bath accessories, wall cabinets, mechanical and electrical items, and other accessories.

B. Related Requirements:
   1. Section 06 0573 – Wood Treatment.
   2. Section 06 1700 – Prefabricated Structural Wood.
   3. Section 06 1753 – Prefabricated Wood Trusses.
   4. Section 07 2100 – Thermal Insulation.

1.02 QUALITY ASSURANCE:

A. Perform Work in accordance with the following agencies:
   1. Lumber Grading Agency: Certified by ALSC.
   2. Plywood Grading Agency: Certified by APA.

## PART 2 PRODUCTS

2.01 LUMBER MATERIALS:

A. Lumber Grading Rules: AFPA, SPIB, and NLGA.

B. Structural Framing: 2 to 4 inches thick, 5 inches and wider, 19 percent maximum moisture content; machine stress rated to the following values:
   1. Bending ($F_b$): Minimum 2400 psi.
   2. Modulus of Elasticity (E): Minimum 1,800,000 psi.

C. Non-structural Light Framing: Southern Pine or Spruce-Pine-Fir, Standard or better grade, 2 to 4 inches thick, 2 to 4 inches wide, 19 percent maximum moisture content.

D. Studding: Southern Pine or Spruce-Pine-Fir, Stud grade, 2 to 4 inches thick, 19 percent maximum moisture content.

E. Miscellaneous Framing and Blocking: Southern Pine or Spruce-Pine-Fir, Utility or better grade, 2 to 4 inches thick, 19 percent maximum moisture content.
   1. At Contractor's option, a flexible wood backing plate system fabricated from ¾ inch fire-retardant treated plywood may be used for blocking.

2.02 SHEATHING MATERIALS:

A. General Requirements: DOC PS 1 or DOC PS 2.

B. Particleboard Sloped Roof Sheathing: ANSI A208.1, APA Oriented Strand Board; wood chips set with waterproof resin binder; Sheathing grade; sanded faces; 5/8 inch thick, 48 x 96 inch sized sheets, square edges.

C. Particleboard Wall Sheathing: ANSI A208.1, APA Oriented Strand Board; wood chips set with waterproof resin binder; Sheathing grade; sanded faces; 7/16 inch thick, 48 x 96 inch sized sheets, square edges.

2.03 ACCESSORIES:

A. Fasteners and Anchors:
   1. Exterior Locations and Treated Wood Locations: Type as recommended for application; hot dip galvanized to ASTM A153.
   2. Other Fasteners: Type as recommended for application; unfinished steel.
   3. Anchors: Expansion shield and lag bolt type for anchorage to concrete.

B. Structural Framing Connectors: Hot dipped galvanized steel, sized to suit framing conditions.

C. Sill Gasket on Top of Foundation: ¼ inch thick, plate width, closed cell polyethylene foam from continuous rolls.

**PART 3 EXECUTION**

3.01 FRAMING:

A. Set structural members level and plumb, in correct position. Accurately saw-cut members to seat square on bearings. Fit closely into proper location.

B. Frame, anchor, tie and brace members to develop strength and rigidity required for intended purposes. Do not stress members in excess of design strength. Secure members permanently in position with proper fastenings to render parts rigid.

C. Make provisions for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.

D. Place horizontal members with crown side up.

E. Space framing 16 inches o.c., except where indicated otherwise.

F. Frame corners, headers, and wall intersections in thermal assemblies to allow maximum insulation coverage

G. Construct load bearing framing members full length without splices.

H. Double members at openings over 24 inches wide. Space short studs over and under opening to stud spacing.

I. Place sill gasket directly on cementitious foundation. Puncture gasket clean and fit tight to protruding foundation anchor bolts.

J. Coordinate installation of prefabricated wood components and other rough carpentry items.

K. Coordinate installation of blocking with requirements of items to be anchored thereto or supported thereby.

3.02 SHEATHING:

A. Secure roof sheathing with long dimension perpendicular to framing members and with ends staggered and sheet ends over bearing.
   1. Use sheathing clips between sheets between roof framing members. Maintain 1/8 inch space between panels at midspan of truss space along unsupported sheathing edges.

B. Secure wall sheathing with long dimension parallel to wall studs, with ends over firm bearing and staggered.

C. Minimum sheathing securement to wood framing shall be 8d nails at 6 inches o.c. at panel edges and 12 inches o.c. at intermediate supports. Do not bridge building expansion joints.

3.03 TOLERANCES:

A. Framing Members: ¼ inch from true position, maximum.

END OF SECTION

## SECTION 06 1700 – PREFABRICATED STRUCTURAL WOOD

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes: Laminated veneer lumber.

B. Related Requirements:
   1. Section 06 1100 – Wood Framing.

1.02 DESIGN REQUIREMENTS:

A. Size components to withstand design loads shown on the Drawings.

B. Maximum Allowable Deflection: 1/360 of span.

1.03 SUBMITTALS: In accordance with Section 01 3300.

A. Shop Drawings: Indicate layout, sizes and spacing of members, fastener description and locations, loads and cambers, and framed openings. Provide bearing and anchor details, bridging and bracing requirements.

1.04 QUALITY ASSURANCE:

A. Design special conditions and loadings not indicated in manufacturer's literature under direct supervision of a Professional Structural Engineer experienced in the design of this Work and licensed at the place where the Project is located.

B. Conform to applicable building code for loads, seismic zoning, and other governing load criteria.

1.05 DELIVERY, STORAGE AND HANDLING: In accordance with Section 01 6000.

A. Store, stack, and handle products vertically, elevated above ground, braced to resist movement and prevent warping.

B. Protect from direct exposure to weather prior to installation; maintain factory wrappings.

## PART 2 PRODUCTS

2.01 LAMINATED VENEER LUMBER:

A. Manufacturers: In accordance with Section 01 6000.
   1. Georgia-Pacific Corporation; G-P Lam.
   2. LP Building Products; Gang-Lam.
   3. Weyerhaeuser Co.; Microllam 1.9E.

B. Fabricated Units: ASTM D5456; softwood veneer, with 12 percent maximum moisture content before fabrication. Fabricate to achieve the following minimum values:
   1. Modulus of Elasticity (E): 1,900,000 psi.
   2. Bending ($F_b$): 2600 psi.
   3. Compression ($F_c$) Perpendicular to Grain: 750 psi.
   4. Compression ($F_c$) Parallel to Grain: 2510 psi.
   5. Horizontal Shear ($F_v$): 285 psi.

2.02 ACCESSORIES:

A. Adhesive: As recommended by manufacturer.

B. Fasteners: Hot dipped galvanized steel.

C. Framing Connectors: Hot dipped galvanized steel, sized to suit framing conditions.

**PART 3 EXECUTION**

3.01 EXAMINATION:

A. Verify that supports and openings are ready to receive members.

3.02 INSTALLATION:

A. Install structural members in accordance with manufacturer's instructions.

B. Seal field cuts with water repellent sealer immediately after cutting.

C. Set structural members level and plumb, in correct position.

D. Make provisions for erection loads, and for sufficient temporary bracing to maintain structure plumb and in true alignment until completion of erection and installation of permanent bracing, and to provide lateral support prior to sheathing installation.

E. Place headers and supports to frame openings.

F. Where holes are required for mechanical and electrical penetrations, do not exceed manufacturer's recommended number, size and spacing.

3.03 ERECTION TOLERANCES:

A. Framing Members: Maximum ½ inch from true position.

END OF SECTION

## SECTION 06 1753 – PREFABRICATED WOOD TRUSSES

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Shop fabricated wood trusses for roof framing.
   2. Bridging, bracing, and anchorage.

B. Related Requirements:
   1. Section 06 1100 – Wood Framing.

1.02 SUBMITTALS: In accordance with Section 01 3300.

A. Shop Drawings: Indicate sizes and spacing of trusses and associated components, web and chord sizes, plate sizes, loads and truss cambers, and framed openings. Indicate truss configurations, bearing and anchor details, bridging and bracing requirements. Submit design calculations.

1.03 QUALITY ASSURANCE:

A. Perform Work in accordance with the following agencies:
   1. Lumber Grading Agency: Certified by ALSC.

B. Truss Design, Fabrication, and Installation: In accordance with Truss Plate Institute (TPI) BWT-76, HET-80, PCT-85 including Supplement, and QSP-88.

C. Manufacturer: Company specializing in manufacturing the Products specified in this Section with minimum three years documented experience.

D. Design trusses under direct supervision of a Professional Structural Engineer experienced in the design of this Work and licensed at the place where the Project is located.

E. Conform to applicable building code for loads, load combinations, seismic zoning, and other governing load criteria, but not less than the design criteria shown on the Drawings. Include loads for sliding and drifting snow, rain-on-snow surcharge, ponding, and other loads as required by building configuration.
   1. Include minimum 5 psf collateral dead load on bottom chord members for mechanical and electrical items.

1.04 DELIVERY, STORAGE, AND PROTECTION: In accordance with Section 01 6000.

A. Handle and erect trusses in accordance with TPI HET-80.

B. Store truss depth in vertical position resting on intermittent bearing pads.

## PART 2 PRODUCTS

2.01 MATERIALS:

A. Lumber Grading Rules: AFPA, SPIB, and NLGA.

B. Wood Members: Single top and bottom chord, 19 percent maximum and 7 percent minimum moisture content, softwood lumber of species and grade required to meet load criteria.

C. Steel Plate Connectors: ASTM A653 steel, Grade A, G60 hot dip galvanized coating, die stamped with integral teeth, 0.036 inch minimum thickness.

D. Truss Bridging: Type, size, and spacing recommended by truss manufacturer.

2.02 ACCESSORIES:

A. Wood Framing and Blocking: In accordance with Section 06 1100.

B. Fasteners and Anchors: Hot dipped galvanized steel for exterior locations; unfinished steel elsewhere.

C. Bearing Plates and Hangers: Hot dipped galvanized steel.

2.03 FABRICATION:

A. Fabricate trusses to achieve structural requirements specified.

B. Brace wood trusses for support in accordance with TPI BWT-76.

C. Stamp each truss with name and address of manufacturer.

D. Provide top chord extensions as indicated.

E. Fabricate to achieve minimum end bearing of 3½ inches on wood; 4 inches on steel or masonry.

F. Frame special sized openings in web framing as detailed.

## PART 3 EXECUTION

3.01 EXAMINATION:

A. Verify that supports and openings are ready to receive trusses.

3.02 PREPARATION:

A. Coordinate placement of support and bearing items.

3.03 ERECTION:

A. Install trusses in accordance with manufacturer's instructions and TPI BWT-76.

B. Set members level and plumb, in correct position.

C. Make provisions for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.

D. Do not field cut or alter structural members without approval of Architect.

E. Place headers and supports to frame openings.

F. Frame openings between trusses in accordance with Section 06 1100.

G. Coordinate placement of sheathing with work of this section.

3.04 ERECTION TOLERANCES:

A. Framing Members: ½ inch from true position, maximum.

END OF SECTION

## SECTION 06 2000 – FINISH CARPENTRY

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes: Standing and running trim.

B. Related Requirements:
   1. Section 06 1100 – Wood Framing: Blocking and support framing.
   2. Section 09 9000 – Painting and Coating.
   3. Section 12 3000 – Casework.

1.02 SUBMITTALS: In accordance with Section 01 3300.

A. Shop Drawings: Indicate materials, component profiles and elevations, and schedule of finishes.

1.03 QUALITY ASSURANCE:

A. Perform Work in accordance with AWI Custom quality.

B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

C. In lieu of grade stamping exposed to view materials, submit manufacturer's certificate certifying that products meet or exceed specified requirements.

1.04 ENVIRONMENTAL REQUIREMENTS: In accordance with Section 01 6000.

A. Protect materials from moisture damage.

B. During and after delivery of materials and installation of work of this section, maintain the same temperature and humidity conditions in building spaces as will occur after occupancy.

## PART 2 PRODUCTS

2.01 WOOD MATERIALS:

A. Interior Hardwood Lumber to Receive Opaque (Painted) Finish: NHLA; graded in accordance with AWI; maximum moisture content of 10 percent; plain sliced Poplar, S4S, Select Grade.

2.02 STANDING AND RUNNING TRIM:

A. Materials: Hardwood lumber of species and grade specified for finish scheduled; all surfaces sanded.
   1. Profiles: Match existing; with kerfed or hollow backs.

B. Lengths:
   1. Standing Trim: Full length without splices.
   2. Running Trim: Commercial long lengths; splices permitted where framing and blocking facilitates solid fastening. Do not splice lengths shorter than 3 feet.

2.03 ACCESSORIES:

A. Adhesive: Type recommended by AWI to suit application.

B. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; chrome finish.

C. Concealed Joint Fasteners: Threaded steel.

**PART 3 EXECUTION**

3.01 EXAMINATION:

A. Verify existing conditions and dimensions before starting work.

B. Verify adequacy of backing and support framing.

3.02 INSTALLATION:

A. Secure components using appropriate anchorages.

B. Miter external corners of running trim; butt and cope internal corners.

C. Sand work smooth and set exposed fasteners.

D. Apply wood filler in exposed nail and screw indentations.

E. Finish exposed to view, internal, and semi-concealed surfaces, except prefinished surfaces.

F. Seal surfaces in contact with cementitious materials.

3.03 PROTECTION:

A. Protect exposed finished work of other Sections from damage during installation of the work of this section.

END OF SECTION

## SECTION 07 2100 – THERMAL INSULATION

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Board insulation.
   2. Batt insulation.
   3. Sprayed insulation.
   4. Insulating foam sealants and sealing tapes.

B. Related Requirements:
   1. Section 03 3000 – Cast-in-Place Concrete.
   2. Section 06 1100 – Wood Framing: Sill plate gaskets.
   3. Section 08 5313 – Vinyl Windows.

1.02 PREINSTALLATION MEETING: In accordance with Section 01 3100.

A. Attendance: Installer, Contractor, Owner, and Architect.

B. Review methods and procedures related to installation, including approved submittals and manufacturer's written instructions.

C. Review schedule and planned sequence of installation; availability of materials and labor; equipment, facilities, and temporary protection.

1.03 QUALITY ASSURANCE:

A. Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience.
   1. Sprayed Insulation: Certified by product manufacturer.

B. Regulatory Requirements:
   1. Fire Performance Characteristics: Provide insulation materials whose fire performance characteristics have been determined in accordance with the test methods indicated below, by testing organizations acceptable to regulatory agencies having jurisdiction.
      a. Surface Burning Characteristics: ASTM E84.
         (1) Flame Spread Index: Maximum 75.
         (2) Smoke Developed Index: Maximum 450.
      b. Fire Resistance Ratings: ASTM E119.
      c. Combustion Characteristics: ASTM E136.
   2. CFC Compliance: Provide insulation materials which are not produced with, and do not contain, CFC compounds regulated by the U.S. Environmental Protection Agency.

1.04 DELIVERY, STORAGE, AND HANDLING: In accordance with Section 01 6000.

A. Deliver materials in manufacturer's original, unopened, undamaged packaging with identification labels intact. Store materials protected from exposure to harmful conditions.

B. Handle boards carefully so corners are not broken off or boards otherwise damaged.

C. Shield boards from exposure to direct sunlight with opaque light-colored tarp.

**PART 2 PRODUCTS**

2.01 BOARD INSULATION:

A. Board Insulation: ASTM C578, Type IV, rigid extruded polystyrene board; 24 x 96 inch or 48 x 96 inch sheets; square edges.

1. Manufacturers: In accordance with Section 01 6000.
   a. Dow Chemical Company; Styrofoam SE.
   b. Kingspan Insulation LLC; GreenGuard CM.
   c. Owens-Corning Fiberglas Corporation; Foamular 250.

2. R Value: ASTM C518, minimum 5.0 per inch at 75 degree F mean temperature.

3. Foundation Perimeter Insulation: 3 inches thick.

4. Wall Continuous Insulation: 1½ inches thick.
   a. Joint Tape: Provided by or approved by insulation board manufacturer.

2.02 BATT INSULATION:

A. Fiberglass Batt Insulation: ASTM C665, Type I; unfaced.

1. Manufacturers: In accordance with Section 01 6000.
   a. CertainTeed Corporation; Building Insulation.
   b. Johns Manville Building Insulation; Formaldehyde-Free Building Insulation.
   c. Knauf Insulation GmbH.
   d. Owens-Corning Fiberglas Corporation; EcoTouch Pink.

2. Size: Width as required by framing member spacing; manufacturer's standard lengths.

3. Thickness and R Value: As indicated on the Drawings.
   a. 3½ inch thickness: R-13.

2.03 SPRAYED INSULATION:

A. Sprayed Cellulose Fiber Insulation: ASTM C739 or ASTM C1149.

1. Manufacturers: In accordance with Section 01 6000.
   a. Ark-Seal International, Inc.; Blow-In-Blanket System.
   b. International Cellulose Corp.; Celbar.

c. Nu-Wool Company, Inc.

2. Binder and Adhesive: Fire retardant, non-corrosive, odor free, fungus resistant.

3. R Value: ASTM C518; minimum 3.8 per inch at 75 degree F mean temperature.

B. Sprayed Fiberglass Insulation: ASTM C764.

1. Manufacturers: In accordance with Section 01 6000.
   a. Johns Manville Building Insulation; Spider Plus.

2. Binder and Adhesive: Formaldehyde-free, fire retardant, non-corrosive, odor free, fungus resistant.

3. R Value: ASTM C518; minimum 4.2 per inch at 75 degree F mean temperature and 1.8 pcf installed density.

2.04 INSULATING FOAM SEALANTS AND SEALING TAPES:

A. Insulating Foam Sealants: ASTM C1029, Type II; ASTM C1620; AAMA 812; single component, minimal expanding, low pressure build, semi-rigid closed cell polyurethane foam.

1. Manufacturers: In accordance with Section 01 6000.
   a. Dow Chemical Company; Great Stuff Pro.
   b. Hilti Corp.; CF-812.
   c. Tremco, Inc.; TremGlaze LEF.

2. Density: ASTM D1622; minimum 1.5 pcf.

B. Sealing Tapes: AAMA 711; flexible, self-sealing, self-healing, fully adhering membrane flashing with butyl or rubberized asphalt adhesive; minimum 0.025 inch thick; minimum 4 inch width or as required for application.

1. Manufacturers: In accordance with Section 01 6000.
   a. Dow Chemical Company; Weathermate.
   b. GCP Applied Technologies; Perm-A-Barrier.
   c. Henry Co.; Blueskin SA.
   d. Protecto Wrap Co.; BT25XL.
   e. W. R. Meadows, Inc.; Air-Shield.

2. Water Vapor Permeance: ASTM E96; maximum 0.02 perm.

3. Accessories: Provide surface conditioner and primer approved by manufacturer.

2.05 ACCESSORIES:

A. Adhesive: Type recommended by insulation manufacturer.

B. Mechanical Fasteners: Type recommended by insulation manufacturer.

C. Baffles: Extruded polystyrene, corrugated; 48 inch length.

## PART 3 EXECUTION

3.01 EXAMINATION:

A. Site Verification of Conditions: Verify substrate conditions are acceptable for product installation in accordance with manufacturer's instructions.

B. Verify substrate and adjacent materials are flat and free of irregularities and foreign materials that may impede adhesive bond, and within manufacturer's recommended temperature range.

C. Verify floor slab grade is well tamped, drained and covered with specified vapor retarder.

3.02 INSTALLATION:

A. General:
   1. Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions, and product carton instructions.
   2. Install building insulation to comply with thermal and acoustical requirements.
   3. Fit insulation to areas and conditions required, to form a complete thermal barrier around indicated areas without voids.
   4. Coordinate insulation installation over or within three inches of lighting fixtures, fans, or other heat-generating electrical devices with manufacturer's recommendations and regulations of authorities having jurisdiction.

B. Foundation Perimeter Insulation: Place insulation boards with long edge horizontally or vertically on the interior foundation wall from a point establishing the top of the proposed floor as indicated on the Drawings. Taper top of insulation at a minimum 60 degree angle.
   1. Secure boards to the foundation wall with adhesive. Apply 2 inch diameter spots of adhesive to insulation boards 16 inches o.c. both ways.
   2. Butt edges and ends tight to adjacent board and to protrusions. Stagger end joints.
   3. Cut insulation to fit snugly around projections and irregularities on the wall surface. Fill all voids with insulation.

C. Wall Continuous Insulation: Apply insulation boards horizontally. Secure to framing members with fasteners; do not exceed manufacturer's recommended maximum spacing for application.
   1. Tape joints and seams with manufacturer's recommended joint tape.

D. Batt Insulation: Friction fit batts between framing members, installed neatly around and behind electrical boxes, vent piping, duct work, and other obstructions. Butt insulation tight, covering the entire area without voids.
   1. Pack loose insulation in narrow spaces where fasteners cannot be installed, to ensure complete insulation coverage.

E. Sprayed Insulation: Perform installation with pneumatic equipment in accordance with manufacturer's recommendations. Distribute insulation material evenly.
   1. Spray-force material into cracks, holes, and seams; seal around electrical boxes, ducts, and plumbing.
   2. Give special attention to penetrations and perimeter conditions to prevent air leakage.
   3. Provide natural or mechanical ventilation continuously until materials are properly cured.
   4. Eaves: Install baffles at each rafter space to prevent insulation from obstructing attic ventilation.
   5. Mask surfaces which will be exposed in completed construction, including unfinished areas and storage rooms; remove visible overspray.

F. Insulating Foam Sealants: Apply in accordance with manufacturer's recommendations to voids between door and window frames and adjacent construction, perimeter of roof penetrations (except flues), and similar cavities in thermal assemblies.
   1. Clean surfaces prior to application; remove oil and chemical substances that may prevent adhesion.
   2. Protect adjacent surfaces subject to damage from overspray or accidental contact.
   3. After initial curing, trim and remove excess material. Apply joint sealant or other protective material promptly to limit ultraviolet exposure.
   4. After final curing, operate window or door to confirm proper operation. Correct binding and distortion caused by overfilling or expansion.

G. Sealing Tapes: Apply in accordance with manufacturer's recommendations and ASTM E2112 to perimeter of door and window frames; seal to adjacent construction. Extend onto face of wall minimum 3 inches or as required by manufacturer's recommendations.
   1. Test surface for adhesion; apply surface conditioner and primer where necessary.
   2. Remove and discard release paper from self-adhesive tape. Position each piece carefully and press firmly into place with hand roller, giving special attention to edges, seams, and penetrations. Fully adhere tape to substrate to prevent water from migrating under tape.

3.03 PROTECTION:

A. Protect installed products from harmful weather exposure and physical abuse, where possible by non-delayed installation of concealing work or, where that is not possible, by temporary covering or enclosure. Installer shall advise Contractor of exposure hazards, including possible sources of deterioration and fire hazard.

END OF SECTION

## SECTION 07 3113 – ASPHALT SHINGLES

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes: Asphalt roof shingles and accessories.

B. Related Requirements:
   1. Section 06 1100 – Wood Framing: Roof sheathing substrate.
   2. Section 07 7100 – Roof Specialties: Drip edges; gutters and down pipes.
   3. Division 22 – Plumbing: Plumbing work projecting through roof.
   4. Division 23 – HVAC: HVAC work projecting through roof.

1.02 PERFORMANCE REQUIREMENTS:

A. Fire Resistance: ASTM E108, Class A.

B. Wind Resistance: ASTM D3161, Type I.

1.03 SUBMITTALS: In accordance with Section 01 3300.

A. Product Data: Indicate material characteristics, performance criteria, limitations, installation instructions and procedures.

1.04 DELIVERY, STORAGE AND PROTECTION: In accordance with Section 01 6000.

A. Store materials on raised platforms and protect with coverings at outdoor locations.

B. Do not stack bundles of shingles more than four feet high.

C. Store rolled goods on end.

1.05 ENVIRONMENTAL REQUIREMENTS:

A. Do not install underlayment on wet surfaces.

B. Do not apply shingles when air temperature is below 40 degrees F.

1.06 WARRANTY: In accordance with Section 01 7700.

A. Correct defective Work within a 2 year period after Date of Substantial Completion for damage resulting from failure to prevent penetration of water.

B. Provide 30 year manufacturer warranty for roofing materials. The first 5 years from the Date of Substantial Completion shall be non-prorated.

## PART 2 PRODUCTS

2.01 ROOF SHINGLES:

A. Manufacturers: In accordance with Section 01 6000.
   1. CertainTeed Corporation; XT 30 IR.
   2. Celotex Roofing Products.
   3. Elk Corporation.
   4. Owens-Corning Fiberglas Corporation.
   5. Tamko Building Products, Inc.

B. Material: ASTM D3018, Type I; ASTM D3462; fiberglass mat base, asphalt composition with ceramic coated mineral granules.

C. Size: 12 x 36 inch three-tab, self-sealing.

D. Application: 5 inch exposure, 2 inch head lap, 80 shingles per square.

E. Weight: 230 lbs. per square.

F. Color: Match existing.

2.02 ACCESSORIES:

A. Felt Underlayment: ASTM D226, Type I; No. 15 asphalt saturated felt.

B. Membrane Underlayment: ASTM D1970; self-adhering rubberized asphalt.
   1. Manufacturers: In accordance with Section 01 6000.
      a. Manufacturer of roof shingles.
      b. CertainTeed Corporation; Winter Guard.
      c. Celotex Roofing Products; Celo-Guard Water and Ice Shield.
      d. Owens-Corning Fiberglas Corporation; WeatherLock.

C. Linear Vents: Extruded polypropylene, low profile, designed for shingle overlay; 4 foot lengths; with end caps; color as selected.
   1. Manufacturers: In accordance with Section 01 6000.
      a. Manufacturer of roof shingles.
      b. Cor-A-Vent, Inc.
   2. Ridge Vents: Air permeable filter material with wind activated airfoil to resist wind driven rain penetration. (Cor-A-Vent X-5)

D. Nails: ASTM F1667; hot dipped galvanized steel, aluminum, or stainless steel; 11 or 12 gauge barbed shank roofing nails, 3/8 inch head, sharp-pointed conventional, of sufficient length to penetrate 1/8 inch through sheathing.
   1. Roofing staples are not permitted.

E. Roofing Cement: ASTM D4586, Type II.

F. Kickout Diverter Flashings: Molded polypropylene.

1. Manufacturers: In accordance with Section 01 6000.
   a. DryFlekt Products, Inc.
2. Color: As selected.

**PART 3 EXECUTION**

3.01 EXAMINATION:

A. Verify that surfaces to which shingles are to be applied are uniform, smooth, sound, clean, dry, and free of ridges, warps, voids or other irregularities.

B. Verify plumbing stacks and other roof penetrations are in place and flashed to deck surface.

C. Verify roof openings are correctly framed.

3.02 INSTALLATION:

A. Install roofing shingles and related items in accordance with manufacturer's recommendations for the specific installation.

B. Eave Protection Installation:
   1. Place eave flashing tight with fascia. Weather lap joints minimum 2 inches and seal with roofing cement. Secure flange with nails.
   2. Apply membrane underlayment with eave edge flush with face of flashing; secure in place. Lap ends minimum 6 inches.
   3. Extend membrane underlayment to minimum 24 inch horizontal projection beyond inside face of wall.

C. Apply 36 inch wide membrane underlayment to valleys.

D. Apply underlayment to field of roof. Weather lap ends and edges minimum 4 inches. Stagger end laps of each consecutive layer. Nail in place.
   1. Roof Slope Greater Than 4/12: Felt underlayment or membrane underlayment.
   2. Roof Slope 4/12 or Less: Membrane underlayment.

E. In areas where shingle installation is delayed following installation of roof insulation, install membrane underlayment to field of roof. Weather lap ends and edges minimum 6 inches. Stagger end laps of each consecutive layer. Secure to insulation with fasteners in addition to self adhesive.

F. Place rake flashing tight with fascia. Weather lap joints minimum 2 inches and seal with roofing cement. Secure flange with nails.

G. Place shingles with indicated exposure to produce double thickness over full roof area. Provide double course of shingles at eaves.
   1. Extend shingles ½ inch beyond face of perimeter drip flashings.

2. Valleys: Extend shingles on one slope across valley and fasten. Trim shingles from other slope 2 inches from valley center line to achieve closed cut valley, concealing the valley protection.
3. Ridges: Cap with individual shingles, maintaining weather exposure indicated for field of roof. Place to avoid exposed nails.

H. Where roof slope abuts vertical walls, install kickout diverter flashings at bottom of slope, under first shingle course and sidewall flashings, arranged to direct water away from wall and into gutter.

I. Coordinate installation of roof mounted components or work projecting through roof with weather tight placement of flashings and counter flashings.

J. Complete installation to provide weather tight service.

END OF SECTION

## SECTION 07 4600 – SIDING

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Vinyl siding.
   2. Trim and accessories.

B. Related Requirements:
   1. Section 06 1100 – Wood Framing: Wall sheathing substrate.
   2. Section 07 7100 – Roof Specialties: Soffit, fascia and related items.

1.02 SUBMITTALS: In accordance with Section 01 3300.

A. Product Data: Indicate material characteristics, performance criteria, limitations, installation instructions and procedures.

1.03 DELIVERY, STORAGE AND HANDLING: In accordance with Section 01 6000.

A. Maintain cartons flat, supported along their entire length.

B. Store in clean, dry location protected from direct sunlight, in temperatures not exceeding 120 degrees F.

1.04 WARRANTY: In accordance with Section 01 7700.

A. Provide manufacturer's standard non-prorated warranty for siding materials, minimum 25 years, including coverage against fading and chalking.

## PART 2 PRODUCTS

2.01 MANUFACTURERS: In accordance with Section 01 6000.

A. CertainTeed Corporation.

B. Georgia-Pacific Corporation.

C. PlyGem; Mastic Home Exteriors.

D. Wolverine Vinyl Siding.

2.02 MATERIALS:

A. Vinyl: ASTM D3679 and ASTM D1435; extruded PVC.

B. Siding Profile: Clapboard; match existing dimensions.

C. Thickness: 0.040 inch.

D. Color and Texture: Match existing.

2.03 ACCESSORIES:

A. Starter Trim and J-Channel: As recommended by manufacturer.

B. Casings, Inside and Outside Corner Trim, Gable Vents, Exhaust Vents, Fixture Mounting Blocks: Material to match siding; manufacturer's standard style to match appearance indicated on Drawings; concealed fasteners.

C. Soffits and Fascias: As specified in Section 07 7100.

D. Fasteners: Manufacturer's recommended type; of sufficient length to penetrate through sheathing and at least ¾ inch into wall studs.
   1. Nails: Hot dipped galvanized; 3/8 inch head.
   2. Staples: Minimum 16 gauge, elliptical cross section; 1/16 inch crown.

**PART 3 EXECUTION**

3.01 EXAMINATION:

A. Verify wall substrate and insulation is straight, flat and smooth.

3.02 INSTALLATION:

A. Install Products in accordance with manufacturer's instructions; square, plumb, level, and proper elevations, and in alignment with other work.

B. Space fasteners 16 inches o.c. Locate fasteners in center of slot, with 1/32 to 1/16 inch space between fastener and nailing hem, to allow siding to expand and contract freely.

C. Allow 1/4 to 3/8 inch clearance where siding meets trim and other accessories, and at corners and openings, to allow expansion and contraction without buckling.

D. Lap and interlock panels to conceal fasteners and assure weather-tight installation.

3.03 CLEANING: In accordance with Section 01 7700.

A. Remove dirt, dust, fingerprints, and soiled areas.

END OF SECTION

## SECTION 07 7100 – ROOF SPECIALTIES

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Gutters and down pipes.
   2. Drip edges.

B. Related Requirements:
   1. Section 07 3113 – Asphalt Shingles.
   2. Section 07 4600 – Siding.
   3. Section 07 9200 – Joint Sealants.

1.02 SUBMITTALS: In accordance with Section 01 3300.

A. Product Data: Provide data on shape of components, materials and finishes, anchor types and locations.

1.03 QUALITY ASSURANCE:

A. Perform Work in accordance with SMACNA Architectural Sheet Metal Manual and NRCA Roofing and Waterproofing Manual.

1.04 DELIVERY, STORAGE, AND PROTECTION: In accordance with Section 01 6000.

A. Do not store materials with strippable film in areas exposed to direct sunlight.

B. Prevent contact with substances which may discolor prefinished surfaces.

1.05 WARRANTY: In accordance with Section 01 7700.

A. Provide minimum 10 year manufacturer warranty for prefinished surfaces to cover pre-finished color coat against chipping, cracking or crazing, blistering, peeling, chalking, or fading.

## PART 2 PRODUCTS

2.01 MATERIALS:

A. Aluminum: ASTM B209.

2.02 COMPONENTS:

A. Manufacturers: In accordance with Section 01 6000.
   1. Alcoa Building Products, Inc.

B. Gutters and Down Pipes: AAMA 1405.1; prefinished aluminum sheet, ogee gutter profile and vertical down pipe ribs; size as indicated.
   1. Gutter Outlets: 1/8 inch less than inside dimension of down pipe; minimum 4 inch length.
   2. Accessories: Prefabricated corners and elbows; end closures; hangers; wire basket strainers; wall mounting brackets.
   3. Finish: Corrosion resistant primer and baked acrylic top coat; corrosion resistant interior finish; color as selected.

C. Roof Drip Edges: Prefinished aluminum, 0.019 inch thick, at all eaves and rakes. (Alcoa DRE3019)
   1. Finish: 70 percent PVDF fluoropolymer; color as selected.

D. Fascia Covers: AAMA 1402; prefinished smooth aluminum sheet, 0.019 inch thick; vertical face size as indicated. (Alcoa F2C series)
   1. Finish: Corrosion resistant primer and baked acrylic top coat; color as selected.

E. Soffit: AAMA 1402; prefinished smooth aluminum sheet, 0.019 inch thick; V-groove profile with 6 inch exposure, perforated for ventilation. (Alcoa Traditional Select series)
   1. Accessories: Moldings, channels and edge trim to coordinate with soffit system.
   2. Finish: Corrosion resistant primer and baked acrylic top coat; color as selected.

2.03 ACCESSORIES:

A. Fasteners: Concealed; hot dipped galvanized steel or stainless steel; size and type as required to penetrate substrate material minimum 1¼ inch; maximum 24 inch o.c. spacing.
   1. Nails: Roofing nails with annular threads and minimum 3/16 inch diameter heads.
   2. Bolts: Round head, ¼ inch minimum diameter.
   3. Rivets: 1/8 inch minimum diameter; compatible with materials being fastened.

B. Sealant: As specified in Section 07 9200.

C. Solder: 50% block tin and 50% lead.

D. Flux: Muratic acid, diluted with equal parts of water.

E. Splash Blocks: Precast concrete.

2.04 FABRICATION:

A. Conform to SMACNA Architectural Sheet Metal Manual and NRCA Roofing and Waterproofing Manual.

B. Hem exposed edges minimum ½ inch.

C. Make all flat and lap seams in direction of flow.

## PART 3 EXECUTION

3.01 EXAMINATION:

A. Verify existing conditions before starting work.

B. Verify that items affecting work of this Section are in place and positioned correctly.

3.02 INSTALLATION:

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

B. Conform to SMACNA Architectural Sheet Metal Manual and NRCA Roofing and Waterproofing Manual.

C. Install components to provide for expansion and contraction of components and adjacent materials. Provide oversized or slotted holes with gasketed fasteners where necessary to accommodate thermal movement.

D. Coordinate installation of components with installation of roofing and flashings.

E. Install gutters level and properly supported, located to collect rainwater and melting snow and ice runoff; lap joints in direction of flow, riveted and sealed watertight.

F. Install down pipes with mounting brackets spaced within 2 ft of each end, and at maximum 6 ft o.c.
   1. Provide splash blocks for each down pipe outlet not connected to storm piping.

G. Coordinate installation of sealants and coatings with work of this section to ensure water tightness.

H. Touch up minor scratches and abrasions in finish work. Replace damaged components.

END OF SECTION

## SECTION 07 9200 – JOINT SEALANTS

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Sealing of interior and exterior joints.
   2. Sealing of glazing joints.

B. Related Requirements:
   1. Caulking and sealant work performed under other Sections shall be performed in accordance with the provisions of this Section.
   2. Section 03 3000 – Cast-in-Place Concrete.
   3. Section 07 2100 – Thermal Insulation: Insulating foam sealants.
   4. Section 08 8000 – Glazing.
   5. Section 22 4000 – Plumbing Fixtures: Caulking around plumbing fixtures.

1.02 SUBMITTALS: In accordance with Section 01 3300.

A. Product Data: Provide manufacturer's standard details and installation instructions; identify substrates requiring primers, type of primer recommended by manufacturer, and surface preparation required.

B. Samples: Submit full range of colors for selection.

1.03 QUALITY ASSURANCE:

A. Installer Qualifications: Firm regularly engaged in installation of sealers of the type specified for not less than 5 years; all work performed by workers thoroughly skilled and specially trained in the techniques required.

1.04 DELIVERY, STORAGE AND HANDLING: In accordance with Section 01 6000.

A. Store materials between 40 and 90 degrees F, and under conditions and for a period of time not longer than that recommended by manufacturer.

1.05 ENVIRONMENTAL REQUIREMENTS:

A. Install sealants when air and substrate temperatures are over 40 degrees F and rising, but less than 100 degrees F, unless specific installation instructions are obtained from manufacturer.

1.06 WARRANTY: In accordance with Section 01 7700.

A. Exterior Joints: Correct defective Work within a 5 year period after Date of Substantial Completion for damage resulting from adhesive or cohesive failure, and failure to prevent infiltration of water or air through the sealed joint.
   1. Obligations of the Surety under the Contract Bond do not extend beyond the initial two years of the correction period.

**PART 2 PRODUCTS**

2.01 JOINT SEALERS:

A. Manufacturers: In accordance with Section 01 6000.
   1. Tremco, Inc.
   2. Dow Chemical Co.
   3. Franklin International; Titebond.
   4. Hilti, Inc.
   5. Master Builders Solutions.
   6. Momentive Performance Materials, Inc.
   7. Pecora Corporation.
   8. Schnee-Morehead, Inc.
   9. Sherwin-Williams Co.
   10. Sika Corporation.
   11. USG Corp.

B. Polyurethane Sealants: ASTM C920.
   1. One-Part Modified Polyurethane: Type S, Grade NS, Class 35, Use NT, M, A, and O; paintable. (Tremco Dymonic FC; MasterSeal NP1)
   2. Multi-Component Polyurethane: Type M, Grade NS, Class 50, Use T, I, M, A, and O. (Tremco Dymeric 240FC; Sikaflex 2c NS)

C. Silicone Sealants: ASTM C920.
   1. Sanitary Type: Type S, Grade NS, Class 25. (Momentive GE SCS1700 series; Dowsil 786; Tremco Tremsil 200)
   2. Glazing Type: Type S, Grade NS, Class 25, Use NT, G, A, and O. (Tremco Proglaze; Tremco Tremsil 600; Dowsil 790)

D. Acrylic Latex Caulk: ASTM C834; paintable. (Tremco Tremflex 834; Sherwin-Williams Magnum XL; Pecora AC-20)

E. Butyl Caulk: ASTM C1311; non-skinning isobutylene-isoprene copolymer. (SikaLastomer 511; Tremco Butyl Sealant)
   1. Tape Mastic: AAMA 800; isobutylene-isoprene copolymer tape. (SikaLastomer 65; Schnee-Morehead SM5227)

F. Acoustical Sealant: ASTM C834; nonsag, paintable, nonstaining latex sealant intended for sealing interior joints to reduce airborne sound transmission. (Titebond Professional Acoustical Smoke & Sound Sealant; Hilti CP 506 Smoke and Acoustic

Sealant; Pecora AC-20 FTR Acoustical and Insulation Sealant; USG Sheetrock Acoustical Sealant)

G. Colors: As selected from manufacturer's standard colors.

2.02 ACCESSORIES:

A. Primers: As recommended by sealant and glazing system manufacturers. Provide primers where indicated, where recommended by manufacturer, and also where preconstruction tests indicate the need for primers to obtain optimum adhesion.

B. Backer Rod: ASTM C1330; round, flexible, closed cell polyethylene, or as recommended by sealant manufacturer; chemically inert, solvent resistant.
   1. Size: Diameter 15% greater than joint width, continuous lengths.

C. Glazing Tape: As specified in Section 08 8000.

**PART 3 EXECUTION**

3.01 EXAMINATION:

A. Verify that dimensions are correct and substrate is in proper condition for installation. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Do not begin installation until substrates are clean, dry, and free of loose aggregate, laitance, paint, corrosion, oil, grease, tar, asphalt, mastic compounds, wax, waterproofing agents, release agents, and other deleterious substances.

3.02 PREPARATION:

A. Preconstruction Field Adhesion Testing: ASTM C1193.
   1. Conduct field tests for adhesion of joint sealants to actual substrates using proposed joint preparation methods, for each type of sealant and substrate, prior to general installation.
   2. Use manufacturer's standard field adhesion test methods and joint preparation methods to verify proper priming and preparation techniques required to obtain optimum adhesion of sealants to substrate.
   3. Repeat testing until satisfactory adhesion is achieved. Evaluate and report results.
   4. Approved results shall become the standard of acceptability for the project.

B. Remove foreign substances from substrate. Clean substrate in accordance with manufacturer's instructions and the following general methods:
   1. Porous Surfaces:
      a. Remove laitance by acid washing, grinding or mechanical abrading.
      b. Remove form oils by sandblasting.
      c. Vacuum or blow out joints with oil-free compressed air to remove loose particles.

2. Non-Porous Surfaces:
   a. Remove protective coatings using solvent recommended by sealant manufacturer.
   b. If surface has been treated or coated with a special coating, contact sealant manufacturer for recommendations.

C. Mask adjacent finished surfaces and adjacent porous surfaces that would be damaged by primer, sealant, or cleaning agents.

D. Prime surfaces to receive sealant in accordance with manufacturer's instructions, and allow to dry before installing sealant. Do not apply primer to surfaces outside of joint. Prime surfaces prior to installing backer rod or bond-breaker tape.

E. Install joint backing. Do not puncture, twist, compress less than 25 percent or more than 50 percent, or stretch backer during installation.

   1. Install joint backing to control joint depth as indicated and to prevent 3-sided bond.

   2. Install to control depth at midpoint of sealant as follows, unless otherwise indicated. Do not exceed sealant manufacturer's recommended maximum width.
      a. Joint Width ¼ to ½ Inch: Depth equal to width.
      b. Joint Width Greater Than ½ Inch: ½ inch depth.

3.03 APPLICATION:

A. Install sealants in accordance with manufacturer's instructions and ASTM C1193.

B. Gun Grade Sealants: Extrude sealant to completely fill joint using proper gun and nozzle. Tool to compress sealant against sides of joint and eliminate air bubbles. Leave a neat, slightly recessed concave surface, unless otherwise indicated.

C. Self Leveling Sealants: Pour sealant to fill joint, slightly recessed below adjacent surfaces.

D. Curing:
   1. Cure sealants in compliance with manufacturer's instructions to obtain high early bond strength, internal cohesive strength, and surface durability.
   2. Where joints are scheduled to be painted, allow sealant to cure before painting over joint.
   3. Advise the General Contractor of procedures required for curing and protection during the construction period, to prevent deterioration or damage (other than normal wear and weathering) at Substantial Completion.

3.04 CLEANING:

A. Clean primer and sealant from adjacent surfaces. Wipe fresh sealant immediately from adjacent surfaces. Do not use cleaning agents which may damage finishes.

B. Remove masking tape from completed joints.

3.05 SCHEDULE:

A. General Purpose Interior and Exterior Applications: Multi-component polyurethane.
   1. Joints and recesses between adjacent construction and frames, sills, and subsills of windows, doors, and similar items.
   2. Around both exterior and interior surfaces of penetrations in exterior walls.
   3. Under door thresholds, and at bottom of door frames.
   4. Wherever necessary to prevent infiltration of water or air into or through exterior building enclosure.

B. Concealed Exterior Locations: Butyl caulk and tape mastic.
   1. Metal to metal joints within sheet metal roofing and flashing assemblies.

C. Other Exterior Applications: One-part modified polyurethane.
   1. Between adjacent construction and flashings.
   2. Joints between new and existing exterior construction.

D. Interior Wet Areas: Silicone sealant, sanitary type.
   1. Between adjacent construction and plumbing fixtures, counter tops, plumbing cut-outs, and similar applications subject to contact with water.

E. Other Interior Applications: Acrylic latex caulk.
   1. Small voids between walls and adjacent casework, door frames, built-in or surface-mounted equipment and fixtures, and similar items.
   2. Interior locations not otherwise indicated or specified, where small voids exist between materials specified to be painted.
   3. Other exposed and concealed locations within partitions to seal against passage of air.

F. Glazing:
   1. Sealer: Silicone sealant, glazing type.
   2. Tape: Glazing tape.
   3. Applications: As scheduled in Section 08 8000.

END OF SECTION

## SECTION 08 1100 – METAL DOORS AND FRAMES

### PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes: Steel doors and frames; thermally insulated.

B. Related Requirements:
   1. Section 07 9200 – Joint Sealants.
   2. Section 08 7100 – Door Hardware.
   3. Section 08 8000 – Glazing.
   4. Section 09 9000 – Painting and Coating: Field painting of doors and frames.

1.02 SUBMITTALS: In accordance with Section 01 3300.

A. Shop Drawings: Indicate door and frame elevations, internal reinforcement, closure method, anchor types and spacings, finishes, and cut-outs for hardware and glazing.

1.03 QUALITY ASSURANCE:

A. Conform to requirements of ANSI A250.8 and ADA.

B. Manufacturer: Company specializing in manufacturing the Products specified in this Section with minimum three years documented experience.

1.04 DELIVERY, STORAGE, AND HANDLING:

A. Deliver, store, protect, and handle products to site under provisions of Section 01 6000 and HMMA 840.

B. Accept Products on site in manufacturer's packaging. Inspect for damage.

C. Break seal on site to permit ventilation.

D. Provide ¼ inch spaces between stored materials to promote air circulation.

1.05 PROJECT CONDITIONS: In accordance with Section 01 3100.

A. Coordinate the work with door opening construction and hardware installation.

### PART 2 PRODUCTS

2.01 MANUFACTURERS: In accordance with Section 01 6000.

A. Ceco Door Products.

B. Curries Company.

C. Core Industries, Inc.; Pioneer Industries Division.

D. Republic Doors and Frames.

E. Steelcraft Manufacturing Company.

2.02 FRAMES:

A. Exterior Frames: 14 gauge thick galvanized steel.

2.03 DOORS:

A. Exterior Doors: ANSI A250.8, Level 3 Extra Heavy Duty, Model 2 Seamless; ANSI A250.4, physical performance level A; 16 gauge galvanized sheet steel.

B. End Closure: Continuous channel, flush.
   1. Hinge Edge: Minimum 11 gauge.
   2. Lock Edge, Top, and Bottom: Minimum 14 gauge.

C. Core: Polystyrene or polyurethane foam; rated, certified and labeled in accordance with NFRC 100; U value certified to meet one or more of the following:
   1. ASTM C518; maximum 0.16.
   2. ASTM C1363; maximum 0.35.

2.04 ACCESSORIES:

A. Glass: In accordance with Section 08 8000.

B. Anchorages: Galvanized steel, minimum 18 gauge.

C. Fasteners: Concealed type where possible. Where exposed screws and bolts are required, provide only countersunk, flat Phillips head fasteners.

D. Bituminous Coating: Fibered asphalt emulsion.

E. Primer: Rust inhibitive, suitable to receive finish coatings specified.

F. Silencers: Resilient rubber or vinyl, fitted into drilled hole.

G. Weatherstripping: Specified in Section 08 7100.

2.05 FABRICATION:

A. Fabricate frames as welded unit, mitered and ground smooth.

B. Fabricate doors and frames for hardware installation in accordance with approved hardware shop drawings and ANSI A115. Provide hardware reinforcement plates welded in place. Provide mortar guard boxes and dust covers. When not otherwise scheduled, provide reinforcement for the following hardware:

   1. Hinges: 4½ x 4½ inch, full mortise, template type.
      a. Doors Without Closers: Regular weight.
      b. Doors With Closers: Extra heavy weight.
      c. Doors up to 88 Inches High: 1½ pair.

   2. Lockset: Cylindrical type, 2¾ inch backset.

C. Prepare frames for silencers. Provide three silencers for single doors. Silencers may be omitted at openings scheduled to receive weatherstripping.

2.06 FINISH:

A. Galvanized Steel Sheet: ASTM A653, A60 zinc-iron or G60 zinc.

B. Primer: Clean by degreasing process; phosphatize; apply one coat primer, baked on, capable of passing a 70 hour salt spray test in accordance with ASTM B117. Prime all surfaces, including under and inside removable stops.

C. Exterior Frames: Coat inside of frame profile with bituminous coating to a thickness of 1/16 inch.

**PART 3 EXECUTION**

3.01 EXAMINATION:

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

3.02 INSTALLATION:

A. Install doors and frames in accordance with ANSI A250.8, HMMA 840, and DHI.

B. Coordinate with wall construction for anchor placement. Install frames in stud walls with 8 anchors.

C. Brace frames placed prior to constructing walls; maintain plumb and planar. Remove braces after anchorages are permanently installed.

D. Prior to installation, paint bottom edge of doors scheduled to be field painted.

E. Coordinate installation of glass and glazing.

F. Coordinate installation of door hardware.

G. Touch-up abrasions with primer. Touch-up minor rust areas; sand smooth; apply primer.

3.03 ERECTION TOLERANCES:

A. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.04 ADJUSTING: In accordance with Section 01 7000.

A. Adjust doors for smooth and balanced door movement.

END OF SECTION

## SECTION 08 1400 – WOOD DOORS

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes: Wood doors; stile and rail design.

B. Related Requirements:
   1. Section 06 2000 – Finish Carpentry: Wood door frames.
   2. Section 08 7100 – Door Hardware.
   3. Section 09 9000 – Painting and Coating: Field finishing of doors and frames.

1.02 SUBMITTALS: In accordance with Section 01 3300.

A. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, special blocking for hardware, factory machining and finishing, and cut-outs and trim for hardware.

B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.

1.03 QUALITY ASSURANCE:

A. Perform work in accordance with WDMA IS-6A and AWI 1300, Premium grade.

B. Manufacturer: Company specializing in manufacturing the Products specified in this Section with minimum three years documented experience.

1.04 DELIVERY, STORAGE, AND HANDLING: In accordance with Section 01 6000.

A. Accept Products on site in manufacturer's packaging. Inspect for damage.

B. Do not store in damp or wet areas, areas with uncured concrete, or in areas exposed to direct sunlight. Seal top and bottom edges if stored more than one week. Break packaging seal on site to permit ventilation.

C. Store flat on a level surface, minimum 3½ inches off the floor. Provide ¼ inch spaces between stacked doors to promote air circulation.

D. Maintain relative humidity in storage area, and in building following installation, between 30% and 50%. Maintain temperature between 50 degrees F and 90 degrees F.

E. Handle with clean hands or gloves; do not drag doors across one another or across other surfaces.

1.05 PROJECT CONDITIONS: In accordance with Section 01 3100.

A. Coordinate the work with door opening construction, door frame and hardware installation.

## PART 2 PRODUCTS

2.01 STILE AND RAIL WOOD DOORS:

A. Manufacturers: In accordance with Section 01 6000.
   1. Eggers Industries.
   2. Jeld-Wen, Inc.
   3. Masonite Architectural; Marshfield-Algoma.
   4. VT Industries, Inc.; Supa Doors.

B. Stile and Rail Interior Doors: 1¾ inches thick; veneer and lumber construction; doweled and glued joints.
   1. Veneer Facing for Paint Finish: Medium density overlay over standard thickness hardwood face veneers.
   2. Facing Adhesive: Type II, water resistant.

2.02 FABRICATION:

A. Fabricate doors in accordance with AWI Architectural Woodwork Standards and WDMA requirements.

B. Vertical Exposed Door Edge: Hardwood for type of finish to match door. Bond edge banding to cores.

C. Factory machine doors for finish hardware in accordance with approved hardware shop drawings and ANSI A115. Provide blocking for lockset, closer, and other finish hardware items scheduled. Do not machine for surface hardware. When not otherwise scheduled, provide for the following hardware:

   1. Hinges: 4½ x 4½ inch, full mortise, template type.
      a. Doors Without Closers: Regular weight.
      b. Doors With Closers: Extra heavy weight.
      c. Doors up to 88 Inches High: 1½ pair.

   2. Lockset: Cylindrical type, 2¾ inch backset.

D. Factory fit doors for frame opening dimensions identified on shop drawings.

E. Provide edge clearances in accordance with AWI 1600.

F. Factory prime doors and frames.

## PART 3 EXECUTION

3.01 EXAMINATION:

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION:

A. Install doors in accordance with AWI Architectural Woodwork Standards and WDMA requirements.

B. Trim non-rated door width by cutting equally on both jamb edges.

C. Trim door height by cutting bottom edge only a maximum of ¾ inch. Allow for installation of finish flooring materials as scheduled.

D. Coordinate installation of doors with installation of frames and hardware.

E. Prior to installation, finish bottom edge of doors scheduled to be field finished.

F. Site finish doors as specified in Section 09 9000.

3.03 INSTALLATION TOLERANCES:

A. Maximum Diagonal Distortion (Warp): 1/8 inch measured with straight edge or taut string, corner to corner, over an imaginary 36 x 84 inch surface area.

B. Maximum Vertical Distortion (Bow): 1/8 inch measured with straight edge or taut string, top to bottom, over an imaginary 36 x 84 inch surface area.

C. Maximum Width Distortion (Cup): 1/8 inch measured with straight edge or taut string, edge to edge, over an imaginary 36 x 84 inch surface area.

3.04 ADJUSTING: In accordance with Section 01 7000.

A. Adjust doors for smooth and balanced door movement.

END OF SECTION

## SECTION 08 5313 – VINYL WINDOWS

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Factory fabricated vinyl windows with fixed and operating sash; factory glazed.
   2. Operating hardware and insect screens.

B. Related Requirements:
   1. Section 06 1100 – Wood Framing: Wood frame wall construction and sheathing.
   2. Section 06 2000 – Finish Carpentry: Interior wood casings and trim.
   3. Section 07 2100 – Thermal Insulation.
   4. Section 07 9200 – Joint Sealants.
   5. Section 08 8000 – Glazing.

1.02 SYSTEM DESCRIPTION:

A. Performance Requirements: AAMA 101, Class LC30 minimum.
   1. Air Infiltration: ASTM E283; maximum 0.15 cfm/sq ft, at 1.57 psf reference differential pressure across assembly.
   2. Water Penetration: ASTM E331; none, at 15 psf test pressure difference.
   3. Deflection: Limit member deflection to flexure limit of glass with full recovery of glazing materials. Limit mullion deflection to 1/175 of span.
   4. Thermal Transmittance: Rated, certified and labeled in accordance with NFRC 100; maximum assembly U value 0.29.

B. System Assembly: Design and size components to withstand dead loads and live loads caused by positive and negative wind loads acting normal to plane of wall, as calculated in accordance with applicable building code. Accommodate movement between window and perimeter framing and deflection of lintel without damage to components or deterioration of seals.

C. Air and Vapor Seal: Maintain continuous air and vapor barrier throughout assembly, primarily in line with inside pane of glass and heel bead of glazing compound.

D. System Internal Drainage: Drain water entering joints, condensation occurring in glazing channel, or migrating moisture occurring within system, to the exterior by a weep drainage network.

E. Egress Requirements: Where egress windows are indicated, provide windows with clear opening dimensions in accordance with applicable building code.

1.03 SUBMITTALS: In accordance with Section 01 3300.

A. Shop Drawings: Indicate opening dimensions, framed opening tolerances, affected related work, and installation requirements.

B. Product Data: Provide component dimensions, anchorage and fasteners, glass, and internal drainage details.

1.04 DELIVERY, STORAGE AND PROTECTION: In accordance with Section 01 6000.

A. Deliver materials to job site in sealed, unopened cartons. Protect uncartoned units from damage prior to installation.

B. Store off ground, under cover, protected from weather, direct sunlight, and construction activities.

1.05 WARRANTY: In accordance with Section 01 7700.

A. Correct defective Work within a 2 year period after Date of Substantial Completion.

B. Provide 20 year manufacturer warranty for insulated glass units from seal failure, inter-pane dusting or misting, and replacement of same.

C. Warranty: Include coverage for degradation of color finish.

**PART 2 PRODUCTS**

2.01 MANUFACTURERS: In accordance with Section 01 6000.

A. Pella Corp.; 350 Series.

B. Silver Line Building Products, LLC; V3 series.

2.02 MATERIALS:

A. Frame and Sash: AAMA 303; ASTM D4726; rigid extruded PVC; welded construction with inconspicuous mitered and heat fused corners; with foam insulation.
   1. Color: White.
   2. Frame Depth: 4 to 4½ inch, with nailing fin.

B. Glass and Glazing Materials: Insulated glass as specified in Section 08 8000.

C. Sealant and Backing Materials: As specified in Section 07 9200.

2.03 COMPONENTS:

A. Simulated Muntin Panels: Factory mounted between panes of insulated glass before sealing glass unit; finish to match window frame; pattern to match existing.

B. Weather Stripping:
   1. Horizontal Weather Stripping: Gasket type vinyl covered foam.
   2. Vertical Weather Stripping: Polypropylene channels in contact with ribs in jamb liners.

C. Fasteners: Stainless steel or galvanized steel.

2.04 HARDWARE:

A. Sash Lock: Lever handle with cam lock, recessed in lower sash.
   1. Accessible Locations: Extended reach range type lock with pull string.

B. Sash Lift: Recessed polystyrene.

C. Balances: Spring power with grooved take-up drum and nylon cord.

2.05 ACCESSORIES:

A. Insect Screens: Fiberglass mesh; frame with attachment hardware, sized to coordinate with operable sash.

B. Jamb Extensions: Primed wood; sized to coordinate with wall thickness; factory applied.

2.06 FABRICATION:

A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet allowing installation and dynamic movement of perimeter seal.

B. Arrange fasteners to be concealed from view.

C. Permit internal drainage weep holes and channels to migrate moisture to exterior. Provide internal drainage of glazing spaces to exterior through weep holes.

D. Assemble insect screen frame; miter and reinforce frame corners. Fit mesh taut into frame and secure.

E. Factory weatherstrip operable units.

F. Factory glaze window units.

**PART 3 EXECUTION**

3.01 EXAMINATION:

A. Verify existing conditions before starting work.

B. Verify wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

C. Verify wall opening is square, sill plate is level, and dimensions are correct.

3.02 PREPARATION:

A. Install sealing tape to face of insulation in accordance with Section 07 2100; align top with sill opening and extend past each side of the rough opening minimum 8 inches.

3.03 INSTALLATION:

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

B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.

C. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.

D. Install components, hardware, and accessories in accordance with manufacturer's instructions.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Apply insulating foam sealant to perimeter voids in accordance with Section 07 2100 to maintain continuity of thermal barrier.

G. Coordinate attachment and seal of perimeter air barrier and vapor retarder materials.

H. Apply sealing tape vertically to each jamb in accordance with Section 07 2100 to seal window frame to insulation. Apply sealing tape to window head; lap over vertical tape.

I. Install perimeter sealant and backing materials in accordance with Section 07 9200.

3.04 ERECTION TOLERANCES:

A. Maximum Variation From Level or Plumb: 1/16 inch every 3 ft non-cumulative or 1/8 inch per 10 ft, whichever is less.

3.05 ADJUSTING:

A. Adjust hardware for smooth operation and secure weathertight closure.

3.06 CLEANING: In accordance with Section 01 7700.

A. Wash surfaces by method recommended and acceptable to sealant and window manufacturer; rinse and wipe surfaces clean.

B. Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

END OF SECTION

## SECTION 08 7100 – DOOR HARDWARE

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Hardware for wood and hollow metal doors.
   2. Thresholds.
   3. Weatherstripping, seals, and door gaskets.
   4. Keying.

B. Related Requirements:
   1. Section 08 1100 – Metal Doors and Frames.
   2. Section 08 1400 – Wood Doors.
   3. Section 10 1402 – Interior Signage.
   4. Section 12 3000 – Casework: Cabinet hardware.

1.02 SUBMITTALS: In accordance with Section 01 3300.

A. Shop Drawings: Indicate locations and mounting dimensions of each type of hardware, schedules, and catalog cuts.
   1. Keying: Include minutes of keying meeting, keying schedule with Owner review comments incorporated, and number of keys.

1.03 CLOSEOUT SUBMITTALS: In accordance with Section 01 7700.

A. Project Record Documents: Record actual locations of installed cylinders and their key code.

B. Maintenance Data: Include data on operating hardware, adjustment procedures, lubrication requirements, and inspection procedures related to preventative maintenance.

C. Maintenance Products: Provide special wrenches and tools applicable to each different or special hardware component. Provide maintenance tools and accessories supplied by hardware component manufacturer.

D. Keys: Deliver to Owner by security shipment direct from hardware supplier. Tag master keys with project name and geographical location. Tag change keys with door number and location in building. Include schematic drawing of keying and explanation of lock operating features, including method of rendering construction master keys inoperative.

1.04 QUALITY ASSURANCE:

A. Perform Work in accordance with applicable requirements of ADA, AWI, BHMA, DHI, NFPA, and UL.

B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

C. Hardware Supplier Qualifications: Company specializing in supplying commercial and institutional door hardware with minimum three years documented experience; approved by manufacturers.

D. Hardware Supplier Personnel: Employ a Door + Hardware Consultant (DHC) and Access Control System Consultant (ACSC) or personnel with similar qualifications to assist in the work of this section.

1.05 DELIVERY, STORAGE AND PROTECTION: In accordance with Section 01 6000.

A. Package hardware items individually; label and identify each package with door opening code to match hardware schedule.

1.06 PROJECT CONDITIONS: In accordance with Section 01 3100.

A. Furnish hardware of proper design and function for the door and frame conditions, dimensions, profile, swing, and performance requirements indicated.

B. Coordinate the work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware and recessed items.

C. Sequence installation of surface applied hardware items with painting and finishing of the substrates involved.

D. Coordinate Owner's keying requirements during the course of the Work.

**PART 2 PRODUCTS**

2.01 SUPPLIERS: In accordance with Section 01 6000.

A. Central Indiana Hardware Co., Inc.

B. General Building Products, Inc.

C. Moss Building Products.

D. Stafford Building Products, Inc.

2.02 COMPONENTS:

A. Butt Hinges: ANSI A156.1; 5 knuckle full mortise type; 4½ x 4½ inch.

1. Manufacturers: In accordance with Section 01 6000.
   a. Allegion PLC; Ives.
   b. Assa Abloy Architectural Door Accessories; McKinney.
   c. Bommer Industries, Inc.
   d. Hager Hinge Co.
   e. Stanley Security Solutions.

2. Interior Type: ANSI A8112; steel. (McKinney TA2714, Bommer BB5000, Hager BB1279, Ives 5BB1, Stanley FBB179)
3. Exterior Type: ANSI A2112; brass with non-removable pin. (McKinney TA2314 NRP, Bommer BB5001-N, Hager BB1191 NRP, Ives 5BB1 NRP, Stanley FBB191 NRP)
4. Spring Hinges: ANSI A156.7 K81071F; UL listed; 3 knuckle full mortise type; 4½ x 4½ inch; steel. (McKinney 1502, Ives 3SP1, Stanley 2060R)

B. Cylindrical Locks and Latches: ANSI A156.2, Series 4000, Grade 2.
1. Manufacturers: In accordance with Section 01 6000.
   a. Allegion PLC; Schlage.
   b. Dorma USA, Inc.
   c. Sargent Manufacturing Co.
   d. Stanley Security Solutions; Best Access Systems.
2. Lever Trim: Schlage Saturn; Dorma LRB; Sargent LL; Best 15D.
   a. Entrance Type: ANSI F81 function. (Schlage AL53PD, Dorma CL753)
   b. Privacy Type: ANSI F76 function. (Schlage AL40S, Dorma CL740; Sargent 7U65; Best 7KC-L)
   c. Passage Type: ANSI F75 function. (Schlage AL10S, Dorma CL710; Sargent 7U15; Best 7KC-N)
3. Deadbolts: ANSI E0142 function; keyed both sides. (Schlage B562P)

C. Closers: ANSI A156.4, Grade 1; rated for 10 million cycles.
1. Manufacturers: In accordance with Section 01 6000.
   a. Allegion PLC; LCN Closers.
   b. Dorma USA, Inc.
   c. Sargent Manufacturing Co.
   d. Stanley Security Solutions.
2. Standard Type: Pull side mounting. (Sargent 351-O, LCN 4011, Dorma 8916-AF89, Stanley D-4551)

D. Overhead Stops: Extruded track, slide, arm, and frame bracket.
1. Manufacturers: In accordance with Section 01 6000.
   a. Allegion PLC; Glynn-Johnson.
   b. Dorma USA, Inc.
   c. Rixson Specialty Door Controls.
   d. Sargent Manufacturing Co.
2. Overhead Stop: Concealed type. (Sargent 698S; Glynn-Johnson 104S; Rixson 1-336; Dorma 912S)

E. Plates and Trim:

1. Manufacturers: In accordance with Section 01 6000.
   a. Allegion PLC; Ives.
   b. Assa Abloy Architectural Door Accessories; Rockwood.
2. Kickplates: Stainless steel, 0.050 inch thick, 8 inch height; 2 inches less than door width. (Rockwood K1050, Ives 8400)
3. Wall Stops: Metal body with resilient bumper; 2½ inch diameter plate with concealed mounting; concave bumper; ¾ inch projection. (Rockwood 409, Ives WS406CCV)

F. Seals and Gaskets:

1. Manufacturers: In accordance with Section 01 6000.
   a. Allegion PLC; Zero.
   b. Assa Abloy Architectural Door Accessories; Pemko.
   c. Durable Products, Inc.
   d. Hager Companies.
   e. National Guard Products, Inc.
   f. Reese Enterprises, Inc.
2. Thresholds: Single piece for full width of wall opening, with vinyl insert. (National Guard 896V, Durable HLT-205HV, Hager 520SV, Pemko 2005AV, Zero 65)
3. Weatherstrip: Surface applied, with vinyl insert. (National Guard 160V, Durable AV305, Hager 891SV, Pemko 303AV, Zero 8303)
4. Sweeps: Surface applied, with neoprene sweep. (National Guard 200N, Durable HDS-21, Pemko 315CN, Zero 39)

G. Pocket Door Hardware:

1. Manufacturers: In accordance with Section 01 6000.
   a. L. E. Johnson Products, Inc.
   b. Häfele America Co.
   c. National Manufacturing Co.
2. Pocket Door Track and Accessories: Header track, uprights, brackets, ball bearing hangers, guides, stop, edge pull, and lock. (L. E. Johnson 2000 series)

H. Sliding Door Hardware:

1. Manufacturers: In accordance with Section 01 6000.
   a. Crown Industrial.
   b. K. N. Crowder Mfg., Inc.
   c. L. E. Johnson Products, Inc.
   d. RW Hardware.

2. Surface Sliding Door Hardware: Surface mounted flat track; bumper shoes, stay roller, and end stops; exterior bow handle; interior flush pull. (RW 1610 series, Crown #43H series, K.N. Crowder CRT-102 series)
3. Bypass Sliding Door Hardware: Extruded box rail track; adjustable height ball bearing hangers; floor guides; flush pulls. (L. E. Johnson 111SD series)

2.03 KEYING:

A. Door Locks: Master keyed to existing system; field verify prior to submitting bid.

B. Include construction master keying.

C. Keying Meeting: Convene after award of contract and before preparation of hardware submittals. Require attendance of Owner, Architect, Contractor, and Hardware Supplier. Review preliminary keying schedule and number of each key to be supplied; revise as necessary to meet Owner's requirements.

D. Supply keys in the following quantities:
   1. Construction master keys as required by Contractor, plus 4 keys for Owner and Architect.
   2. 4 keys for each master key and change key, except as otherwise noted.
      a. Provide minimum 2 keys per keyed cylinder.

2.04 FINISHES:

A. Butt Hinges and Cylindrical Locks: US 26D; BHMA 626.

B. Closers: Painted enamel finish; aluminum powder coat; BHMA 689.

C. Plates and Stops: US 32D; BHMA 630.

D. Thresholds, Weatherstrips, and Sweeps: Clear anodized aluminum.

**PART 3 EXECUTION**

3.01 EXAMINATION:

A. Verify existing conditions before starting work.

B. Verify that doors and frames are ready to receive work and dimensions are as indicated on shop drawings and as instructed by manufacturer.

3.02 INSTALLATION:

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

B. Use templates provided by hardware item manufacturer.

C. Hardware Mounting Heights: In accordance with DHI.

D. Kickplates: Mount on push side of door, flush with bottom of door, unless specifically indicated. Center between frame stops.

E. Stops: Coordinate location and installation with levers and other hardware for proper clearance and function. Provide shims, blocking, or other components as necessary; coordinate finishes with Architect where exposed.
   1. Provide wall stop, floor stop, overhead stop, or closer with stop for all doors. At locations where type of stop scheduled does not suit field conditions, contact Architect for resolution.

3.03 ADJUSTING:

A. Adjust hardware for smooth operation.

B. Adjust hardware to provide operating and door opening forces in accordance with ADA and NFPA, maximum 5 lbf for non-rated interior doors.

3.04 SCHEDULE:

A. Set No. 1: Door 108.
   1. Butts (3): Exterior type.
   2. Closer: Standard type.
   3. Entrance lock.
   4. Overhead stop.
   5. Weatherstrip.
   6. Threshold.
   7. Sweep.

B. Set No. 2: Doors 105, 110A.
   1. Butts (3): Interior type.
   2. Passage latch.
   3. Wall stop.

C. Set No. 3: Door 103A.
   1. Butts (3): Interior type.
   2. Passage latch.
   3. Overhead stop.

D. Set No. 4: Door 102.
   1. Butts (3): Interior type.
   2. Passage latch.
   3. Deadbolt.
   4. Wall stop.

E. Set No. 5: Door 109.
   1. Butts (3): Spring type.
   2. Privacy lock.
   3. Wall stop.
   4. Kickplate.

F. Set No. 6: Doors 104, 111, 112, 113, 114, 201, 202.
   1. Butts (3): Interior type.

2. Privacy lock.
3. Wall stop.

G. Set No. 7: Doors 103B, 106, 109A.
1. Pocket door track and accessories.

H. Set No. 8: Door 103.
1. Surface sliding door hardware.

I. Set No. 9: Doors 111A, 112A, 113A, 114A.
1. Bypass sliding door hardware.

END OF SECTION

## SECTION 08 8000 – GLAZING

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Annealed glass.
   2. Insulating glass units.
   3. Safety glazing.

B. Related Requirements:
   1. Section 07 9200 – Joint Sealants.
   2. Section 08 1100 – Metal Doors and Frames.
   3. Section 08 5313 – Vinyl Windows.

1.02 DESIGN REQUIREMENTS:

A. Size glazing in accordance with ASTM E1300 to withstand dead loads and positive and negative live loads acting normal to the plane of glazing in accordance with applicable building code.

B. Limit glazing deflection to ¾ inch or flexure limit of glazing with full recovery, whichever is less.

1.03 QUALITY ASSURANCE:

A. Each glass lite shall bear the manufacturer's label designating the type and thickness of glass.
   1. Permanently identify each lite of tempered glass with identification etched or ceramic-fired on the glass and visible when the unit is installed.

B. Provide safety glazing in accordance with ANSI Z97.1.

1.04 DELIVERY, STORAGE AND HANDLING: In accordance with Section 01 6000.

A. Deliver glazing with manufacturer's labels intact. Do not remove label until glazing has been installed.

1.05 WARRANTY: In accordance with Section 01 7700.

A. Each lite of glass and each sealed glass unit shall have a 10 year manufacturer warranty against defects, including but not limited to seal failure, interpane dusting or misting.

## PART 2 PRODUCTS

2.01 GLASS:

A. Manufacturers and Fabricators: In accordance with Section 01 6000.
   1. Vitro Architectural Glass.
   2. AGC Flat Glass North America, Inc.
   3. Guardian Industries Corp.
   4. Oldcastle BuildingEnvelope.
   5. Pilkington North America, Inc.
   6. Viracon, Inc.

B. Annealed Glass: ASTM C1036, Type I, Class 1, Quality q3; clear.

C. Low-Emissivity Coated Glass: ASTM C1036, Type I, Class 1, Quality q3; clear annealed float glass with pyrolitic coating. (Vitro Solarban 60; Guardian SN68; AGC Comfort Ti-AC40)

2.02 GLAZING ACCESSORIES:

A. Setting Blocks: ASTM C864, neoprene, 80 to 90 Shore A durometer hardness; compatible with sealant materials; length 4 inches, width of glazing rabbet space less 1/16 inch, height required for glazing method, pane weight, and pane area.

B. Spacer Shims: ASTM C864, neoprene, 50 to 60 Shore A durometer hardness; compatible with sealant materials; length 3 inches, one half height of glazing stop, thickness required for application, one face self-adhesive.

C. Glazing Tape: Butyl compound tape with integral resilient tube spacer, 10 to 15 Shore A durometer hardness, black color, coiled on release paper; widths required for specified installation.

D. Glazing Splines and Glazing Gaskets: ASTM C864 and ASTM D2287, resilient polyvinyl chloride, extruded shape to fit glazing channel retaining slot; black color.

E. Glazing Clips: Manufacturer's standard type.

F. Sealants: As specified in Section 07 9200.

2.03 FABRICATION:

A. Tempered Glass:
   1. Cut float glass materials to indicated sizes and provide cut-outs and holes, if indicated, before heat strengthening.
   2. Grind and polish exposed edges, where indicated, prior to tempering.
   3. Fully temper float glass materials in accordance with ASTM C1048, Kind FT.

B. Sealed Insulating Glass Units: Provide unit edge seals meeting requirements of ASTM E773, with aluminum spacers having mitered corners, and silicone sealant for glass-to-spacer seals. Where tempered glass is indicated, both outer and inner panes

shall be tempered. Where low-emissivity coated glass is indicated, coating shall be on interior surface of outer pane unless specifically noted.

1. Insulating Glass Units for Hollow Metal Door Lites:
   a. Outer Pane: 1/8 inch thick; clear tempered glass.
   b. Air Space: 1/4 inch thick; dehydrated, hermetically sealed.
   c. Inner Pane: 1/8 inch thick; clear tempered glass.
2. Insulating Glass Units for Vinyl Windows: 11/16 inch total thickness.
   a. Outer Pane: 3 mm thick; low-emissivity coated glass.
   b. Air Space: 7/16 inch thick; dehydrated, hermetically sealed, argon gas filled.
   c. Inner Pane: 3 mm thick; clear annealed glass.
   d. Solar Heat Gain Coefficient (SHGC): NFRC 200; maximum 0.28.
   e. Visible Light Transmittance: NFRC 200; minimum 47%.

## PART 3 EXECUTION

3.01 EXAMINATION:

A. Inspect all openings prior to commencing work to verify that conditions do not interfere with proper glazing installation.

B. Verify glazing sizes in comparison with opening size to confirm that adequate clearances in accordance with Flat Glass Marketing Association (FGMA) standards are maintained on all four edges at perimeter, and that stops are of proper size.

C. Verify that glazing channels and recesses are clean and free of obstructions, that weeps are clear, and that channels and recesses are ready for glazing.

3.02 PREPARATION:

A. Clean contact surfaces to receive sealant with solvent; wipe dry.

B. Seal porous glazing channels and recesses with primer or sealer compatible with substrate.

C. Prime surfaces to receive sealant in accordance with sealant manufacturer's instructions.

3.03 INSTALLATION:

A. Perform glazing work in accordance with FGMA standards and glazing manufacturer's recommendations.

B. Exercise care in cutting and handling of glass to have clean cut edges, free of any defects or damage which would interfere with the installation.

C. Replace all glass broken or damaged in the process of the work. Replace glass which is cracked or broken by others at the expense of the party causing damage.

D. Installation Methods: As scheduled at the end of this Section, and in accordance with recommendations of manufacturers of doors, windows and framing systems.

1. Exterior Wet/Dry Method (Tape and Sealant):
   a. Apply glazing tape to glass; butt-joint tape edges; seal joints with sealant.
   b. Apply glazing tape to permanent stops, ¼ inch below sight line; butt-joint tape edges; seal joints with sealant.
   c. Apply heel bead of sealant along intersection of permanent stop with frame; ensure full perimeter seal between glass and frame for continuity of air and vapor seal.
   d. Locate setting blocks in accordance with IGMA TM-3000.
   e. Set glass unit on setting blocks; apply pressure against fixed stop for full contact.
   f. Install removable stops without displacing glazing tape; insert spacer strips between glazing and applied stops; terminate spacer strips ¼ inch below sight line; apply pressure for full continuous contact.
   g. Fill gap between glazing and stop with sealant to depth equal to bite of frame on glazing and to 3/8 inch below sight line.
   h. Apply cap bead of sealant along void between stop and glazing to uniform line flush with sight line; tool sealant surface smooth.

3.04 CLEANING: In accordance with Section 01 7700.

A. Remove excess glazing materials and sealants immediately after glazing operation is completed.

B. Remove labels from glass immediately after Substantial Completion.

3.05 SCHEDULE:

A. Safety Glazing: Provide tempered glass at the following locations, at locations required by applicable building code, and where indicated:
   1. In ingress and egress doors.
   2. In fixed panels having a glazed area in excess of 9 square feet with the lowest edge less than 18 inches above the finish floor level or walking surface within 36 inches of such glazing.
      a. Safety glazing is not required when glazed panels have a horizontal mullion located between 24 and 36 inches above the walking surfaces.
   3. In fixed or operable panels adjacent to a door and within the same plane as the door whose nearest vertical edge is within 24 inches of the door in a closed position and whose bottom edge is less than 60 inches above the floor or walking surface.

B. Installation Methods:
   1. Hollow Metal Doors: Wet/Dry method.

2. Vinyl Windows: Factory glazed.

END OF SECTION

## SECTION 09 2900 – GYPSUM BOARD

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Interior gypsum wall and ceiling board.
   2. Gypsum board finishing.

B. Related Requirements:
   1. Section 06 1100 – Wood Framing.
   2. Section 06 1753 – Prefabricated Wood Trusses.
   3. Section 07 9200 – Joint Sealants.
   4. Section 09 9000 – Painting and Coating.

1.02 QUALITY ASSURANCE:

A. Perform Work in accordance with ANSI A97.1.

1.03 DELIVERY, STORAGE AND HANDLING: In accordance with Section 01 6000.

A. Store materials in enclosed areas, protected from damage, moisture, and exposure to the elements. Protect ready-mixed joint compounds from freezing.

B. Store panels in a flat, horizontal position. Prevent damage to edges, ends and surfaces of panels. Do not allow panel storage area to exceed 70 percent relative humidity.

C. Do not install panels damaged by moisture or mold, including those with surface contamination, discoloration, swelling, or warping.

D. Exercise caution to prevent damage to windows, doors, floors and other finished work.

1.04 ENVIRONMENTAL REQUIREMENTS:

A. Provide temporary heat, ventilation, and dehumidification in accordance with Section 01 5000 and GA 236 upon beginning gypsum board installation and continuously until finishing is complete and joint compound is fully cured. Maintain ambient temperature between 60 degrees F and 80 degrees F. Maintain relative humidity below 50 percent at 60 degrees F and 70 percent at 80 degrees F.

## PART 2 PRODUCTS

2.01 MANUFACTURERS: In accordance with Section 01 6000.

A. CertainTeed Corp.

B. Continental Building Products.

C. Georgia-Pacific Corp.

D. National Gypsum Company, Gold Bond Building Products.

E. USG Corp.

2.02 GYPSUM BOARD:

A. Interior Gypsum Panels: ASTM C1396; tapered edge; 48 inch width, lengths as long as practical to minimize number of joints.
   1. Panels for Wall Application: ½ inch typical thickness.
   2. Panels for Ceiling Application: 5/8 inch typical thickness.
   3. Where indicated, provide Type X panels; 5/8 inch typical thickness.

B. Moisture Resistant Gypsum Panels: ASTM C1658; glass mat faced; tapered edge; 48 inch width, lengths as long as practical to minimize number of joints.
   1. Panels for Wall Application: ½ inch typical thickness.
   2. Panels for Ceiling Application: 5/8 inch typical thickness.
   3. Mold Resistance: ASTM D3273; minimum 8.
   4. Water Absorption: ASTM C473; maximum 10 percent.

2.03 FASTENERS:

A. Fasteners: ASTM C954 or C1002; Type W bugle head screws; minimum length in accordance with GA 216.

2.04 FINISHING MATERIALS:

A. Joint Tape: Cross-fibered paper or self-adhesive fiberglass mesh.

B. Joint Compound: ASTM C475; mix in accordance with manufacturer's recommendations.
   1. Use only setting-type joint compounds for Level 1 and Level 2 finish applications.

C. Corner Bead and Trim: ASTM C1047; galvanized steel.

D. Control Joint: Roll-formed zinc or extruded PVC.

**PART 3 EXECUTION**

3.01 EXAMINATION:

A. Verify that framing members are plumb and aligned to permit panel installation in a true surface plane.

B. Verify that all work of other trades which will be concealed or covered by this work has been completed and approved. Such work may include, but not be limited to, blocking, insulation, mechanical piping and ductwork, and electrical and communications boxes, conduit, raceway and cable.

3.02 PANEL APPLICATION:

A. Apply panels in accordance with ASTM C840, GA 216, and manufacturer's recommendations.

B. Position panel ends and edges over framing members, except when joints are at right angles to framing members or when end joints are back-blocked.

C. Apply ceiling panels before wall panels. Extend ceiling board into corners and make firm contact with top plate.

D. Apply wall panels perpendicular to studs with end joints positioned over studs. Use maximum practical lengths to minimize end joints.

E. At top of walls adjacent to unconditioned attic space, seal gypsum board to top plate with acoustical sealant.

F. Fit ends and edges closely, but not forced together. Stagger end joints in successive courses, with joints on opposite sides of a partition placed on different studs.

G. Attach panels to framing members with power-driven screws; draw panels tight to framing. Space fasteners not less than 3/8 inch from edges and ends of panels, and 12 inches o.c. along each framing member in field of panels. Drive fasteners in field of panels first, working toward ends and edges. Drive fastener heads slightly below surface of panels in a uniform dimple without breaking face paper.

H. Cut ends, edges, scribe or make cutouts within field of panels with knife and straight edge; square and true to required dimension.

I. Install trim at internal and external angles formed by the intersection of panels with adjacent panels or other surfaces. Apply corner bead to external corners in accordance with manufacturer's directions.

J. Control Joints: Provide separate framing members on each side of joint. Position to intersect door and window openings where possible. Coordinate with items indicated to be applied to wall surface. Provide control joints at the following locations:
   1. Aligned with control joints and expansion joints in building structure.
   2. Where dissimilar substrates meet without change in surface plane.
   3. Where board surface forms L, U or T shape.
   4. Maximum 30 feet o.c. in all directions.

3.03 FINISHING:

A. Provide surfaces with finishes as scheduled, in accordance with the GA 214 definitions of finishes.

B. Level 0: No finishing required.

C. Level 1: One coat fire-tape application.
   1. Board Joints and Interior Angles: Pre-fill abutting tapered panel V-grooves flush with joint compound; wipe off excess. Apply compound in thin uniform layer.

Apply joint tape centered over joint and embedded in compound, with sufficient compound remaining under tape to provide proper bond. Fold and embed tape in interior angles to provide true angle.

2. Fasteners: Cover fastener heads with one coat of joint compound; wipe off excess.

D. Level 2: One coat application.
   1. Board Joints and Interior Angles: Finish as specified for Level 1. Follow immediately with thin skim coat to embed tape.
   2. Fasteners: Finish as specified for Level 1.
   3. Bead and Trim: Apply one coat of joint compound over flanges; wipe off excess and apply a thin coat of joint compound over flanges.

E. Level 3: Two coat application.
   1. Finish as specified for Level 2. When first coat is thoroughly dry, apply second coat of compound, extending slightly beyond first coat into face of board. Do not allow finish coat to protrude beyond plane of surface.
   2. Board Joints and Interior Angles: Fill panel taper flush with surface; cover tape and feather out at least two inches beyond first coat. On joints with no taper, cover the tape and feather out at least four inches on each side of tape.

F. Level 4: Three coat application.
   1. Apply final coat of joint compound feathered out over the dry second coat.

G. Level 5: Three coat application with skim coat.
   1. Apply a thin coat of joint compound over entire finished board surface. Wipe down immediately, leaving a tight smooth film of joint compound.

H. Final Finishing (Not Required for Levels 0, 1 and 2):
   1. Sand between coats where necessary and following final coat, to provide flat, smooth surface ready for priming and decoration; free of ridges, tool marks and sanding grooves. Do not abrade adjacent face-paper surfaces.
   2. Inspect finished surfaces and repair all defects, ridges, cracks, blisters, pits, checks, discolorations, and damaged spots.
   3. Ridges: Sand ridges to reinforcing tape without cutting through tape. Fill concave areas on both sides of ridge with topping compound. After fill is dry, blend in topping compound over repaired area.
   4. Cracks: Fill cracks with compound and finish smooth and flush.

3.04 CLEANING:

A. At completion of the work of this section, remove all debris and excess materials. Remove all joint compound from floor and leave all areas broom clean.

3.05 SCHEDULE OF FINISHES:

A. Surfaces Indicated as Unfinished: Level 0.

B. Surfaces in Attics: Level 1.

C. Gypsum Board Indicated to Receive Paint: Level 4.

D. Moisture Resistant Gypsum Board Indicated to Receive Paint: Level 5.

E. Surfaces Not Otherwise Scheduled: Level 3.

END OF SECTION

## SECTION 09 6500 – RESILIENT FLOORING

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes: Resilient floor tile.

B. Related Requirements:
   1. Section 01 5000 – Temporary Facilities and Controls: Temporary dehumidification.
   2. Section 03 3000 – Cast-in-place Concrete.
   3. Section 09 6800 – Carpeting.

1.02 PREINSTALLATION MEETING: In accordance with Section 01 3100.

A. Attendance: Flooring Installer, Contractor, Owner, and Architect.

B. Review methods and procedures related to flooring work, including approved submittals, samples, substrate conditions, perimeter transitions, and manufacturer's written instructions.

C. Review schedule and planned sequence of installation; availability of materials and labor; equipment, facilities, and temporary protection.

1.03 SEQUENCING AND SCHEDULING:

A. Install resilient flooring and accessories after other finishing operations (including painting) have been completed.

B. After installation, close areas to traffic and to other work for minimum 72 hours and until flooring is firmly set.

1.04 SUBMITTALS: In accordance with Section 01 3300.

A. Product Data: Indicate physical and performance characteristics, and installation instructions.

B. Samples: Submit samples for each product scheduled, showing full range of standard colors and patterns.

1.05 CLOSEOUT SUBMITTALS: In accordance with Section 01 7700.

A. Maintenance Instructions: Include manufacturer's recommendations for each type of flooring.

B. Extra Materials: Provide one box of each type, color, pattern, and size, from same lot as installed materials; in new, unopened, packaging with protective covering for storage, identified with appropriate labels.

1.06 QUALITY ASSURANCE:

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

B. Installer Qualifications: Company specializing in installing the Products specified in this section with minimum three years documented experience; approved by manufacturer.

C. Fire Performance Characteristics: Provide materials whose properties have been determined in accordance with the test methods indicated below, by testing organizations acceptable to regulatory agencies having jurisdiction.
   1. Radiant Panel Test: ASTM E648; Class I.
   2. Smoke Density: ASTM E662; maximum 450 specific optical density.

1.07 DELIVERY, STORAGE AND HANDLING: In accordance with Section 01 6000.

A. Store materials in original containers, at temperatures between 65 degrees F and 100 degrees F.

1.08 ENVIRONMENTAL REQUIREMENTS:

A. Maintain the temperature of the space and the materials to be installed at a minimum 65 degrees F and maximum 100 degrees F for minimum 48 hours prior to, during, and 48 hours after installation.

B. Provide temporary ventilation in accordance with Section 01 5000 where required. Where solvent-based adhesives are used, provide safety sparkproof fans; prohibit smoking.

C. After installation, maintain minimum temperature of 55 degrees F in areas where work is complete.

1.09 WARRANTY: In accordance with Section 01 7700.

A. Luxury Vinyl Flooring: Provide manufacturer warranty against wear; minimum 15 years.

**PART 2 PRODUCTS**

2.01 LUXURY VINYL FLOORING:

A. Manufacturers: In accordance with Section 01 6000.
   1. Armstrong Flooring, Inc.
   2. Shaw Contract.
   3. Tarkett North America.

B. Luxury Vinyl Flooring: ASTM F1700, Class III, Type B; 12 x 24 inch; 2.5 mm thick; 20 mil polymerized vinyl wear layer; embossed surface; factory applied polyurethane finish. (Armstrong Parallel 20)
   1. Color and Pattern: As selected.

2.02 ACCESSORIES:

A. Manufacturers: In accordance with Section 01 6000.
   1. Flooring or base manufacturer.
   2. Dural USA, Inc.
   3. Tarkett North America; Johnsonite.

B. Floor Transitions and Edge Protection: As recommended by resilient flooring manufacturer.
   1. Carpet to Resilient Flooring or Exposed Concrete: Rubber for glue down installation; undercut for carpet. (Tarkett EG-L series)

C. Expansion Joint: Aluminum extrusion with perforated anchoring leg; 4 mm horizontal profile, height to match flooring; flexible rubber insert with 2 mm movement absorption. (Dural Slimflex)

D. Adhesive: Waterproof mastic, as recommended by resilient flooring manufacturer for application and substrate conditions; spray-on adhesives are not permitted.

**PART 3 EXECUTION**

3.01 EXAMINATION:

A. Test concrete substrate for moisture emission in accordance with ASTM F1869; maximum 3.0 pounds of water per 1000 square feet of slab in a 24 hour period, unless manufacturer recommends more stringent criteria.

B. Verify that substrates are dry, clean, smooth and flat and meet the requirements of ASTM F710. Correct unsatisfactory conditions prior to beginning installation. Proceeding with installation indicates acceptance of substrate conditions.

3.02 PREPARATION:

A. It shall be the full responsibility of the flooring installer to assure a level floor prior to installation of new finish flooring. Install patching compound to fill cracks, holes and depressions and to correct uneven areas in the floor or grind off high spots prior to installation of flooring.
   1. Where thickness greater than 1/8 inch is required, apply patching compound in two or more applications.

B. Remove paints, oils, release agents, waxes, and sealers. Remove curing and hardening compounds not compatible with the adhesives employed.

C. Remove mastics and adhesives from previous flooring in accordance with RFCI Recommended Work Practices.

D. Broom or vacuum clean subfloor prior to installing flooring material.

E. Remove debris, sand, and other materials which would result in lack of adhesion or promote cracking. If these or any other defects occur within 1 year after Substantial Completion, the entire flooring at these areas shall be removed and replaced at no additional cost to the Owner.

3.03 INSTALLATION:

A. Install products in accordance with manufacturer's recommendations.

B. Adhesive Application: Apply adhesives following manufacturer's instructions, observing the recommended trowel notching, spread rates and open times. Do not permit the use of reground trowels.

C. Tightly adhere resilient flooring to substrate without open cracks, voids, raising and puckering at joints, telegraphing of adhesive, spreader marks, or other surface imperfections. Hand roll resilient flooring with minimum 100 pound floor roller at perimeter of each covered area to assure adhesion.

D. Scribe, cut, and fit resilient flooring to permanent fixtures, built-in cabinets, pipes, outlets, walls, and partitions.
   1. Scribe, cut, and fit resilient flooring to perimeter of electrical and plumbing items which penetrate through the finish floor, including but not limited to electrical floor outlets, conduit, communications outlets, floor drains, plumbing and gas lines and related items.

E. Extend resilient flooring into toe spaces, door reveals, and into closets and similar openings.

F. Maintain reference markers, holes, or openings that are in place or plainly marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other non-permanent marking device.

G. Floor Tile Layout:
   1. Lay tile from center marks established with principal walls, discounting minor offsets, so that tile at opposite edges of room area are of equal width. Adjust as necessary to avoid use of cut widths less than ½ tile at room perimeters. Lay tile square to room axis.
   2. Match tiles for color and pattern by using tile from cartons in same sequence as manufactured and packaged, if so numbered. Cut tile neatly around fixtures. Broken, cracked, chipped, or deformed tiles are not acceptable. Lay tile with grain running parallel in adjacent tiles unless otherwise indicated.
   3. Joints need not align at doorways.

H. Place carpet edge strips tightly butted to flooring and secure with adhesive. Install edge strips at all areas where carpet abuts dissimilar flooring material.

I. Place reducer strips tightly butted to flooring and secure with adhesive. Install reducer strips where resilient flooring material abuts exposed concrete.

3.04 CLEANING: In accordance with Section 01 7700.

A. Sweep or vacuum floor thoroughly immediately upon completion.

B. Remove excess adhesives from flooring and adjacent surfaces using appropriate cleaner recommended by manufacturer.

C. Do not wash floor until time period recommended by manufacturer has elapsed, to allow resilient flooring to become well sealed in adhesive.

D. Damp mop floor, being careful to remove black marks and excessive soil.

3.05 PROTECTION:

A. Protect flooring against damage during construction period in accordance with manufacturer's instructions.

END OF SECTION

## SECTION 09 6800 – CARPETING

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes: Sheet carpet direct-glued to substrate.

B. Related Requirements:
   1. Section 01 5000 – Temporary Facilities and Controls: Temporary dehumidification.
   2. Section 06 2000 – Finish Carpentry: Wood base.
   3. Section 09 6500 – Resilient Flooring: Edge and transition strips.

1.02 PERFORMANCE REQUIREMENTS:

A. Colorfastness to Crocking: American Association of Textile Chemists and Colorists (AATCC) 165; minimum Class 4 color transfer, wet and dry.

B. Colorfastness to Light: AATCC 16E; minimum Grade 4 color change after exposure of 40 AFU.

C. Electrostatic Propensity: AATCC 134 Step Method; maximum 3.0 Kv.

D. Flammability:
   1. Methenamine Pill Test: ASTM D2859; pass.
   2. Radiant Panel Test: ASTM E648; Class I.
   3. Smoke Density: ASTM E662; maximum 450 corrected optical density (flaming mode).

E. Indoor Air Quality: Carpet and Rug Institute (CRI) Green Label Plus.

F. Static Coefficient of Friction: Minimum 0.60.

1.03 PREINSTALLATION MEETING: In accordance with Section 01 3100.

A. Attendance: Flooring Installer, Contractor, Owner, and Architect.

B. Review methods and procedures related to flooring work, including approved submittals, samples, substrate conditions, perimeter transitions, and manufacturer's written instructions.

C. Review schedule and planned sequence of installation; availability of materials and labor; equipment, facilities, and temporary protection.

1.04 SUBMITTALS: In accordance with Section 01 3300.

A. Shop Drawings: CRI 104 Section 6; indicate layout, seaming plan, method of joining seams, direction of pile and pattern, and location of edge moldings.

B. Product Data: Indicate physical and performance characteristics, sizes, and method of installation.

C. Samples: Submit complete sets of color swatches for the proposed style and pattern.
   1. Owner reserves the right to change the color selection within the same style or price group without an increase in Contract Sum. Verify color selection prior to ordering materials.

D. Installation Instructions: Indicate special procedures, and perimeter conditions requiring special attention.

1.05 CLOSEOUT SUBMITTALS: In accordance with Section 01 7700.

A. Maintenance Instructions: Include manufacturer's cleaning and spot removal recommendations for each type of carpet.

B. Extra Materials: Provide minimum 1 percent of total yardage of each style and color, with protective covering for storage, identified with appropriate labels.

1.06 QUALITY ASSURANCE:

A. Installer Qualifications: Company specializing in installing the Products specified in this section with minimum three years documented experience; manufacturer's authorized dealer or distributor.

1.07 ENVIRONMENTAL REQUIREMENTS:

A. In areas to receive flooring, maintain room temperatures at minimum 70 degrees F for 48 hours prior to, during and 48 hours following application. Materials shall be conditioned at application temperature and humidity at least 24 hours prior to, during and 48 hours following application.

B. Ventilate installation area during installation and for 3 days after installation.

1.08 WARRANTY: In accordance with Section 01 7700.

A. Provide manufacturer's standard lifetime commercial wear warranty.

**PART 2 PRODUCTS**

2.01 MANUFACTURERS: In accordance with Section 01 6000.

A. J & J Industries, Inc.

B. Atlas Carpet Mills.

C. Tarkett Industries, Inc.

2.02 SHEET CARPET:

A. Style C: J & J Fuse II, Merge II, or Mix II.

1. Type: Broadloom carpet with secondary backing. (J & J PremierBac Plus)
2. Construction: Patterned loop pile.
3. Roll Width: 12 ft.
4. Yarn: 100% nylon.
   a. Soil Retardant Treatment: AATCC 189; minimum 350 ppm fluorine on pile fiber of 3 separate tests. (J & J ProTex)
5. Pile Thickness: ASTM D418; 0.28 inch.
6. Yarn Weight: ASTM D5848; 19 oz/sq yd.
7. Gauge: 1/10.
8. Color: As selected.

2.03 ACCESSORIES:

A. Installation Adhesives and Seam Sealers: As recommended by carpet manufacturer for substrate type; CRI Green Label Plus.

B. Reducer Strips: Refer to Section 09 6500.

**PART 3 EXECUTION**

3.01 EXAMINATION:

A. Field verify room dimensions at building site before ordering or cutting material.

B. Verify that floor surfaces are smooth and flat, within specified surface tolerances, free from grease or foreign matter, free from concrete dust or powder, and ready to receive work.

C. Verify that concrete floors are aged minimum 60 days and are ready for flooring installation by testing for alkalinity and moisture emission rate in accordance with ASTM F1869. Obtain instructions if test results are not within specified limits.

1. Moisture Emission Rate: Maximum 3.0 pounds of water per 1000 square feet of slab in a 24 hour period, unless manufacturer recommends more stringent criteria.
2. Alkalinity: pH range of 5 to 9.

D. Installation of flooring indicates acceptance of substrate conditions including responsibility for defects after installation.

3.02 PREPARATION:

A. Remove subfloor ridges, bumps and high spots. Fill minor or local low spots, cracks, joints, holes and other defects with latex filler.

B. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.

C. Remove wax or silicone-type curing compounds prior to application of adhesive.

D. Vacuum clean substrate.

3.03 SHEET CARPET INSTALLATION:

A. Install carpet by experienced carpet layers in an approved manner in accordance with carpet manufacturer's written instructions.

B. Verify carpet match before cutting to ensure minimal variation between dye lots.

C. Lay out carpet and locate seams in accordance with CRI 104 Section 6.2 and approved shop drawings.
   1. Avoid seams at conspicuous locations, high traffic areas and pivot points, including perpendicular seams at doorways and entries.
   2. Where parallel seams at doorways and entries are required, center seams directly under the door.
   3. Where seams are required at change of corridor direction, seam shall follow the wall line parallel to the carpet direction.
   4. Align run of pile in same direction as anticipated traffic and in same direction on adjacent pieces.
   5. Provide monolithic color, pattern, and texture match within any one area.

D. Install carpet tight and flat on subfloor, well fastened at edges, with uniform appearance.

E. Double cut carpet seams with accurate pattern match. Make cuts straight, true, and unfrayed. Apply seam adhesive to cut edges of woven carpet immediately.

F. Direct Glue-Down Installation: CRI 104 Section 9.
   1. Apply adhesive uniformly at rate recommended by manufacturer. After sufficient open time, press carpet into adhesive.
   2. Apply seam adhesive. Lay adjoining piece with seam straight, not overlapped or peaked, and free of gaps.
   3. Roll with appropriate roller for complete contact of adhesive to carpet backing.

G. Install carpet wall-to-wall, using continuous lengths and as broad widths as possible to minimize the placement of seams in traffic lanes. Cut edges straight and true, and seal with adhesive or cement to form permanently invisible and non-raveling joints and seams.

H. Trim carpet neatly at walls and around interruptions.

I. Install reducer strips at door openings, where floor covering material changes, where carpet edges do not abut a vertical surface, and where indicated on the Drawings.

J. Installer is responsible for the accuracy of measurement and fit.

3.04 CLEANING:

A. Package and label remnants and usable scrap in appropriate wrappings; leave at job site where directed. Remove all scraps smaller than 10 square feet and dispose of in a legal manner.

B. Remove excess adhesive without damage from floor, base and wall surfaces.

C. Perform final cleaning in accordance with Section 01 7700. Vacuum flooring thoroughly and leave in clean and acceptable condition, free from spots, dirt or soil, and without tears, frayed or pulled tufts.

3.05 PROTECTION:

A. Protect installed flooring in accordance with Section 01 7000 and CRI 104 Section 16.

B. Do not permit traffic over unprotected floor surface.

C. Apply appropriate protective non-staining building paper covering over finished flooring areas during construction. Immediately prior to Substantial Completion, remove protective coverings and all debris from the site and dispose of in a legal manner.

END OF SECTION

## SECTION 09 9000 – PAINTING AND COATING

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Exterior painting.
   2. Interior painting.

B. Related Requirements:
   1. Shop Priming: Unless otherwise specified, shop priming of ferrous metal items is included under other sections.
   2. Section 06 2000 – Finish Carpentry.
   3. Section 07 9200 – Joint Sealants.
   4. Section 08 1100 – Metal Doors and Frames.
   5. Section 08 1400 – Wood Doors.
   6. Section 09 2900 – Gypsum Board.
   7. Divisions 22 to 28: Facility services piping and equipment.
   8. Section 22 2123 – Natural Gas Piping.
   9. Examine the above sections and all other sections of this specification and become familiar with their provisions regarding painting. All surfaces left unfinished by the requirements of other sections shall be painted or finished as part of this work, except as specifically indicated.

1.02 SYSTEM DESCRIPTION:

A. Paint all primed surfaces, and all surfaces not prefinished. The following categories of work are not included as part of field-applied finish work unless specifically indicated:
   1. Prefinished and factory finished items, or where installer finishing is specified.
   2. Concealed surfaces in generally inaccessible areas.
   3. Materials or areas scheduled or indicated as unfinished.
   4. Finished metal surfaces, including anodized and fluoropolymer finishes, and non-ferrous metals unless otherwise indicated.
   5. Operating parts.
   6. Glass.
   7. Concrete flatwork.

1.03 SUBMITTALS: In accordance with Section 01 3300.

A. Do not begin work or deliver products to project site prior to approval of submittals.

B. Product Data: Indicate product characteristics, surface preparation, compatible primers and topcoats, recommended wet and dry film thickness, storage and handling requirements and recommendations, application methods, and cautions.

C. Color Selections: Obtain color schedule from Architect. If proposed manufacturer is different from that identified on color schedule, prepare and submit two samples 6 inches square of each color and sheen required on properly prepared and identified paint-out cards or hardboard.

1.04 CLOSEOUT SUBMITTALS: In accordance with Section 01 7700.

A. Project Record Documents: Include schedule of each product, sheen, color, and location.

1.05 QUALITY ASSURANCE:

A. Single Source Responsibility: Provide primers and other undercoat paint produced by same manufacturer as finish coats.

B. Material Quality: Provide best quality grade of specified types of coatings as regularly produced by approved manufacturers. Claims relating to unsuitability of specified products, or inability to produce first-class work with specified products, must be submitted to Architect in writing.

C. Mock-Up: Prepare job site mock-up of each substrate and each paint system specified, using approved products and manufacturer recommended application methods.
   1. Obtain Owner's and Architect's acceptance of finish color, texture and pattern and workmanship standard prior to proceeding with remainder of work.
   2. Maintain mock-up during construction for workmanship comparison. Mock-up may be incorporated into final construction upon Owner's approval.

1.06 DELIVERY, STORAGE AND HANDLING: In accordance with Section 01 6000.

A. Deliver products to the project site in original, unopened containers with all labels intact and legible at time of use.

B. Store materials at minimum ambient temperature of 45 degrees F in well ventilated area. Follow manufacturer's requirements for maximum temperatures.

1.07 ENVIRONMENTAL REQUIREMENTS:

A. VOC Content: ASTM D3960; comply with the most restrictive of the following requirements:
   1. Ozone Transport Commission (OTC) Model Rule.
   2. Applicable federal, state and local regulations.

B. Lead Contamination Prevention: Work shall be performed by EPA certified contractors and shall comply with EPA requirements.
   1. Provide lead hazard information pamphlets to dwelling unit owners and occupants. Document compliance with notification requirements.
   2. Seal off work areas, access paths, and HVAC systems to prevent occupant access and dust contamination. Post warning signs.
   3. Move or cover furniture, equipment, and contents of work areas.

4. Minimize dust generation during surface preparation. Use shrouds and HEPA vacuum attachments on power tools. Do not use heat guns or open flame.
5. Perform daily cleaning in work areas by vacuuming with HEPA equipment and wet mopping. Perform final cleaning before removing protective plastic sheeting. Verify final cleaning by wiping floor with disposable cleaning cloths.
6. Testing may be performed by testing laboratory, at Owner's option. Collect testing samples. If necessary, reclean and retest until results are acceptable.

C. Protect materials from freezing before, during, and after application.

D. Apply water-based paints only when temperatures of surfaces to be painted and ambient temperatures are between 50 degrees F and 90 degrees F.

E. Apply solvent-thinned paints only when temperature of surfaces to be painted and ambient temperatures are between 45 degrees F and 95 degrees F.

F. Do not apply paint in snow, rain, fog or mist, or when relative humidity exceeds 80%, or to damp or wet surfaces.

G. Apply interior finish painting only when ambient temperature is above 60 degrees F; after painting, maintain ambient temperature above 60 degrees F to prevent condensation.

H. Provide adequate continuous ventilation to maintain humidity below dew point of coldest surface.

## PART 2 PRODUCTS

2.01 PAINT AND STAIN MATERIALS:

A. Manufacturers: In accordance with Section 01 6000.

1. Sherwin-Williams Co.
2. ICI Paints.
3. Benjamin Moore & Co.
4. PPG Architectural Finishes, Inc.
5. Pratt & Lambert.
6. Tnemec Co., Inc.

B. Materials scheduled below are products of Sherwin-Williams Co. (abbreviated S-W) unless noted otherwise. Proprietary names used to designate materials are not intended to imply that products of named manufacturers are required to the exclusion of others. Equivalent products of other manufacturers listed above are also acceptable.

C. Provide primers and compatible finish coats by the same manufacturer.

D. Color Pigments: Pure, non-fading, applicable types to suit substrates and applications indicated.

E. Primers:
   1. Industrial Primer: S-W DTM Acrylic Primer/Finish (B66W1).
   2. Metal Primer:
      a. Aluminum and Galvanized:
         (1) Gloss Finishes: S-W DTM Wash Primer (B71Y1).
         (2) Other Finishes: S-W Pro-Cryl Universal Primer (B66-310).
      b. Non-Galvanized Ferrous Metals: S-W Pro-Cryl Universal Primer (B66-310).
   3. Wall Primer: S-W ProMar 200 Interior Latex Primer (B28W8200) or ProMar 200 Zero VOC Interior Latex Primer (B28W02600).
   4. Wood Primer: S-W Premium Wall & Wood Interior Latex Primer (B28W8111).

F. Finish Coats:

   1. Acrylic Coatings:
      a. Acrylic Latex Semi-Gloss Coating: S-W Pro Industrial Acrylic Semi-Gloss (B66-650).
      b. Acrylic Gloss Coating: S-W DTM Acrylic Gloss Coating (B66-100).

   2. Alkyd Gloss Enamel: S-W Waterbased Industrial Enamel (B53-300).

   3. Latex Coatings:
      a. Latex Satin Enamel: S-W ProMar 200 Interior Latex Eg-Shel (B20W2200) or ProMar 200 Zero VOC Interior Latex Eg-Shel (B20-2600).
      b. Latex Semi-Gloss Enamel: S-W ProMar 200 Interior Latex Semi-Gloss (B31W2200) or ProMar 200 Zero VOC Interior Latex Semi-Gloss (B31-2600).

## PART 3 EXECUTION

3.01 EXAMINATION:

A. Verify that the work of all other trades is correct and complete so that paint application may properly commence.

B. Verify substrate conditions are acceptable for product application in accordance with manufacturer's instructions.

C. Painting of surface indicates Contractor's acceptance of surface and responsibility for paint failure.

3.02 PREPARATION:

A. Protection:

   1. Remove electrical plates, hardware, light fixture trim, fittings, and similar items not scheduled to receive paint, prior to surface preparation or finishing. Mask in place items that cannot be removed.

   2. Spot prime exposed metals such as bolts, nails, and welds which are to receive paint. Clean all metal work, smooth and prime if necessary where rusting or scaling occurs.

3. Remove dirt, dust, grease, mildew and other contaminants from all surfaces scheduled to be painted or finished.

B. Surface Preparation: In addition to the following general requirements, follow specific recommendations of the manufacturer for each finish system and substrate application.

1. Interior Wood (Opaque Finish): Repair damaged spots, fill voids and holes with wood putty, and sand completely.

2. Steel: Remove mill scale, rust, grease, dirt and dust, by hand scraping, wire brushing, power tool scraping, or sandblasting.

3. Shop Primed Steel: Sand and scrape to remove loose primer and rust. Sand and feather edges to smooth surface. Clean areas with solvent; spot prime bare metal areas.

4. Galvanized Surfaces: Acid etch or clean thoroughly with a grease cutting solvent such as mineral spirits.

5. Aluminum: Remove surface contamination by steam, high pressure detergent wash or solvent washing. Apply acid primer or acid etch. Apply paint immediately following cleaning and etching.

6. Gypsum Board: Verify that surfaces are free of sanding dust, and that joint compound is thoroughly dry. Prime metal corner beads with metal primer before applying latex coatings. Fill minor defects with finishing compound; spot prime.

7. Previously Painted Surfaces: Remove all blistered, peeling and scaling paint to a sound substrate. Remove heavy chalk by scrubbing with soap and water. Sand glossy areas and dust clean. Clean and spot prime failed areas. Use soap and water on protected areas such as eaves and ceilings to remove invisible residues. Rinse clean and let dry. Remove and kill existing surface mildew before applying paint.
   a. Test sample area for compatibility, adhesion and film integrity; report in writing conditions that may affect proper application, appearance or performance.

3.03 PAINT APPLICATION:

A. Apply paint using spray, roller or brush unless otherwise specified or restricted. Method selected must be in accordance with manufacturer's recommendations, suitable for intended surface and finish.

B. Do not open containers until required for use. Stir materials thoroughly and keep at uniform consistency during application.
   1. Mix multiple-component products in accordance with manufacturer's instructions.

C. Apply minimum two finish coats, unless otherwise indicated, in addition to field or shop applied prime coat.
   1. Allow sufficient drying time between coats in accordance with manufacturer's recommendations.

2. Thinning: In accordance with the manufacturer's recommendations; adhere strictly to manufacturer's recommended spreading rate and dry or wet mil thickness per coat.
3. Apply each coat to uniform finish without runs, sags, brush or roller marks, skips, ropiness or other defects.
4. Tint primer and undercoats of paint approximately ½ to ¾ depth of final color.
5. Sand and dust lightly between coats to achieve smooth finish.
6. Clean surfaces free of loose particles. Use tack cloth just prior to applying next coat.
7. Back prime concealed wood surfaces with primer prior to installation.
8. Touch-up suction spots between coats.
9. Refinish surfaces affected by refitting work.
10. Apply additional coat wherever there are voids, imperfections or lap marks.

D. Wood and Hollow Metal Doors:
1. Seal, prime and finish coat top, bottom and edges of doors prior to door installation, same as door face.
2. Finish glazing stops to match door face.

E. Exposed Mechanical and Electrical Equipment: Paint same color as used on walls or ceilings of room. Do not paint equipment or materials in unfinished areas.
1. Remove and paint separately from adjacent surfaces all unfinished grilles, louvers, access panels, and covers.
2. Prime and paint exposed pipes, ducts, covers, conduit, boxes, hangers, brackets and collars, including insulated items, except where items are plated or prefinished.
3. Paint dampers and baffles behind grilles or in convectors to match face panels. Paint visible surfaces of ducts behind air outlets and inlets flat black.
4. Do not paint over name plates or joints in moving parts of equipment.

3.04 TOUCH-UP:

A. Do all touch-up work that may be required throughout the project.

B. Apply materials in accordance with manufacturer's recommendations for adequate coverage, waterproofing, and weather resistance. If the specified number of coats do not achieve adequate coverage, waterproofing, and weather resistance, apply additional coats at no additional cost until acceptable performance and finish are obtained.

3.05 CLEANING:

A. Perform progress cleaning in accordance with Section 01 7000. Remove discarded paint materials, rubbish, cans, and soiled or used rags from the project site at the end of each work day. Use every precaution to avoid the danger of fire.

B. At completion of painting work, remove surplus paint materials and debris from the project site, and leave work areas in a clean and finished condition.

C. Perform final cleaning in accordance with Section 01 7700. Clean window glass and other paint-spattered surfaces. Remove spattered paint by approved methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.

3.06 PROTECTION:

A. Protect surfaces and objects inside and outside the building, including lawns, shrubbery, and adjacent properties against damage; repair damage to adjacent surfaces.

B. Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct damage by cleaning, repairing, or replacing as required to match existing.

C. Exercise care and provide protection for adjacent prefinished or unfinished items, moving parts or assemblies, sprinkler heads, valves, motors, machinery, and related items. Provide all required covering, masking tape, and other protective materials.

D. Provide "wet paint" signs as required to protect newly painted finishes.

E. Following completion of painting in each area, promptly reinstall all items removed for protection.

F. After completion of painting operations, remove temporary protective materials, including those provided by others for protection of their work.

3.07 SCHEDULE:

A. Items scheduled herein to be painted are not intended to be all inclusive and are listed only as a guide to material type and exposure. Additional items indicated on the Drawings or in the Specifications shall receive applicable finishes, unless otherwise noted.

B. Exterior Metals: Exposed structural and miscellaneous galvanized and non-galvanized ferrous metal and aluminum items; hollow metal doors and frames, mechanical and electrical piping including all exposed gas piping, mechanical vents, flues, conduit, electrical boxes, and related items.

1. Factory Primed Surfaces: Clean, sand, and touch-up with compatible primer wherever necessary before applying finish coats.

2. Unprimed Non-Galvanized Ferrous Metal Surfaces: Apply one coat industrial primer (6.0 mils wet, 3.0 mils dry).

3. Apply two finish coats acrylic gloss coating (8.0 mils wet, 3.0 mils dry per coat).

C. Interior Metals: Clean, sand, and touch-up factory primed surfaces with compatible primer wherever necessary before applying finish coats.

1. General Building Components: Hollow metal doors and frames, and related items.
   a. Apply one coat metal primer (5.0 mils wet, 2.0 mils dry).

b. Apply two finish coats acrylic latex semi-gloss coating (6.0 mils wet, 2.1 mils dry per coat).

2. Mechanical and Electrical Components: Sheet metal duct work, exposed piping, electrical panel covers, and related items.
   a. Apply one coat metal primer (7.5 mils wet, 3.0 mils dry).
   b. Apply two finish coats alkyd gloss enamel (4.5 mils wet, 1.6 mils dry per coat).

D. Interior Wood (Opaque Finish):

1. Apply one coat wood primer (4.0 mils wet, 1.8 mils dry).
2. After thoroughly drying, sand lightly before applying finish coats.
3. Apply two finish coats latex semi-gloss enamel (4.0 mils wet, 1.3 mils dry per coat).

E. Interior Gypsum Board:

1. Apply one coat wall primer (4.0 mils wet, 1.1 mils dry).
2. Apply two finish coats latex satin enamel (4.0 mils wet, 1.6 mils dry per coat).

END OF SECTION

## SECTION 10 2800 – TOILET AND BATH ACCESSORIES

### PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes: Toilet room accessories.

B. Related Requirements:
   1. Section 01 1000 – Summary of Work: Owner supplied Products.
   2. Section 06 1100 – Wood Framing: Wall backing required to secure accessories.

1.02 SUBMITTALS: In accordance with Section 01 3300.

A. Product Data: Manufacturer's data sheets, accessories schedule, and installation instructions.

1.03 QUALITY ASSURANCE:

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

1.04 WARRANTY: In accordance with Section 01 7700.

A. Mirrors: Provide 15 year warranty against silver spoilage.

### PART 2 PRODUCTS

2.01 MANUFACTURERS: In accordance with Section 01 6000.

A. Bobrick Washroom Equipment, Inc.; GAMCO Specialty Accessories.

B. American Accessories, Inc.

C. American Specialties, Inc.

D. Bradley Corporation.

2.02 MATERIALS:

A. General: Shop assembled, free of dents or 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 using seamless sheets, with flat surfaces.

B. Stainless Steel: ASTM A167, Type 304; No. 4 satin brushed finish; 22 gauge minimum thickness.

C. Mirror Glass: ASTM C1503.

D. Fasteners: ASTM A153, hot dip galvanized.

2.03 TOILET ROOM ACCESSORIES:

A. Mirrors: ¼ inch plate glass, sizes as indicated; with one piece roll formed stainless steel angle frame; with galvanized steel wall hanger for concealed mounting. (Bobrick B-290 series; Bradley 780 series; ASI 0600-A series)

B. Shower Curtain Rods: 18 gauge stainless steel tube, size to fit opening; 1 inch outside diameter, satin finish; stainless steel mounting flanges, concealed mounting; with curtain hooks. (Bradley 9538)
   1. Shower Curtains: Opaque vinyl or nylon reinforced vinyl fabric, 0.008 inch thick, with antibacterial treatment; flameproof and stain-resistant. (Bobrick 204 series; Bradley 9537 series; ASI 1200 series)

**PART 3 EXECUTION**

3.01 EXAMINATION:

A. Verify wall construction for proper dimensions and conditions affecting installation. For surface mounted accessories, check condition of wall and confirm installation of backing materials within wall.

3.02 INSTALLATION:

A. Install accessories at locations and heights indicated, in accordance with manufacturer's installation instructions; plumb and level, securely and rigidly attached to substrate.

B. Install items using non-corrosive anchoring devices.

C. Conceal evidence of drilling, cutting, and fitting to room finish.

3.03 CLEANING: In accordance with Section 01 7700.

A. Remove protective coatings and paper covers.

B. Clean and polish exposed surfaces.

END OF SECTION

## SECTION 10 4400 – FIRE PROTECTION SPECIALTIES

### PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes: Fire extinguishers.

### PART 2 PRODUCTS

2.01 MANUFACTURERS: In accordance with Section 01 6000.

A. Amerex.

B. J.L. Industries.

C. Larsen's Manufacturing Company.

D. Smith Industries, Inc.; Potter-Roemer.

2.02 FIRE EXTINGUISHERS:

A. Residential Locations: NFPA 10, UL rated, FM approved; 10 lb., 1A-10BC type, pressurized multi-purpose dry chemical extinguisher; with pressure gauge and hose.

B. Provide mounting brackets and fasteners for wall mounted extinguishers.

### PART 3 EXECUTION

3.01 INSTALLATION:

A. Install Products in accordance with manufacturer's instructions and requirements of governing authorities.

B. Securely fasten mounting brackets to structure, square and plumb.

C. Mounting Height: 54 inches above finish floor to top of extinguisher.

D. Check extinguishers for proper charge operation. Remove and replace damaged, defective or undercharged units prior to substantial completion.

E. Tag all extinguishers; indicate expiration date of charge.

END OF SECTION

## SECTION 10 5700 – WARDROBE AND CLOSET SPECIALTIES

### PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes: Closet rods and shelving.

B. Related Requirements:
   1. Section 06 1100 – Wood Framing: Wall backing.

1.02 SUBMITTALS: In accordance with Section 01 3300.

A. Product Data: Indicate component layout, installation instructions, and maintenance recommendations.

### PART 2 PRODUCTS

2.01 CLOSET RODS AND SHELVING:

A. Manufacturers: In accordance with Section 01 6000.
   1. Knape & Vogt Manufacturing Company.
   2. National Manufacturing Co.
   3. Rubbermaid Closet & Organization Products.
   4. Schulte Corporation.

B. Closet Shelving: Factory fabricated from steel wire with maximum ½ inch spacing and white baked-on epoxy finish. (Schulte Lifetime series; Rubbermaid Wardrobe Shelf series)
   1. Load Capacity: Minimum 75 lbs per linear foot.
   2. Accessories: End brackets; back clips; support braces from front edge of shelf to back wall of closet at each stud location; mounting hardware.

C. Adjustable Closet Shelving: Epoxy coated steel uprights and brackets; steel wire shelving with maximum ½ inch spacing and white baked-on epoxy finish. (Schulte FreedomRail series; Rubbermaid FastTrack series)
   1. Load Capacity: Minimum 120 lbs per linear foot.
   2. Accessories: End caps; mounting hardware.

### PART 3 EXECUTION

3.01 INSTALLATION:

A. Install products in accordance with manufacturer's installation instructions, plumb and level, securely and rigidly attached to substrate.

B. Install products at locations and heights indicated, and as required to comply with ADA and applicable building codes.

C. Install items using non-corrosive anchoring devices.
D. Fit flanges snugly to mounting surfaces.
E. Conceal evidence of drilling, cutting, and fitting to room finish.

END OF SECTION

## SECTION 11 3034 – CEILING FANS

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes: Residential ceiling fans.

B. Related Requirements:
   1. Division 26 – Electrical: Power connections; wall switches.

1.02 SUBMITTALS: In accordance with Section 01 3300.

A. Product Data: Indicate dimensions, installation and operating instructions, and accessories.

## PART 2 PRODUCTS

2.01 CEILING FANS:

A. Manufacturers: In accordance with Section 01 6000.
   1. Hunter Fan Co.
   2. Luminance Brands; Emerson.
   3. Modern Fan Co.
   4. Visual Comfort & Co.; Monte Carlo.

B. Low Profile Fans: 42 inch diameter; 3 speed motor with pull chain speed selector; white blades and housing. (Hunter Low Profile IV)

## PART 3 EXECUTION

3.01 INSTALLATION:

A. Install ceiling fans and accessories in accordance with manufacturer's instructions.

B. Verify installation conditions, and clearances from fans to adjacent construction, with manufacturer's requirements.

C. Support fans heavier than 50 lbs. directly and securely from building structural members. Where necessary to span building structural members, support light fixtures from steel channel or approved supplemental framing in accordance with Section 26 0500, directly and securely attached to building structural members. Do not use wood or wire supporting members.

D. Test fans and controls for normal operation.

END OF SECTION

## SECTION 12 3000 – CASEWORK

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Stock cabinet units.
   2. Countertops.
   3. Cabinet hardware.
   4. Prefinished surfaces.
   5. Preparation for installing utilities.

B. Related Requirements:
   1. Section 06 1100 – Wood Framing: Wall blocking for attachment of components.
   2. Section 06 2000 – Finish Carpentry: Base for installation in toe kick space.
   3. Section 07 9200 – Joint Sealants.
   4. Section 22 4000 – Plumbing Fixtures.

1.02 SUBMITTALS: In accordance with Section 01 3300.

A. Shop Drawings: Indicate materials, component profiles and elevations, required field dimensions, assembly methods, joint details, fastening methods, accessory listings, hardware locations, utility connections, required blocking and supports, and schedule of finishes.

B. Samples:
   1. Submit two samples illustrating cabinet finish.
   2. Submit two samples illustrating countertop finish.
   3. Submit two samples of pulls and hinges, illustrating hardware finish.

1.03 QUALITY ASSURANCE:

A. Perform Work in accordance with AWI Custom quality.

B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

C. Regulatory Requirements: Components indicated to be accessible shall comply with ADA.

D. In lieu of grade stamping exposed to view lumber and plywood, submit manufacturer's certificate certifying that products meet or exceed specified requirements.

1.04 ENVIRONMENTAL REQUIREMENTS: In accordance with Section 01 6000.

A. Protect units from moisture damage.

B. During and after delivery of materials and installation of work of this section, maintain the same temperature and humidity conditions in building spaces as will occur after occupancy.

## PART 2 PRODUCTS

2.01 WOOD MATERIALS:

A. Hardwood Lumber Scheduled to Receive Transparent (Stained) Finish: NHLA; graded in accordance with AWI; maximum moisture content of 10 percent; plain sliced, S4S, Select Grade; species as selected.

B. Hardwood Plywood Scheduled to Receive Transparent (Stained) Finish: HPVA HP-1, Grade C faces and Grade J crossbands; graded in accordance with AWI; veneer core; type of glue recommended for application, species as selected.
   1. Exposed Both Sides: APA N-N.
   2. Exposed One Side: APA N-A.

C. Softwood Lumber Scheduled to Receive Laminate Finish: DOC PS 20; graded in accordance with AWI; maximum moisture content of 10 percent; Idaho White Pine, S4S, Standard "Medium Knotty" Grade.

D. Softwood Plywood Scheduled to Receive Laminate Finish: DOC PS 1; graded in accordance with AWI; veneer core; APA B-B, Group 2, type of glue recommended for application, rotary cut Douglas Fir face species.

E. Wood Particleboard Scheduled to Receive Laminate Finish: ANSI A208.1, Grade M-2, medium density (45 lbs per cu ft), Industrial grade; composed of wood chips, made with high waterproof resin binders; sanded faces.

2.02 LAMINATE MATERIALS:

A. Manufacturers: In accordance with Section 01 6000.
   1. Formica Corporation.
   2. International Paper Decorative Products; Nevamar.
   3. Pioneer Plastics Corporation, Pionite.
   4. Wilsonart International, Inc.

B. Plastic Laminate: NEMA LD3; color, pattern, and surface texture as selected from minimum 70 standard color selections.
   1. Grade HGS, 0.050 inch thick, for horizontal surfaces, high usage locations, and cabinet exteriors.
   2. Grade VGS, 0.028 inch thick, for vertical surfaces.
   3. Grade HGP, 0.039 inch thick, for forming radius edges and backsplashes.
   4. General Purpose type, 0.020 inch thick, for thermally fused melamine surfaces.
   5. Cabinet Liner type, 0.020 inch thick, for lining cabinet interiors.

C. Laminate Backing Sheet: NEMA LD3; backing grade, undecorated plastic laminate.

D. Factory Laminated Melamine Faced Panels: Thermally fused melamine on wood particleboard; fabricated in accordance with ALA.

2.03 STOCK CABINET UNITS:

A. Manufacturers: In accordance with Section 01 6000.
   1. Smart, LLC; Smart Cabinetry.
   2. Armstrong Cabinets.
   3. Merillat Industries, Inc.

B. Cabinet Units: Kitchen Cabinet Manufacturers Association (KCMA) A161.1; framed construction; plywood construction with hardwood veneer; traditional overlay doors and drawers with flush design; concealed hinges; transparent finish as selected.
   1. Cabinet Body: Particleboard backs, sides, tops, bottoms, and mounting rails; Grade VGS exposed exterior surfaces; melamine interior and concealed surfaces.
      a. Base Cabinets: Nominal dimensions as indicated; integral toe kick base front and back.
      b. Wall Cabinets: Nominal dimensions as indicated; wall hung.
   2. Drawers: 5/8 inch thick solid hardwood with transparent finish; dovetail construction.
      a. Drawer Bottoms: Minimum ¼ inch thick; fully captured in drawer frame.
   3. Shelving: Wood particleboard with powder coated finish; ¾ inch thick.

C. Accessories: Fillers, hardware, edge banding, toekick covers, and touch-up materials.
   1. Provide wall cabinet top and bottom fillers to close spaces between cabinets and walls.

2.04 COUNTERTOPS:

A. Tops: Wood particleboard, minimum ¾ inch thick, with grade HGS plastic laminate, with backing sheet; reinforced with additional layer of ¾ x 3 inch particleboard at perimeter; front edge radiused and postformed 180 degrees.
   1. Factory fabricated with openings for sinks, faucets, and other accessories as indicated.
   2. Backsplashes and End Splashes: Factory fabricated to match countertop.

2.05 HARDWARE:

A. Manufacturers: In accordance with Section 01 6000.
   1. Casework manufacturer's standard.
   2. Julius Blum, Inc.
   3. Häfele America Co.
   4. Hettich America LP.
   5. Knape & Vogt Manufacturing Company (K & V).
   6. National Manufacturing Co.

7. Newell Rubbermaid, Inc.; Amerock.

B. Door and Drawer Pulls: Style and finish as selected from cabinet manufacturer's standard.

C. Shelf Clips for Adjustable Shelving: Heavy duty plastic; L shaped with locking feature; two pins sized to fit holes in cabinet sides.

D. Drawer Slides: ANSI A156.9; epoxy coated steel with nylon rollers; self closing; minimum 75 lb capacity.

E. Hinges: Concealed type, self closing, minimum 95 degree opening angle; nickel plated finish; with die cast zinc mounting plate; with adapter for face frame mounting.

F. Door Catches: Roller type, magnetic type, or integral with hinge assembly.

G. Door Stops: Chain type or bar type; provide for doors located adjacent to walls.

2.06 ACCESSORIES:

A. Adhesive: Type recommended by AWI and laminate manufacturer to suit application.

B. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; chrome finish.

C. Silencers: Resilient rubber; self adhesive.

D. Concealed Joint Fasteners: Threaded steel.

2.07 FABRICATION:

A. Shop assemble casework for delivery to site in units easily handled and to permit passage through building openings.

B. Join components with concealed fasteners and with mortise and tenons or with dowels glued under pressure; countersink exposed fasteners.

C. Provide minimum two silencers for each door and drawer.

D. Locate applied door catches at head or jamb of single door openings, and at head of double door openings.

E. At adjustable shelving locations, provide 5mm holes in cabinet sides for shelf clips at vertical spacing of 32mm o.c., at front and back of cabinet.

F. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide filler sections and trim for scribing and site cutting.

G. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Locate counter butt joints minimum 2 feet from sink cut-outs, minimum 4 feet from end of top, and minimum 4 feet apart.

H. Apply laminate backing sheet to reverse side of laminate finished surfaces where concealed.

I. Where countertops are fabricated in multiple pieces for field assembly, provide splines or wafers for proper alignment.

J. Provide cutouts for plumbing fixtures, inserts, and fittings. Verify locations of cutouts from on-site dimensions. Coordinate dimensions of cutouts with the work of other Sections. Seal cut edges.

2.08 FACTORY FINISHING:

A. Sand work smooth and set exposed fasteners.

B. Apply wood filler in exposed nail and screw indentations.

C. On items to receive transparent finishes, use wood filler which matches surrounding surfaces and of types recommended for applied finishes.

D. Finish exposed to view, internal, and semi-concealed surfaces, except prefinished surfaces.

**PART 3 EXECUTION**

3.01 EXAMINATION:

A. Verify existing conditions and dimensions before starting work.

B. Verify adequacy and location of backing and support framing.

C. Verify location and sizes of utility rough-in associated with work of this section.

3.02 INSTALLATION:

A. Set and secure casework in place; rigid, plumb, and level.

B. Use fixture attachments in concealed locations for wall mounted components.

C. Use concealed joint fasteners to align and secure adjoining units and tops.

D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.

E. Countersink anchorage devices at exposed locations. Conceal with solid plugs to match surrounding materials; finish flush with surrounding surfaces.

F. Seal separate backsplashes to countertops, and joints where countertops and backsplashes meet walls and adjacent surfaces, with sanitary type silicone sealant in accordance with Section 07 9200.

G. Prepare toe kick space for installation of wood base as specified in Section 06 2000.

H. Coordinate installation of plumbing fixtures.

3.03 ADJUSTING:

A. Test installed work for rigidity and ability to support loads.

B. Adjust moving or operating parts to function smoothly and correctly, without warp or bind.

C. Adjust hinges to provide equal clearances on all sides of doors.

3.04 CLEANING: In accordance with Section 01 7700.

A. Perform final cleaning of casework, shelves, hardware, fittings, and fixtures.

3.05 PROTECTION:

A. Protect exposed finished work of other Sections from damage during installation of the work of this section.

END OF SECTION

## SECTION 22 0500 – COMMON WORK RESULTS FOR PLUMBING

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Materials and installation methods applicable to all Sections of Division 22.
   2. Identification.
   3. Testing and inspection.

B. Related Requirements:
   1. Section 09 9000 – Painting and Coating.

## PART 2 PRODUCTS

2.01 IDENTIFICATION MATERIALS:

A. Manufacturers: In accordance with Section 01 6000.
   1. Allen Systems, Inc.
   2. W.H. Brady Company.
   3. Seton Name Plate Co.

B. Service Identification: Contractor's option from the following:
   1. Stenciled characters, 1 inch high. Provide one coat of clear lacquer or varnish over the stencils.
   2. Pipe Markers: Snap-around type; preprinted vinyl, color coded per ANSI A13.1, with name of piping system and "Supply" or "Return" where applicable; arrows to indicate flow direction; with nylon ties for pipe sizes 6 inch and larger.

C. Valve Tags: Polished brass, 2 inch diameter, with stamped numbers and letters to identify serial number and service designation; with chain and corrosion resistant S-hook.

D. Engraved Plastic Nameplates: 1 x 3 x 1/16 inch thick minimum size; white engraved letters on black background; minimum ¼ inch high lettering.

## PART 3 EXECUTION

3.01 PAINTING:

A. Finish painting of piping shall be done in accordance with Section 09 9000. Damage to finish painting shall be repaired at the expense of the party causing the damage.

B. Refinish factory primed or finished components damaged during shipping or installation. Remove rust, prime, and paint per manufacturer's recommendations for finish equal to original.

3.02 IDENTIFICATION:

A. Identify piping, valves, equipment and controls in accordance with ANSI A13.1. Verify numbering system with Owner; coordinate with existing identification system, where present.

B. Piping: Identify each pipe in exposed or accessible space (except architecturally finished spaces) at each major change of direction, at 20 foot intervals in straight runs, each branch connection, each riser, equipment connections, and both sides of walls.

C. Valve Tags: Securely fasten tags to all valves and cocks, chained to hand wheel, on main lines and branches, and at switches, equipment, and controls. Indicate piping system and purpose of valve; indicate whether valve is normally closed (N.C.) or normally open (N.O.) in service; supply (S) or return (R); indicate direction of flow. Tags may be omitted for local stop or shutoff valves to an item of equipment.

3.03 TESTING AND INSPECTION:

A. Refer to individual Sections for specific tests required for each system.

B. Pay for all required tests and inspections. Furnish labor, materials, and instruments; bear other costs in connection with all tests.

C. Coordinate testing and inspection with utility companies and authorities having jurisdiction.

D. Notice of Tests: Give written notice in ample time to all concerned of date when tests will be conducted.

E. Prior Tests: Concealed or insulated work shall remain uncovered until required tests have been completed, but if construction schedule requires it, arrange for prior tests on parts of system as approved by the Architect.

F. Test piping systems before piping is concealed, covered, or insulated. Before testing pipe systems, remove or otherwise protect from damage components not designed to withstand the pressures used in testing piping.

G. Adjustments, Repairs, and Retests:
   1. Make adjustments, repairs, and alterations as required to meet specified test results.
   2. Correct defects disclosed by tests or inspection, and replace defective parts when directed.
   3. In replacing defective parts, use only new materials; in the case of pipe, replace with same length as defective piece.
   4. Caulking of screwed joints or peening of welds is not permitted.
   5. Repeat tests after defects have been corrected and parts replaced, as directed and until pronounced satisfactory.

H. Responsibility for Damage: Bear the cost of repairs and restoration of the work of other Contractors damaged by the tests or cutting required in connection with the tests.

END OF SECTION

## SECTION 22 0529 – PLUMBING HANGERS AND SUPPORTS

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes: Piping hangers and supports.

B. Related Requirements:
   1. Section 22 0500 – Common Work Results for Plumbing.

## PART 2 PRODUCTS

2.01 MANUFACTURERS: In accordance with Section 01 6000.

A. Anvil International, Inc.

B. Eaton; B-Line.

C. Elcen Metal Products Co.

D. Fee and Mason Manufacturing Company.

E. Miro Industries, Inc.

2.02 COMPONENTS:

A. Provide all required components to rigidly support systems and equipment, using methods suitable for weight of components being supported. Include provisions for vertical and lateral adjustment, and accommodate expansion. Comply with ANSI B31.1, ASTM F708 and MSS SP58.

B. Pipe Hangers and Supports:

   1. Provide continuous threaded solid steel hanger rods for each pipe hanger. Equip each hanger rod with 3 semi-finished hex nuts not including the insert nut.

   2. Hanger Attachments to Piping: Materials and coatings compatible with piping materials. For insulated piping, provide oversized hangers to fit on the outside of the pipe saddles and shields.
      a. Uninsulated Copper Tubing: Copper plated plastic-coated adjustable tubing rings. (Anvil CT-99C)
      b. Uninsulated Ferrous Piping: Adjustable clevis type. (Anvil 260)
      c. Uninsulated Plastic Piping: Protective type hangers. (Elcen 91)
      d. Insulated Piping to 4 Inch: Adjustable clevis type with insulation shield of 18 gauge galvanized steel in 180 degree segments, minimum 12 inches long. (Anvil 260)

   3. Multiple Pipe Supports: Trapeze hangers, preformed channel, enamel finish, with clamps to secure individual piping. (Fee and Mason 500 or 521 with 8500 pipe clamps or 8600 tubing clamps)

4. Wall Support: Cast iron hook.

**PART 3 EXECUTION**

3.01 INSTALLATION:

A. Install in accordance with ANSI B31.9 and ASTM F708.

B. Piping shall be independently supported from the building structure and shall not be supported from other pipes. Where interferences do occur, provide trapeze type hangers or supports.

C. Pipe Hangers and Supports:

1. Install hangers to provide minimum ½ inch space between finished covering and adjacent work.
2. Place hangers within 12 inches of each horizontal elbow.
3. Use hangers with 1½ inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
4. Support riser piping independently of connected horizontal piping.
5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
6. Provide sheet metal packing between hanger or support and piping. Insulate dissimilar metals against direct contact.
7. Minimum Hanger and Rod Size:
   a. Pipe Sizes to 2 Inch: 3/8 inch diameter.
   b. 2½ Inch to 3½ Inch: 1/2 inch diameter.
   c. 4 Inch to 5 Inch: 5/8 inch diameter.
8. Provide maximum hanger spacings for horizontal piping runs as follows, with minimum one hanger per section of pipe.
   a. Steel Pipe and No-Hub Cast Iron Soil Pipe:
      (1) Sizes to ¾ Inch: 6 ft o.c.
      (2) 1 Inch to 1¼ Inch: 7 ft o.c.
      (3) 1½ Inch: 9 ft o.c.
      (4) 2 Inch: 10 ft o.c.
      (5) 2½ Inch: 11 ft o.c.
      (6) 3 Inch: 12 ft o.c.
      (7) 4 Inch: 14 ft o.c.
   b. Cast Iron Soil Pipe (Hub and Spigot): Locate hangers at each joint, maximum 5 ft o.c.
   c. Copper Pipe:
      (1) Sizes to ¾ Inch: 5 ft o.c.

(2) 1 Inch: 6 ft o.c.
(3) 1¼ Inch: 7 ft o.c.
(4) 1½ Inch to 2 Inch: 8 ft o.c.
(5) 2½ Inch: 9 ft o.c.
(6) 3 Inch: 10 ft o.c.
(7) 4 Inch: 12 ft o.c.

d. Plastic Pipe Sizes to 6 Inch: 4 ft o.c.

END OF SECTION

## SECTION 22 0700 – PLUMBING INSULATION

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes: Thermal insulation for plumbing piping.

B. Related Requirements:
   1. Section 22 0500 – Common Work Results for Plumbing.
   2. Section 22 1000 – Plumbing Piping.
   3. Section 22 1116 – Domestic Water Piping.
   4. Section 22 1316 – Sanitary Waste and Vent Piping.
   5. Section 22 1400 – Drainage Piping.
   6. Section 22 4000 – Plumbing Fixtures.

1.02 DEFINITIONS:

A. Concealed: Below grade or hidden from sight in normally inaccessible areas such as attic spaces and similar locations.

B. Exposed: Not concealed. Exception: Pipe chases 24 inches and wider shall be considered exposed.

C. Below Grade: Buried in earth below floor inside building or below grade at exterior of building.

1.03 QUALITY ASSURANCE:

A. Fire and Smoke Hazard Ratings: ASTM E84.
   1. Flame Spread: Maximum 25.
   2. Smoke Developed: Maximum 50.

B. Thermal Conductivity: ASTM C335; maximum K value for each product listed with product description.

C. Accessories such as cements, fitting covers, and pressure sensitive tape shall have the same component ratings as listed above.

D. Paper laminate jackets shall be permanently fire and smoke resistant. Chemicals used for treating paper in jacket laminates shall not be water soluble and shall be unaffected by water and humidity.

## PART 2 PRODUCTS

2.01 MANUFACTURERS: In accordance with Section 01 6000.

A. Armacell LLC.

B. CertainTeed Corporation.

C. Johns Manville.

D. Knauf Fiber Glass.

E. Owens-Corning Fiberglas Corporation.

2.02 MATERIALS:

A. Fiberglass Pipe Insulation: ASTM C547, Class I; rigid one piece construction with vapor barrier; minimum 36 inch sections; rated for applications to 850 degrees F; maximum K value 0.23 at 75 degrees F. (Johns Manville Micro-Lok)

1. All Purpose Jacket: ASTM C1136, Type I; reinforced foil-kraft laminate, with pressure sensitive tape sealing system at butt joints and longitudinal seams; white finish. (Johns Manville AP-T Plus)

2. PVC Jacket: ASTM D1784; preformed to shape of pipe or fitting; gloss white finish. (Johns Manville Zeston 2000)

3. Metal Jacket: Aluminum sheet, minimum 0.016 inch thick, with laminated moisture retarder.

4. Jacket Application Schedule:
   a. Piping Not Otherwise Scheduled: All purpose jacket; PVC fitting covers with precut fiberglass insulation insert; minimum two layers of insulation inserts where pipe operating temperature is below 45 degrees F or above 250 degrees F.
   b. Exposed Piping in Finished Areas: PVC jacket; PVC fitting covers with precut fiberglass insulation insert; minimum two layers of insulation inserts where pipe operating temperature is below 45 degrees F or above 250 degrees F.
   c. Outdoor Piping: Metal jacket with preformed aluminum fitting covers.
   d. Below Grade Piping: Metal jacket with preformed aluminum fitting covers.

B. Closed Cell Pipe Insulation: ASTM C534, Type II; flexible elastomeric tubing, black color; maximum K value 0.28 at 75 degrees F. (Johns Manville Aerotube AP; AP ArmaFlex or ProFlex)

1. Adhesive: Air drying contact type, for joining seams and butt joints. (Johns Manville 57; Armaflex 520 BLV)

2. Finish Paint: Water based latex enamel, semi-gloss; white color. (Johns Manville Aerotube Finish)

C. Heavy Duty Pipe Insulation: ASTM C533, Type I; rigid block molded from hydrous calcium silicate; specially formulated for high temperature, high strength, abuse resistant and fire protection applications; maximum K value 0.40 at 300 degrees F. (Johns Manville Thermo-12 Gold)

D. Mastic: Vapor retardant type, compatible with adjoining materials.

## PART 3 EXECUTION

3.01 PREPARATION:

A. Perform leak testing of piping systems, where specified, before installing insulation.

3.02 INSTALLATION:

A. Apply insulation over clean, dry pipe with all joints butted firmly together. Secure longitudinal jacket laps and butt strips according to manufacturer's recommendations.

B. Extend insulation continuous through wall and ceiling openings and sleeves.

C. Assure continuous, unbroken vapor seal at seams, butt joints, and fittings where vapor barrier jackets are used, and on cold service piping below 60 degrees F. Provide adequate insulation and vapor seal to prevent condensation at hangers and support anchors secured directly to cold surfaces.

D. Extend surface finishes to protect all surfaces, ends and raw edges of insulation.

E. Install galvanized metal shields between hangers or supports and pipe insulation. Form shields to fit insulation and extend up to the center line of the pipe, with minimum length as follows:
   1. Pipe Sizes to 2½ Inches: 10 inches.
   2. Pipe Sizes 3 Inches to 6 Inches: 12 inches.

F. Install inserts between pipe and hangers, consisting of heavy duty pipe insulation of thickness equal to adjoining insulation, with vapor barrier where required. Insulation inserts shall have the same length as specified for shields.
   1. For ½ inch insulation thickness only, inserts may be preservative treated wood blocking.

G. Closed Cell Insulation: Push unslit sections over open ends of pipe where practical; otherwise slit tubular sections and wrap around pipe. Adhere and seal seams and butt joints with adhesive.
   1. Cold Piping: Adhere insulation to pipe at high end of run with one inch strip of adhesive on both insulation and pipe. Coat exposed end cuts with adhesive.
   2. Outdoor Exposed Piping: Locate seams on lower half of pipe. Apply two coats of finish paint.

H. Metal Jacket: Install with minimum 2 inch laps, configured to shed water; secure system with ½ inch aluminum bands at 12 inches o.c.

3.03 PROTECTION:

A. Protect installed insulation materials from inclement weather using approved waterproof sheeting. Remove and replace water-damaged insulation.

3.04 SCHEDULE:

A. Insulate all piping, fittings, valves, flanges and unions unless factory insulated or otherwise excluded. Maintain visibility and accessibility of testing laboratory labels, equipment nameplates, and access panels. Do not insulate the following unless specifically scheduled:
   1. Automatic air vent and discharge piping.
   2. Drain and discharge piping downstream of system drain valves and relief valves.
   3. Unions, on hot lines (65 to 250 degrees F) except for personnel protection from floor to seven feet above floor.
   4. Chrome plated pipe fittings and valves at fixtures (except at accessible fixtures).
   5. Bonnet on screwed valve bodies.
   6. Removable plates on check valves, strainers, etc.
   7. Flexible connectors and vibration control devices.

B. Exposed Piping: 1 inch fiberglass.

C. Concealed Piping: ½ inch closed cell.

D. Where piping is exposed to outdoor ambient temperatures, provide insulation thickness ½ inch greater than scheduled thickness.

END OF SECTION

## SECTION 22 1000 – PLUMBING PIPING

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes: Piping materials and installation methods applicable to all plumbing piping work.

B. Related Requirements:
   1. Section 07 9200 – Joint Sealants.
   2. Section 22 0500 – Common Work Results for Plumbing.
   3. Section 22 0529 – Plumbing Hangers and Supports.
   4. Section 31 2000 – Earth Moving: Excavation and backfilling.

1.02 CLOSEOUT SUBMITTALS: In accordance with Section 01 7700.

A. Valve Directories: Include in Operation and Maintenance binders. For each piping system, indicate identification (correlated with record documents), location and purpose of each valve.

1.03 QUALITY ASSURANCE:

A. Pipe: Identify with marking including size, material classification, and ASTM specification. Include water pressure rating and potable water certification where applicable.

B. Valves: Manufacturer's name and pressure rating marked on valve body.

C. Welding Procedures: Conform to ASME SEC IX, AWS D1.1, NCPWB Procedure Specifications for Pipe Welding, and applicable state labor regulations.

D. Brazing Procedures: Conform to ASME Boiler and Pressure Vessel Code requirements.

E. Soldering Procedures: Conform to ANSI B16.18.

F. Welders Certification: In accordance with ASME SEC IX and NCPWB.

1.04 DELIVERY, STORAGE AND HANDLING: In accordance with Section 01 6000.

A. Store piping and specialties elevated above grade, protected from moisture and dirt.

B. Store plastic piping protected from direct sunlight, with supports to prevent sagging and bending.

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

2.01 PIPE AND PIPE FITTINGS:

A. Refer to individual specification Sections for piping materials, fittings and related requirements for specific piping systems.

B. Pipe Threads: ANSI B1.20.1.

C. Pipe Flanges:
   1. Full Face Type: Class 125, cast iron and cast bronze.
   2. Narrow Face Type: Class 250, cast iron and cast steel.
   3. Gasket Materials: ANSI B16.21, nonmetallic, flat, non-asbestos.
   4. Bolts and Nuts: ANSI B18.2.1.

D. Welding Materials: AWS D10.12.

E. Brazing Materials: AWS A5.8.

F. Solder Materials: ASTM B32, Alloy Sn95 and Sn94.

G. Solvents for PVC Piping: ASTM D2564, with ASTM F656 primer.

2.02 PIPING SPECIALTIES:

A. Unions for Steel Pipe:
   1. Sizes to 2 Inch: Class 150 malleable iron unions with ground joint brass to iron seat, galvanized or black.
   2. Sizes 2½ Inch and Over (Welded): Class 150 malleable iron forged steel slip-on flanges, preformed neoprene gaskets, and carbon steel bolts.
   3. Sizes 2½ Inch and Over (Screwed): Class 150 malleable iron threaded steel flanges, galvanized or black, preformed neoprene gaskets, and carbon steel bolts.

B. Unions for Copper Pipe:
   1. Sizes to 3 Inch: Class 150 bronze unions with soldered joints.
   2. Sizes 3½ Inch and Over: Class 150 slip-on bronze flanges; preformed neoprene gaskets.

C. Dielectric Unions:
   1. Sizes to 2 Inch: Steel body and nut with insulating gasket (250 lb at 210 degrees F) and copper connector. (EPCO Models FX, EA, and FB)
   2. Sizes 2½ Inch and Over: Cast iron body flanges with insulating gasket (250 lb at 210 degrees F) and copper connector. (EPCO Model GX and GA)

D. Floor, Wall, and Ceiling Plates (Escutcheons):
   1. Finished Areas and Casework: Chrome plated brass.
   2. Unfinished and Concealed Areas: Stamped brass, split hinged type.

E. Pipe Sleeves:
   1. Existing Construction: 22 gauge galvanized steel.
   2. Roofs, Interior Walls, and Floors (Concealed): 22 gauge galvanized steel.
   3. Exterior Walls, and Floors (Exposed): Galvanized steel pipe, ASTM A53, Type E, Grade A, Schedule 40.
   4. Isolate sleeves from copper piping materials.

**PART 3 EXECUTION**

3.01 EXCAVATION AND BACKFILL:

A. Perform excavation and backfill in accordance with Section 31 2000.

B. Excavate as necessary to install below grade piping at indicated or required elevations. Maintain excavations free of water. Excavate trenches to uniform widths to allow minimum 12 inch working clearance on each side of pipe. Trim floor of excavation true, with uniform grade, to permit installation of piping on undisturbed earth.

C. Beyond building perimeter, excavate to allow installation of top of pipe below frost line.

D. Perform testing and obtain required approvals after pipe embedment and before backfilling.

E. Backfill by hand and manually compact initial backfill, using approved fill material free of particles larger than 1 inch, until 12 inches of cover is provided over top of pipe.

F. Place final backfill of approved fill material in maximum 8 inch layers to final subgrade. Compact each layer to ASTM D1557, 95 percent maximum dry density.

G. Exercise caution during backfilling and compaction to prevent damage or displacement of buried components.

3.02 PIPING INSTALLATION:

A. Verify piping and tubing is round and straight prior to installation. Prevent deformation during cutting and threading. Do not permit tool marks on exposed piping in finished areas.

B. Verify that excavations are to required grade, dry, and not over-excavated. Do not install underground piping when bedding is wet or frozen.

C. Establish elevations of buried piping outside the building to ensure not less than 3 ft of cover unless shallower cover is specifically approved.

D. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

E. Remove scale and foreign material from inside and outside before assembly.

F. Prepare piping connections to equipment with flanges or unions, arranged for quick disconnect for maintenance.
   1. Pipe Size 2 Inch and Smaller: Install unions adjacent to each valve on the downstream side, and at connection to each piece of equipment.
   2. Pipe Size 2½ Inch and Larger: Install unions adjacent to flanged valves on the downstream side, and at connection to each piece of equipment supplied with flanged pipe connections.
   3. Use the same material and finish as the piping system.
   4. Use non-conducting dielectric connections wherever joining dissimilar metals.
   5. Do not use unions or flanged unions in straight runs of pipe or in concealed locations except for flanged valve applications.

G. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.

H. Install piping to conserve building space, to not interfere with use of space and other work, and to maintain required headroom and clearances for equipment, door and window swings, ceiling panel removal, and related conditions.

I. Place piping in concealed spaces above finished ceilings. In areas without finish ceilings, route piping through spaces in open web joists, trusses, or girders.

J. Conceal vertical piping in stud wall cavities and pipe chases where possible. Except in unfinished spaces, obtain approval prior to installing exposed piping.

K. Group piping whenever practical at common elevations. When installing piping in parallel, leave sufficient space between pipe lines to facilitate future work on any line.

L. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Utilize offsets, changes in direction and expansion loops, constructed to allow maximum anticipated variation in piping length.

M. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.

N. Install valves at service connections to equipment and at branch connections to main lines. Locate valves to facilitate maintenance access. In vertical piping in unfinished locations, locate valves within 8 feet of floor.

O. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.

P. Prime coat and prepare for finish painting exposed pipe, fittings, supports, and accessories scheduled for field painting. Refer to Section 09 9000.

Q. Do not penetrate building structural members unless indicated.

R. 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.

S. Install bell and spigot pipe with bell end upstream.

T. Die cut threaded joints with full cut standard taper pipe threads with non-toxic joint compound applied to male threads only.

U. Install valves with stems upright or horizontal, not inverted. Remove protective coatings after installation.

V. Provide valves for shut-off and to isolate service equipment, parts of systems, or vertical risers.

W. Install valves for throttling, bypass, or manual flow control services.

X. Install unions downstream of valves and at equipment or apparatus connections.

Y. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.

Z. Clean and flush piping systems prior to testing system or connecting equipment.

3.03 JOINING PIPE AND FITTINGS:

A. Steel Pipe and Fittings:

1. Threaded Joints: Right hand tapered national pipe threads; pipe joint compound on male threads only.

2. Welded Joints: In accordance with ASME SEC IX and NCPWB.

B. Cast Iron Soil Pipe and Fittings:

1. Join hub and spigot cast iron pipe and fittings with lead and oakum, or with neoprene compression gaskets.

2. Join no-hub cast iron pipe and fittings in accordance with CISPI 310.

3. Join cast iron fittings to threaded steel pipe with threaded fittings, using pipe joint compound on male threads only.

C. Copper Pipe and Fittings:

1. Type L Solder Fittings: 95-5 tin-antimony solder and soldering flux paste.
   a. Thoroughly clean the tube end and fitting portions of the joint prior to assembly.
   b. When applying flux, prevent excess paste from entering joint.
   c. Remove excess flux from outside of assembly before applying heat.

2. Press Fittings: Install in accordance with manufacturer's instructions, using tools approved by manufacturer.

D. Plastic Pipe and Fittings: Thoroughly clean all joint surfaces before starting the joining process. Make all connections to other piping systems using adapters. Do not thread Schedule 40 pipe. Schedule 80 pipe may be threaded.

1. PVC: Solvent weld in accordance with ASTM D2855.

3.04 PIPE SLEEVES:

A. Provide sleeves and escutcheons when penetrating foundations, floors, walls and partitions. Cut escutcheons as necessary to fit in close quarters.

B. Size sleeves to provide minimum ¾ inch clearance around all sides of piping and insulation.

C. Maintain sleeves plumb, level, and in proper position throughout construction. Inspect sleeves in cast-in-place concrete during and after concrete pour and correct any deviation from proper position.

D. Seal pipe and sleeve penetrations with waterproof sealant in accordance with Section 07 9200.

E. Exterior Wall Sleeves: Install sleeves reamed with welded flanged ends flush with wall.

F. Floor Sleeves: Install sleeves reamed with the top of the sleeve ¼ inch above floor.

G. Stud Wall Sleeves: Terminate ends flush with wall.

END OF SECTION

## SECTION 22 1116 – DOMESTIC WATER PIPING

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Domestic hot and cold water supply piping and valves.
   2. Specialties: Water hammer arresters, thermostatic mixing valves, recessed valve boxes.

B. Related Requirements:
   1. Section 22 0500 – Common Work Results for Plumbing.
   2. Section 22 0700 – Plumbing Insulation.
   3. Section 22 1000 – Plumbing Piping.
   4. Section 22 4000 – Plumbing Fixtures.

1.02 CLOSEOUT SUBMITTALS: In accordance with Section 01 7700.

A. Project Record Documents: Record actual locations of components, water hammer arresters, and other equipment.

1.03 PROJECT CONDITIONS:

A. Verify and coordinate all required connections to fixtures, equipment, and accessories with manufacturer's instructions.

1.04 WARRANTY: In accordance with Section 01 7700.

A. PEX Tubing: Provide 25 year manufacturer warranty.
   1. Manifolds and Fittings: Provide minimum 5 year manufacturer warranty.

## PART 2 PRODUCTS

2.01 PIPE AND FITTINGS:

A. Copper Tubing: ASTM B88; Type L hard drawn copper tubing.
   1. Wrought Copper Solder Joint Fittings: ANSI B16.22.
   2. Copper Press Fittings: ANSI B16.18; ANSI B16.22; IAPMO PS 117; EPDM seals.

B. PEX Tubing: ASTM F876 and ASTM F877; rated for 80 psi at 200 degrees F.
   1. Fittings: ASTM F1960; barbed adapter and PEX ring with O-ring seal.
   2. Manifolds: Type L copper; with combination isolation and balancing valve on each outlet; manual air vents; with mounting brackets.

2.02 VALVES:

A. Manufacturers: In accordance with Section 01 6000.
   1. Nibco, Inc.

2. Conbraco Industries, Inc.
3. Crane Valves.
4. Hammond Valve.
5. Milwaukee Valve Co.
6. The Wm. Powell Co.
7. Stockham Valves & Fittings.
8. Tyco Valves & Controls.

B. Gate Valves: Class 125, 200 psi WWP; MSS SP80, bronze body and trim, solid wedge disc, threaded or solder ends, inside screw, rising stem, handwheel. (Nibco T124 or S134)

C. Ball Valves: Class 150, 600 psi WOG; MSS SP110, standard port type, bronze two-piece body, chrome plated brass or stainless steel ball, Teflon seats and stuffing box ring, blow-out proof stem, lever handle, threaded or solder ends. (Nibco T580-70 or S580-70)
   1. Insulated Piping: Provide stem extensions, non-thermal conductive type with protective sleeve and memory stops.

D. Globe Valves: Class 125, 200 psi WOG; MSS SP80, bronze body and trim, bronze disc, threaded or solder ends, inside screw, handwheel. (Nibco T211-Y or S211-Y)

E. Check Valves: Class 125, 200 psi WOG; MSS SP80, bronze body and cap, bronze swing disc with rubber seat, threaded or solder ends. (Nibco T413 or S413)

F. Drain Valves: Bronze body, threaded or solder inlet end with hose thread outlet, Class 125. (Nibco 72, 73, or 74)

2.03 VALVE BOXES:

A. Manufacturers: In accordance with Section 01 6000.
   1. Acudor Products, Inc.
   2. IPS Corp.; Guy Gray.
   3. Mifab, Inc.
   4. Oatey.

B. Washing Machine: Plastic preformed rough-in box with brass long shank valves with wheel handles, socket for 2 inch waste, slip in finishing cover.

2.04 SPECIALTIES:

A. Manufacturers: In accordance with Section 01 6000.
   1. Armstrong-Lynwood, Inc.; Rada.
   2. Caleffi North America, Inc.
   3. Lawler Manufacturing Co.
   4. Leonard Valve Co.
   5. Mifab, Inc.
   6. Powers Process Controls.
   7. Precision Plumbing Products.

8. Sioux Chief Mfg. Co.
9. Jay R. Smith Manufacturing Co.
10. Watts Water Technologies.
11. Zurn Industries, Inc.

B. Water Hammer Arresters: ASSE 1010; ANSI A112.26.1; bellows type sized in accordance with PDI WH-201, precharged suitable for operation in temperature range 33 to 180 degrees F and maximum 125 psi working pressure. (Zurn Shoktrol Z-1700 series; Mifab WHB series; Smith 5000 series; Watts LF15M2 series)

C. Thermostatic Tempering Valves: ASSE 1062 and ASSE 1070; solid brass body, stainless steel internal components, integral temperature adjustment, sized for intended application, with integral check valves.
   1. Single Fixtures: ASSE 1016; 4 gpm capacity at 45 psi pressure drop. (Powers Hydroguard e480 series)
   2. Two Fixtures: ASSE 1016; 12 gpm capacity at 45 psi pressure drop. (Powers Hydroguard LM495 series)
   3. Three to Five Fixtures: ASSE 1017; 23 gpm capacity at 45 psi pressure drop. (Powers Hydroguard LM490 series)

## PART 3 EXECUTION

3.01 INSTALLATION:

A. Connect piping system to existing primary water supply piping. Fill, drain, and flush new piping before connecting into existing system.

B. Install piping and fittings in accordance with Section 22 1000 and ANSI B31.9. Insulate piping in accordance with Section 22 0700.

C. Slope piping minimum 0.25 percent and arrange systems to drain through fixtures or drain valves at low points of piping.

D. Where branch lines serve only fixtures located above the piping, connect branch lines to top of main supply piping.

E. Avoid unnecessary traps in circulating lines.

F. Install unions and shut-off valves at all plumbing fixtures, equipment, and branch lines off main lines.
   1. Flared connections are acceptable for soft copper lines in lieu of unions.

G. Install expansion offsets in lines where required. Anchor piping at each end.

H. Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur, including the following:
   1. Hose bib and hydrant connections.
   2. Other locations as required by applicable codes.

I. Install water hammer arresters complete with accessible isolation valve on hot and cold water branch lines serving lavatories and sinks, and on branch lines with quick closing valves.

J. Install air chambers on hot and cold water supply piping to each fixture or group of fixtures. Fabricate same size as supply pipe or ¾ inch minimum, and minimum 18 inches long.

K. Thermostatic Tempering Valves: Mount below counter or in accessible chase, located to prevent accidental user contact.

3.02 TESTING AND INSPECTION:

A. Test piping systems in accordance with Section 22 0500.

B. Water Supply Piping Test: Before connecting fixtures and equipment, test water supply piping at a hydrostatic pressure of 1.5 times normal operating pressure or 150 psig, whichever is larger, for 2 hours.

C. Final Operating Test: After connecting fixtures and equipment, operate all fixtures and verify proper performance of supply systems without leaks. Fully open and close all valves and verify proper operation without leaks.

3.03 CLEANING AND DISINFECTING:

A. Prior to starting work, verify system is complete.

B. Flush system with domestic water, using the maximum amount of water available.

C. Ensure Ph of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or hydrochloric acid.

D. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.

E. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.

F. Maintain disinfectant in system for 24 hours.

G. If final disinfectant residual tests less than 25 mg/L, repeat treatment.

H. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.

I. 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.

J. Repeat disinfecting until piping meets state and local bacteriological tests and is approved.

END OF SECTION

## SECTION 22 1316 – SANITARY WASTE AND VENT PIPING

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Sanitary sewer drain, waste and vent piping.
   2. Cleanouts.

B. Related Requirements:
   1. Section 22 0500 – Common Work Results for Plumbing.
   2. Section 22 0700 – Plumbing Insulation.
   3. Section 22 1000 – Plumbing Piping.
   4. Section 22 4000 – Plumbing Fixtures.

1.02 SUBMITTALS: In accordance with Section 01 3300.

A. Product Data: Provide for piping materials and specialties. Indicate materials, sizes, dimensions and types.

1.03 PROJECT CONDITIONS:

A. Verify locations of all floor slab penetrations prior to installation, including rough-in dimensions and floor drains.

B. Verify and coordinate all required connections (including indirect waste connections) to fixtures, equipment, and accessories with manufacturer's instructions.

## PART 2 PRODUCTS

2.01 SANITARY PIPING:

A. Above Grade and Below Grade:

   1. Cast Iron Soil Pipe: ASTM A74; service weight, with hub and spigot.
      a. Fittings: Cast iron.
      b. Neoprene Compression Gaskets: ASTM C564.

   2. Polyvinyl Chloride (PVC): ASTM D2665, Schedule 40 and Schedule 80, with PVC fittings.

B. Above Grade Only:

   1. Galvanized Steel Pipe: ASTM A53, Schedule 40; seamless or welded.
      a. Sizes to 2 Inch: Threaded and coupled ends.
      b. Sizes 2½ Inch and Larger: Beveled ends for welding.
      c. Fittings (Sizes to 2 Inch): ANSI B16.3; Class 150 malleable iron, threaded type.

d. Fittings (Sizes 2½ Inch and Larger): ANSI B16.9, butt welding type.

2. No-Hub Cast Iron Pipe: ASTM A888; CISPI 301.
   a. Fittings: Cast iron.
   b. Mechanical Joint Couplings: CISPI 310; metallic shielded type with elastomeric sealing sleeve and clamps; 24 gauge type 304 stainless steel with ASTM C564 neoprene compression gaskets.

2.02 DRAINS AND CLEANOUTS:

A. Manufacturers: In accordance with Section 01 6000.
   1. Zurn Industries, Inc.
   2. Amtrol, Inc.
   3. Josam Co.
   4. Mifab, Inc.
   5. Jay R. Smith Manufacturing Co.
   6. Wade.
   7. Watts Drainage.

B. Floor Cleanouts: ASME A112.36.2; lacquered cast iron body; line size, maximum 4 inch. (Zurn ZN-1400 series; Watts CO-200 series; Mifab C1220 series)
   1. Exterior: Heavy duty threaded top assembly, round polished nickel bronze scored cover adjustable to finished concrete surface.
   2. Finished Floor Areas with Resilient Flooring: Threaded top assembly, square polished nickel bronze cover recessed to accept floor finish, adjustable to finished floor.
   3. Finished Floor Areas with Carpet: Threaded top assembly, round polished nickel bronze scored cover adjustable to finished floor, with carpet marker.

**PART 3 EXECUTION**

3.01 EXAMINATION:

A. Before commencing work, check invert elevations required for sanitary sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.

3.02 INSTALLATION:

A. Connect to existing sanitary drainage system as indicated.

B. Install piping and fittings in accordance with Section 22 1000. Insulate piping in accordance with Section 22 0700.

C. Slope piping and support to prevent sags and traps.
   1. Pipe Sizes to 3 Inch: ¼ inch per foot minimum, ½ inch per foot maximum.
   2. Pipe Sizes 4 Inch and Above: 1/8 inch per foot minimum, ½ inch per foot maximum.

D. Extend waste and vent stacks through roof minimum 12 inches, using cast iron soil pipe from a point below the roof deck to top of piping; pipe size full size of stack, 4 inch minimum. Maintain required distance from fresh air intakes, operable windows, and ventilation louvers, and minimum 4 feet from exterior building walls. Encase piping above roof in approved roof jacket, with flashing flange of 16 oz copper, compatible with roofing materials. Maintain integrity of roof assembly.

E. Conceal cast iron hubs located in partition walls where above grade piping joins below grade piping. Where thickness of stud is less than outside diameter of hub, locate top of hub below finished floor.

F. Provide cleanouts at locations required by applicable codes; where indicated on Drawings; at flow direction changes greater than 45 degrees; at base of each riser or stack; in all P-traps installed above grade; and at maximum 50 foot intervals in horizontal lines.
   1. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.
   2. Encase exterior cleanouts in minimum 18 x 18 inch concrete slab, thickened around cleanout, flush with grade.
   3. Install floor cleanouts at elevation to accommodate finished floor.

3.03 TESTING AND INSPECTION:

A. Test piping systems in accordance with Section 22 0500.

B. Drainage Systems Test: Test piping at a pressure of 5 psig for 15 minutes, using methods approved by state and local regulatory agencies.
   1. Perform test in presence of authorized plumbing inspector. Submit approval certificate in accordance with Section 01 7700.

C. Final Operating Test: After connecting fixtures and equipment, operate all fixtures and verify proper performance of waste systems without leaks.

END OF SECTION

## SECTION 22 1400 – DRAINAGE PIPING

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes: Condensate drain piping.

B. Related Requirements:
   1. Section 22 0500 – Common Work Results for Plumbing.
   2. Section 22 0700 – Plumbing Insulation.
   3. Section 22 1000 – Plumbing Piping.

1.02 PROJECT CONDITIONS:

A. Verify and coordinate all required connections (including indirect waste connections) to equipment with manufacturer's instructions.

## PART 2 PRODUCTS

2.01 CONDENSATE DRAIN PIPING:

A. Galvanized Steel Pipe (Sizes to 2 Inch): ASTM A53, Schedule 40; seamless or welded; threaded and coupled ends.
   1. Fittings: ANSI B16.3; Class 150 malleable iron, threaded type.

B. Copper Drainage Tubing: ASTM B306, Type DWV.
   1. Wrought Copper Solder Joint Fittings: ANSI B16.29.

C. Polyvinyl Chloride (PVC) Pipe: ASTM D2665, Schedule 80, with PVC fittings. Do not use PVC piping in plenums or where penetrating fire rated assemblies.

## PART 3 EXECUTION

3.01 EXAMINATION:

A. Before commencing work, check invert elevations required for connections; confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.

3.02 INSTALLATION:

A. Minimum pipe size shall be ¾ inch. Discharge condensate waste into sanitary drainage system using approved indirect connection.

B. Install piping and fittings in accordance with Section 22 1000. Insulate piping in accordance with Section 22 0700.

C. Slope piping ¼ inch per foot minimum, ½ inch per foot maximum; support to prevent sags and traps.

D. Provide cleanouts at locations required by applicable codes; where indicated on Drawings; at flow direction changes greater than 45 degrees; at base of each riser or stack; in all P-traps installed above grade; and at maximum 50 foot intervals in horizontal lines.
   1. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.

3.03 TESTING AND INSPECTION:

A. Test piping systems in accordance with Section 22 0500.

B. Drainage Systems Test: Test piping at a pressure of 5 psig for 15 minutes, using methods approved by state and local regulatory agencies.
   1. Perform test in presence of authorized plumbing inspector. Submit approval certificate in accordance with Section 01 7700.

END OF SECTION

## SECTION 22 2123 – NATURAL GAS PIPING

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Natural gas piping system for operating pressures up to 160 psig.
   2. Accessories.

B. Related Requirements:
   1. Section 09 9000 – Painting and Coating: Field painting of exposed piping.
   2. Section 22 0500 – Common Work Results for Plumbing.
   3. Section 22 0700 – Plumbing Insulation.
   4. Section 22 1000 – Plumbing Piping.

1.02 DESIGN REQUIREMENTS:

A. Design natural gas piping system to all gas fired equipment indicated, in accordance with applicable codes and utility company requirements.
   1. Obtain load and pressure requirements from equipment supplier for each piece of gas fired equipment. Adjust pipe sizes and provide additional regulators as required to ensure that the correct pressure is provided to each piece of equipment.
   2. Field verify load and pressure requirements for existing gas fired equipment to remain.

1.03 SUBMITTALS: In accordance with Section 01 3300.

A. Product Data: Provide for piping materials, valves and specialties. Indicate materials, sizes, dimensions and types.

1.04 QUALITY ASSURANCE:

A. Ensure products and installation are in conformance with applicable recommendations and requirements of AGA, ANSI B31.2, NFPA 54, and local utility company.

## PART 2 PRODUCTS

2.01 PIPE AND FITTINGS:

A. Above Grade: Black steel pipe; ASTM A53, Schedule 40; seamless or welded; beveled ends for welding.
   1. Threaded and coupled ends may be used at exposed locations, for pipe sizes 2 inch and smaller.

B. Fittings for Welded Joints: ASTM A234; wrought steel welding type.
   1. Make tee connections with welding tees; mitered tees will not be permitted in welded lines. The use of weldolets is permitted in lieu of welding tees in welded lines provided they are installed in prefabricated assemblies and the pipe interior is cleaned of slag. Field installation of weldolets is permitted in lines of 5 inches and larger, if the installation is cleaned inside after welding.
   2. Use welding elbows for all bends; mitered elbows in welded lines will not be permitted.
   3. Make reductions in line sizes with welding reducers; mitered reducers will not be permitted in welded lines.
   4. Carefully prepare pipe ends in all tees, laterals and reducers to provide for proper weld penetration.
   5. End to end joints of the same size pipe, sizes ¾ inch through 1 inch, may be butt welded provided that an internal welding ring is used.

C. Fittings for Threaded Joints: ANSI B16.3, Class 150.

2.02 GAS VALVES:

A. Sizes to 2 Inch: ANSI Z21.15; full port type; all brass construction with check; lever operator.

B. Sizes 2½ Inch and Larger: MSS SP78; 125 psi, cast iron body and bonnet, cast iron lubricated plug; square head wrench operated.

2.03 ACCESSORIES:

A. Gas Pressure Regulators: Cast iron body; cast aluminum alloy diaphragm with nylon fabric insert, external vent connection, interchangeable brass orifices; adjustment range 4 inches to 12 inches w.c., or as required by equipment; with automatic safety vent limiting device.

**PART 3 EXECUTION**

3.01 PIPING INSTALLATION:

A. Connect piping system to existing gas piping system.

B. Install piping and fittings in accordance with Section 22 1000. Weld joints in accordance with ANSI B31.2.

C. Install plugged drip pockets at low points of piping.

D. Make branch connections with premanufactured fittings only. Do not torch cut holes for branch connections.

E. Clean welding slag and carbon from welded connections. Paint welded area with primer.

F. Route indoor piping as high as possible. Piping exposed to view in public areas is not permitted.

G. Prepare exposed outdoor piping for priming and painting in accordance with Section 09 9000.

H. Where piping is concealed in walls and at floor penetrations, wrap pipe with ½ inch closed cell insulation in accordance with Section 22 0700.

I. On inlet piping to equipment, install valve, union and dirt leg, including safety shut-off valves where required or indicated. Do not install valves or unions in accessible spaces above ceilings, or in air plenums.

J. Cap all outlets scheduled for future use or not connected to equipment.

K. Install gas pressure regulator at each equipment connection, sized in accordance with equipment.

L. Pipe vents from pressure reducing valves to outdoors and terminate with turndown elbow and insect screen. Maintain required distances from air intakes.

3.02 TESTING AND INSPECTION:

A. Test piping in accordance with Section 22 0500 and NFPA 54.

B. Before connecting fixtures and equipment, test gas piping with compressed air at a pressure of 60 psig for two hours without pressure loss.

C. Purge gas lines in accordance with NFPA 54.

D. After connecting equipment, operate all equipment and valves and verify proper performance of system without leaks. Use leak detector to check for leaks at all fittings and connections, and at meter.

END OF SECTION

## SECTION 22 4000 – PLUMBING FIXTURES

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Water closets.
   2. Lavatories.
   3. Sinks.
   4. Bathtubs and showers.

B. Related Requirements:
   1. Section 07 9200 – Joint Sealants: Seal fixtures to walls, floors, and adjoining materials.
   2. Section 12 3000 – Casework: Preparation of countertops for sinks.
   3. Section 22 0500 – Common Work Results for Plumbing.
   4. Section 22 1116 – Domestic Water Piping.
   5. Section 22 1316 – Sanitary Waste and Vent Piping.

1.02 SUBMITTALS: In accordance with Section 01 3300.

A. Product Data: Provide component sizes, rough-in requirements, and service sizes. Provide catalog illustrations of fixtures, trim, and finishes.
   1. Indicate dimensions, weights, and placement of openings and holes.
   2. Manufacturer's Instructions: Indicate assembly and support requirements, installation methods and procedures.

1.03 CLOSEOUT SUBMITTALS: In accordance with Section 01 7700.

A. Project Record Documents: Record actual locations of components, cleanouts, and other equipment.

B. Maintenance Data: Include spare parts lists and exploded assembly views.

C. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE:

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

B. Ensure products and installation are in conformance with applicable recommendations and requirements of ASME, NEMA, NSF, and UL.

1.05 REGULATORY REQUIREMENTS:

A. Accessible Products: Ensure products and installation are in conformance with applicable requirements of ADA and ICC A117.1.

B. Provide products complying with the low flow standards mandated by Energy Policy Act (EPACT).

1.06 DELIVERY, STORAGE, AND PROTECTION: In accordance with Section 01 6000.

A. Accept Products on site in original factory packaging. Inspect for damage.

B. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

C. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

**PART 2 PRODUCTS**

2.01 MANUFACTURERS: In accordance with Section 01 6000.

A. Faucets; Trim:
   1. Manufacturer of lavatory, sink, or fixture.
   2. Chicago Faucets.
   3. Moen Incorporated.
   4. Sloan Valve Company.
   5. Speakman Co.
   6. T & S Brass and Bronze Works, Inc.
   7. Zurn Industries, Inc.

B. Supply Fittings; Traps:
   1. Brass-Craft Manufacturing Co.
   2. Dearborn Brass.
   3. Engineered Brass Company.
   4. Kohler Co.
   5. McGuire Manufacturing Co., Inc.
   6. Moen Incorporated.
   7. Zurn Industries, Inc.

2.02 WATER CLOSETS:

A. Manufacturers: In accordance with Section 01 6000.

   1. Fixtures:
      a. American Standard, Inc.
      b. Eljer, Inc.
      c. Kohler Co.
      d. Mansfield Plumbing Products, LLC.
      e. Zurn Industries, Inc.

2. Seats:
   a. Manufacturer of water closet.
   b. Bemis Manufacturing Co.
   c. Beneke Corp.
   d. Centoco.
   e. Church Seat Company.
   f. Olsonite Corp.
   g. Sperzel Co.

B. Tank Type Water Closets, Floor Mounted: ASME A112.19.2; floor mounted, siphon jet, close-coupled closet combination, with elongated rim, 16½ inch rim height; insulated vitreous china closet tank with fittings and lever flushing valve, maximum 1.6 gallon flush volume, china bolt caps; white color. (American Standard 2386 series Cadet 3 Right Height; Mansfield 137-160 Alto)

1. Color: White.

2. Provide flushing lever on right side at accessible locations where nearest wall or partition is on the left. Provide flushing lever on left side at remaining locations.

3. Seats: Solid white plastic, closed front, extended back, brass bolts, with cover.

4. Supply Fittings: Angle supply with wheel handle stop and escutcheon. (Zurn Z8806CR)

2.03 LAVATORIES:

A. Manufacturers: In accordance with Section 01 6000.
   1. American Standard, Inc.
   2. Eljer, Inc.
   3. Mansfield Plumbing Products, LLC.
   4. Kohler Co.
   5. Zurn Industries, Inc.

B. Counter Top Lavatories: ASME A112.19.2; vitreous china rectangular undermount counter top lavatory, 18 x 12 inch, front overflow; white color. (American Standard 0483.600 Esteem)

C. Faucets: ASME A112.18.1; chrome plated dual handle lavatory faucet with pop-up drain, water economy aerator with flow regulator set to 1.2 gpm maximum, metal lever handles. (American Standard 7052207 Delancey)

D. Supply Fittings: Angle supply with wheel handle stop and escutcheon. (Zurn Z8800-LR series)

E. Traps: Chrome plated 17 gauge brass P-trap with cleanout plug and arm with escutcheon; with offset tailpiece where required for accessible clearance. (Zurn Z8700 series)

2.04 SINKS:

A. Manufacturers: In accordance with Section 01 6000.

1. Elkay Manufacturing Company.
2. American Standard, Inc.
3. Just Manufacturing Co.

B. Single Compartment Sinks: ASME A112.19.3; 18 gauge thick, Type 302 or 304 stainless steel, self rimming, with stainless steel drain and basket type strainer; factory drilled for trim; 22 x 19½ x 6½ inch outside dimensions. (Elkay LRAD2219; Just SL-ADA-1921-A-GR)

C. Faucets: ASME A112.18.1; chrome plated brass with swing spout, water economy aerator with flow regulator set to 2.2 gpm maximum, single control metal lever handle. (Elkay LK1000CR)

D. Supply Fittings: Angle supply with wheel handle stop and escutcheon. (Zurn Z8806LR)

E. Traps: Chrome plated 17 gauge brass P-trap with cleanout plug and arm with escutcheon; with offset tailpiece where required for accessible clearance. (Zurn Z8700 series)

2.05 BATHTUBS AND SHOWERS:

A. Manufacturers: In accordance with Section 01 6000.
1. American Standard, Inc.
2. Florestone Products Company.
3. Kohler Co.
4. Lasco Bathware.

B. Bathtubs: IAPMO Z124; molded glass fiber reinforced polyester, with slip resistant bottom surface, contoured shape, 60 inches long x 32 inches wide, with integral shower walls; white color. (Florestone 6032TS-3W)
1. Trim: ASME A112.18.1; concealed shower and over rim supply with diverter spout, pressure balanced mixing valve, bent shower arm with flow control and adjustable spray ball joint shower head with maximum 2.5 gpm flow and escutcheon, lever operated pop-up waste and overflow. (American Standard 1344.310 UltraMix+)

C. Showers: IAPMO Z124; composite acrylic material with matte finish; 60 x 42 inch nominal dimensions; white color.
1. Base: Slip resistant receptor; threshold with water containment bead; center drain. (Kohler K-8659-0 Rely with K-9132-CP drain)
2. Wall Panels: Full height, with factory molded edges; with corner joint trim. (Kohler K-97617-0 Choreograph)

3. Doors: Clear sliding frameless tempered glass with polished chrome header and towel bars. (Kohler K-709064-L-SHP Gradient)
4. Trim: Pressure balanced mixing valve with anti-scald protection; metal lever handle; shower arm, flange, and head with maximum 2.5 gpm flow rate. (Kohler K-TS14422-4-CP Purist with K-8304 Rite-Temp valve)

**PART 3 EXECUTION**

3.01 EXAMINATION:

A. Verify existing conditions before starting work.

B. Verify that walls and floors are prepared and ready for installation of fixtures.

C. Confirm that casework is constructed with adequate provision for the installation of counter top lavatories and sinks.

3.02 PREPARATION:

A. Rough-in fixture piping connections in accordance with manufacturer's recommendations and in accordance with minimum sizes indicated in fixture rough-in schedule on Drawings.

3.03 INSTALLATION:

A. Install Products in accordance with manufacturer's instructions, with all required trim, accessories, and mounting devices.

B. Coordinate with plumbing piping to achieve operating system.

C. Install each fixture with trap, easily removable for servicing and cleaning.

D. Provide chrome plated rigid or flexible supplies to fixtures with stops, reducers, and escutcheons.

E. Install components level and plumb.

F. Install and secure fixtures in place with supports, carriers, and bolts.

G. Seal fixtures to walls, floors, and adjoining surfaces with sealant as specified in Section 07 9200, color to match fixture.

H. Floor Mounted Water Closets: Solidly attach to floor with lag screws.

3.04 ADJUSTING: In accordance with Section 01 7000.

A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.05 CLEANING:

A. Perform daily progress cleaning and final cleaning in accordance with Section 01 7000 and Section 01 7700.

3.06 PROTECTION OF FINISHED WORK: In accordance with Section 01 7000.

A. Do not permit use of fixtures prior to substantial completion.

END OF SECTION

## SECTION 23 0500 – COMMON WORK RESULTS FOR HVAC

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Materials and installation methods applicable to all Sections of Division 23.
   2. Equipment and motors.
   3. Vibration control.
   4. Mechanical identification.
   5. Testing and inspection.

B. Related Requirements:
   1. Section 09 9000 – Painting and Coating.
   2. Section 23 0593 – Testing, Adjusting, and Balancing.

1.02 CLOSEOUT SUBMITTALS: In accordance with Section 01 7700.

A. Record Drawings: Indicate equipment locations, identified in accordance with identification system.

B. Operation and Maintenance Manuals:
   1. Equipment Schedules: Identify each equipment item by identification number, model number, and serial number.
   2. Filter Schedules: Identify each filter by size, type, and equipment identification number.

## PART 2 PRODUCTS

2.01 EQUIPMENT GENERAL REQUIREMENTS:

A. All similar equipment shall be the product of one manufacturer.

B. Motors: Provide HVAC equipment with motors and motor starters as scheduled and as required. Motors must be wound and nameplated by manufacturer as indicated.

   1. Manufacturers: In accordance with Section 01 6000.
      a. Baldor Electric Co.
      b. Emerson Electric.
      c. General Electric.
      d. Magnetek.
      e. Westinghouse Motor Co.

   2. Motor Sizes 1 HP and Over: High efficiency type; minimum power factor 82 percent.

   3. Vertical position: Ball bearing with end thrust bearing.

4. Horizontal position: Sleeve bearings.
5. Motors shall comply with applicable UL, NEMA, ANSI, and IEEE standards.
6. Motors shall operate at full speed and full load without heating any portion of the windings more than 40 degrees C above ambient temperature.
7. Equip motors and fans with adjustable drives, sheaves, and accessories as recommended by the manufacturer for 150 percent of the motor horsepower ratings. Select adjustable drive for its midrange based on rpm of fan scheduled.

C. Provide starters and disconnects as indicated and as required.

1. Motors ½ HP and over shall be provided with across-the-line starters with overload protection unless otherwise scheduled. Motors under ½ HP shall have integral overload protection. On factory supplied prewired equipment, accessory motors such as condensing unit fan motors may be single-phase instead of three phase if standard with the manufacturer.

D. Provide filters as indicated.

E. Lubrication:

1. Lubricate rotating and reciprocating equipment with the correct grade, type and quality of lubricant before placing in service.
2. Check condition of each shaft containing a packing gland by backing the packing gland off and examining for proper grade, amount and type of packing as recommended by the manufacturer.
3. Maintain lubrication gaskets and packing during construction and assure that all are in proper operating condition at Substantial Completion.
4. Extend lubrication fittings as required for service access.

2.02 VIBRATION ISOLATION:

A. Manufacturers: In accordance with Section 01 6000.

1. Kinetics Noise Control Corporation.
2. Peabody Noise Control Corporation.
3. Mason Industries, Inc.
4. Vibration Eliminator Co., Inc.
5. Vibron Limited.

B. Provide vibration isolation equipment to reduce transmission of vibration between rotating mechanical equipment and building structure, to achieve a vibration efficiency of minimum 90%. Protect isolation equipment from moisture, oil or surrounding damaging materials by an approved method of sealing the material.

C. Provide flexible piping connectors for piping connections to vibration isolation mounted equipment, of the following types:

1. Molded reinforced neoprene construction with steel flanges and control rods.
2. Flexible steel braided construction with steel flanges.

D. Provide vibration isolation equipment of the type scheduled, selected taking into account equipment weight and size, loading, spans and rotating speeds.

1. Ductwork and Piping in Mechanical Equipment Room:
   a. Isolator: Combination spring and neoprene hangers incorporating ¼ inch thick ribbed neoprene pad in series with springs. (Peabody Model SRH)
   b. Static Deflection: Minimum 1 inch.
2. Isolation is not required for propeller fans or curb mounted roof fans.

2.03 IDENTIFICATION MATERIALS:

A. Manufacturers: In accordance with Section 01 6000.
   1. Allen Systems, Inc.
   2. W.H. Brady Company.
   3. Seton Name Plate Co.

B. Service Identification: Contractor's option from the following:
   1. Stenciled characters, 1 inch high. Provide one coat of clear lacquer or varnish over the stencils.
   2. Pipe Markers: Snap-around type; preprinted vinyl, color coded per ANSI A13.1, with name of piping system and "Supply" or "Return" where applicable; arrows to indicate flow direction; with nylon ties for pipe sizes 6 inch and larger.

C. Valve Tags: Polished brass, 2 inch diameter, with stamped numbers and letters to identify serial number and service designation; with chain and corrosion resistant S-hook.

D. Engraved Plastic Nameplates: 1 x 3 x 1/16 inch thick minimum size; white engraved letters on black background; minimum ¼ inch high lettering.

## PART 3 EXECUTION

3.01 EQUIPMENT INSTALLATION:

A. Locate and install equipment to facilitate service, maintenance, repair, and replacement of components. Maintain manufacturer's recommended clearances.

B. Maintain factory packaging, lubrication and gaskets during construction; remove immediately prior to Substantial Completion, except when temporary construction use is approved.

3.02 HVAC EQUIPMENT START-UP, INSPECTION, AND TRAINING:

A. Require manufacturer 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.

B. Submit a written report in accordance with Section 01 4000 that equipment or system has been properly installed and is functioning correctly.

C. Demonstrate operation and maintenance of equipment to Owner's personnel two weeks prior to date of Substantial Completion, under provisions of Section 01 7700.

D. Appoint, employ, and pay for services of an independent firm acceptable to Architect and Owner to perform testing, adjusting, and balancing as specified in Section 23 0593. The independent firm shall promptly submit reports to Architect, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.

E. Install new disposable type filters at Substantial Completion. Thoroughly clean permanent type filters.

F. Alteration Projects: Provide start-up and inspection services on existing equipment. Check proper air flow, air filters, heat and cooling operation, economizer operation and sequence of operation. Clean coils and other components where accumulated dirt may degrade performance. Submit a written start-up report to the Architect. In the event of incompatible, damaged, or defective parts, notify the Architect and obtain proper authorization before making repairs. Costs incurred as a result of defective existing parts are the responsibility of the Owner.

3.03 PAINTING:

A. Finish painting of piping, grilles, ductwork, steel, and related components, unless otherwise specified hereinafter, shall be done under Section 09 9000. In the event of damage to finish painting caused by the work of this Contractor, the necessary re-painting shall be done by the painter at this Contractor's expense.

B. Refinish factory primed or finished components damaged during shipping or installation. Remove rust, prime, and paint per manufacturer's recommendations for finish equal to original.

3.04 IDENTIFICATION:

A. Identify piping, valves, equipment and controls in accordance with ANSI A13.1. Verify numbering system with Owner; coordinate with existing identification system, where present.

B. Piping: Identify each pipe in exposed or accessible space (except architecturally finished spaces) at each major change of direction, at 20 foot intervals in straight runs, each branch connection, each riser, equipment connections, and both sides of walls.

C. Valve Tags: Securely fasten tags to all valves and cocks, chained to hand wheel, on main lines and branches, and at switches, equipment, and controls. Indicate piping system and purpose of valve; indicate whether valve is normally closed (N.C.) or normally open (N.O.) in service; supply (S) or return (R); indicate direction of flow. Tags may be omitted for local stop or shutoff valves to an item of equipment.

D. Equipment: Install identification labels on furnaces, unit heaters, air conditioning units, air handlers, exhaust fans, other HVAC equipment, and ductwork connected at equipment.

E. Controls: Identify controls with engraved plastic nameplates securely fastened with screws. Where space is limited, valve tags may be used where approved.

3.05 TESTING AND INSPECTION:

A. Refer to individual Sections for specific tests required for each system.

B. Pay for all required tests and inspections. Furnish labor, materials, and instruments; bear other costs in connection with all tests.

C. Notice of Tests: Give written notice in ample time to all concerned of date when tests will be conducted.

D. Prior Tests: Concealed or insulated work shall remain uncovered until required tests have been completed, but if construction schedule requires it, arrange for prior tests on parts of system as approved by the Architect.

E. All equipment, fans, and motors shall run at their required speed without showing undue vibration, objectionable noise or sparking.

F. Test piping systems before piping is concealed, covered, or insulated. Before testing pipe systems, remove or otherwise protect from damage components not designed to withstand the pressures used in testing piping.

G. Adjustments, Repairs, and Retests:
   1. Make adjustments, repairs, and alterations as required to meet specified test results.
   2. Correct defects disclosed by tests or inspection, and replace defective parts when directed.
   3. In replacing defective parts, use only new materials; in the case of pipe, replace with same length as defective piece.
   4. Caulking of screwed joints or peening of welds is not permitted.
   5. Repeat tests after defects have been corrected and parts replaced, as directed and until pronounced satisfactory.

H. Responsibility for Damage: Bear the cost of repairs and restoration of the work of other Contractors damaged by the tests or cutting required in connection with the tests.

END OF SECTION

## SECTION 23 0593 – TESTING, ADJUSTING, AND BALANCING

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes: Test, adjust, and balance HVAC air distribution systems.

B. Related Requirements:
   1. Section 23 0500 – Common Work Results for HVAC.
   2. Section 23 0900 – Instrumentation and Control.
   3. Section 23 3100 – HVAC Ducts.
   4. Division 23 – HVAC: Equipment.

1.02 CLOSEOUT SUBMITTALS: In accordance with Section 01 7700.

A. Project Record Documents: Record test data on a copy of the latest revised set of drawings.

B. Balance Report: Include line diagrams of all systems; individual unit diagrams for each supply system with diagrammatic arrangement of zone dampers, trimming dampers, and mixing box dampers, with pressure drops at each location. Record initial filter pressure drops and calibration of instruments. Include confirmation of the volume circulated during full cooling cycles. Record design data and observed data to facilitate comparisons.
   1. The final report shall be certified by a Professional Engineer or member of AABC specializing in the field of air and water testing and who is not affiliated with any firm involved in the construction of the project.

C. Air Balance Data:
   1. Equipment: Manufacturer and model; size; arrangement, discharge, and class; total cfm, static pressure (external and total), and percent outside air; motor HP, voltage, phase, RPM, and full load amps (all phases); location and mark number; inlet and outlet dry bulb and wet bulb temperatures; starter heater element data; drive and belt data; outside temperature and wind velocity.
   2. Duct Systems: Duct size and location of traverse; number of readings; velocity measurements; average velocity, temperature and static pressure; actual cfm.
   3. Individual Air Terminals: Manufacturer and model; location and mark number; applicable calculation factors for velocity and capacity; cfm and thermal capacities; electrical data.

D. Where design capacities cannot be obtained, specifically note conditions in first section of report. Describe specific problem, actions attempted to solve problem, and recommendations for further action to solve problem.

1.03 QUALITY ASSURANCE:

A. Balancing Agency: Member of Associated Air Balance Council, or an independent firm specializing in balancing of systems whose principals are Professional Engineers. All personnel shall be regular employees experienced and technically trained specifically in the total balancing of HVAC systems.

B. Perform HVAC systems balancing in accordance with AABC standards.

C. Provide labor, engineering and test equipment required to adjust and balance heating, ventilating, air conditioning and exhaust systems.

D. Test electrical interlocking for proper operation. Require attendance of installers of piping, equipment, ductwork, and controls, as applicable.

E. Permanently mark final settings of valves, splitters, dampers, and other adjustment devices so that adjustment can be restored if disturbed at any time.

**PART 2 PRODUCTS**

2.01 EQUIPMENT:

A. Furnish required test equipment. Verify calibration of instruments prior to beginning work. Equipment specifically furnished for this project such as flow meters shall be turned over to the Owner in good operating condition at completion.

**PART 3 EXECUTION**

3.01 GENERAL PROCEDURES:

A. Adjust and balance the complete HVAC system under conditions approximating actual operation. Work must be completed prior to the final inspection of the building HVAC system.

B. Check each piece of equipment or system for proper lubrication, drive rotation, belt tension, control sequence, and other conditions which may cause damage.

C. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

D. Verify wiring and support components for equipment are complete and tested.

E. Install at each piece of HVAC equipment a data sheet enclosed in a clear plastic holder securely attached to the equipment or wall in immediate area, showing significant operating temperatures, pressures, amperes, voltage, brake horsepower, and other relevant data.

F. Instruct the Owner's personnel along with HVAC installer and equipment suppliers in the proper operation and maintenance of each piece of equipment.

G. Any changes required for final balancing results as determined by Balancing Agency will be provided for the installers, who shall supply and install such equipment under

their contractual obligations. Such changes may include, but are not limited to, the changing of pulleys, belts, dampers, or adding dampers or access holes.

3.02 AIR DISTRIBUTION SYSTEMS BALANCE PROCEDURE:

A. Measure air volumes in duct system by the pitot tube duct traverse method across the entire cross-sectional area (usually a minimum of 16 readings). Indicate locations of readings on record drawings and cross reference to report. Record static pressure and air temperature at the traverse point.

B. Pressure test supply, return, and exhaust duct systems; verify that leakage rate is within permissible values.

C. Seal test holes with permanent type snap-in plugs when test is complete. Do not use duct tape to seal test holes. Do not make test holes in flexible duct or flexible equipment connectors.

D. Regulate air volumes by adjusting splitter dampers and branch duct dampers to obtain required quantities of supply, return and exhaust air. Utilize dampers at grilles, registers, and diffusers for fine adjustments only. Adjustment shall not create objectionable air patterns, drafts, or sound levels. Do not use devices other than dampers to adjust air volume.

E. Adjust air volume at terminals within 10 percent of the individual requirements specified. Measure air volume at each air outlet and inlet by methods approved or recommended by the manufacturer of the terminal device.

F. Regulate total air delivery of fan systems by adjusting fan speed, motor speed, or fan blade pitch. Do not load drive motors above the corrected full load amperage rating.

G. Plug instrument test holes with permanent closure on completion of work.

3.03 PROTECTION:

A. Repair or replace finished work damaged during the performance of this work.

3.04 POST-CONSTRUCTION PROCEDURES:

A. Seasonal Testing: If initial procedures were not performed during near-peak summer and winter conditions, perform additional testing, adjusting, and balancing during near-peak summer and winter conditions.

END OF SECTION

## SECTION 23 0700 – HVAC INSULATION

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Thermal insulation for HVAC refrigerant piping.
   2. Thermal insulation for HVAC ductwork.

B. Related Requirements:
   1. Section 22 0700 – Plumbing Insulation.
   2. Section 23 0500 – Common Work Results for HVAC.
   3. Section 23 2000 – HVAC Piping.
   4. Section 23 2300 – Refrigerant Piping.
   5. Section 23 3100 – HVAC Ducts.

1.02 DEFINITIONS:

A. Concealed: Below grade or hidden from sight in normally inaccessible areas such as attic spaces and similar locations.

B. Exposed: Not concealed. Exception: Pipe chases 24 inches and wider shall be considered exposed.

1.03 QUALITY ASSURANCE:

A. Fire and Smoke Hazard Ratings: ASTM E84.
   1. Flame Spread: Maximum 25.
   2. Smoke Developed: Maximum 50.

B. Thermal Conductivity: ASTM C335; maximum K value for each product listed with product description.

C. Accessories such as cements, fitting covers, and pressure sensitive tape shall have the same component ratings as listed above.

D. Paper laminate jackets shall be permanently fire and smoke resistant. Chemicals used for treating paper in jacket laminates shall not be water soluble and shall be unaffected by water and humidity.

## PART 2 PRODUCTS

2.01 MANUFACTURERS: In accordance with Section 01 6000.

A. Armacell LLC.

B. CertainTeed Corporation.

C. Johns Manville.

D. Knauf Fiber Glass.

E. Owens-Corning Fiberglas Corporation.

2.02 PIPING AND EQUIPMENT INSULATION MATERIALS:

A. Fiberglass Pipe Insulation: ASTM C547, Class I; rigid one piece construction with vapor barrier; minimum 36 inch sections; rated for applications to 850 degrees F; maximum K value 0.23 at 75 degrees F. (Johns Manville Micro-Lok)

1. All Purpose Jacket: ASTM C1136, Type I; reinforced foil-kraft laminate, with pressure sensitive tape sealing system at butt joints and longitudinal seams; white finish. (Johns Manville AP-T Plus)

2. PVC Jacket: ASTM D1784; preformed to shape of pipe or fitting; gloss white finish. (Johns Manville Zeston 2000)

3. Metal Jacket: Aluminum sheet, minimum 0.016 inch thick, with laminated moisture retarder.

4. Jacket Application Schedule:

a. Piping Not Otherwise Scheduled: All purpose jacket; PVC fitting covers with precut fiberglass insulation insert; minimum two layers of insulation inserts where pipe operating temperature is below 45 degrees F or above 250 degrees F.

b. Exposed Piping in Finished Areas: PVC jacket; PVC fitting covers with precut fiberglass insulation insert; minimum two layers of insulation inserts where pipe operating temperature is below 45 degrees F or above 250 degrees F.

c. Outdoor Piping: Metal jacket with preformed aluminum fitting covers.

B. Closed Cell Pipe Insulation: ASTM C534, Type II; flexible elastomeric tubing, black color; maximum K value 0.28 at 75 degrees F. (Johns Manville Aerotube AP; AP ArmaFlex or ProFlex)

1. Adhesive: Air drying contact type, for joining seams and butt joints. (Johns Manville 57 Adhesive; Armaflex 520 BLV)

2. Finish Paint: Water based latex enamel, semi-gloss; white color. (Johns Manville Aerotube Finish)

C. Heavy Duty Pipe Insulation: ASTM C533, Type I; rigid block molded from hydrous calcium silicate; specially formulated for high temperature, high strength, abuse resistant and fire protection applications; maximum K value 0.40 at 300 degrees F. (Johns Manville Thermo-12 Gold)

D. Mastic: Vapor retardant type, compatible with adjoining materials.

2.03 DUCTWORK INSULATION MATERIALS:

A. External Duct Insulation:
   1. Concealed Locations Above Ceilings: ASTM C553, Type II, Class F-1; flexible fiberglass blanket; formaldehyde-free; maximum K value 0.25 at 75 degrees F. (Johns Manville Microlite 150; CertainTeed SoftTouch 150)
   2. Other Locations: ASTM C612, Type 2; rigid and semi-rigid fiberglass board, 3.0 pcf density; maximum K value 0.23 at 75 degrees F. (Johns Manville Spin-Glas 814)
   3. Facing: ASTM C1136; foil-scrim-kraft vapor retardant type; aluminum foil reinforced with fiberglass yarn and laminated with fire-resistant adhesive to kraft paper.

B. Accessories:
   1. Seam Tape: To match facing finish.
   2. Metal Jacket: Aluminum sheet, minimum 0.016 inch thick, with laminated moisture retarder.

**PART 3 EXECUTION**

3.01 PREPARATION:

A. Perform leak testing of piping and ductwork systems, where specified, before installing insulation.

3.02 INSTALLATION OF PIPING INSULATION:

A. Apply insulation over clean, dry pipe with all joints butted firmly together. Secure longitudinal jacket laps and butt strips according to manufacturer's recommendations.

B. Extend insulation continuous through wall and ceiling openings and sleeves.

C. Assure continuous, unbroken vapor seal at seams, butt joints, and fittings where vapor barrier jackets are used, and on cold service piping below 60 degrees F. Provide adequate insulation and vapor seal to prevent condensation at hangers and support anchors secured directly to cold surfaces.

D. Extend surface finishes to protect all surfaces, ends and raw edges of insulation.

E. Install galvanized metal shields between hangers or supports and pipe insulation. Form shields to fit insulation and extend up to the center line of the pipe, with minimum 10 inch length.

F. Install inserts between pipe and hangers, consisting of heavy duty pipe insulation of thickness equal to adjoining insulation, with vapor barrier where required. Insulation inserts shall have the same length as specified for shields.
   1. For ½ inch insulation thickness only, inserts may be preservative treated wood blocking.

G. Closed Cell Insulation: Push unslit sections over open ends of pipe where practical; otherwise slit tubular sections and wrap around pipe. Adhere and seal seams and butt joints with adhesive.
   1. Cold Piping: Adhere insulation to pipe at high end of run with one inch strip of adhesive on both insulation and pipe. Coat exposed end cuts with adhesive.
   2. Outdoor Exposed Piping: Locate seams on lower half of pipe. Apply two coats of finish paint.

H. Metal Jacket: Install with minimum 2 inch laps, configured to shed water; secure system with ½ inch aluminum bands at 12 inches o.c.

3.03 INSTALLATION OF EXTERNAL DUCTWORK INSULATION:

A. Flexible Insulation: Apply insulation to clean, dry, tightly sealed ducts with edges tightly butted. Overlap facing minimum 2 inches at seams. Secure seams with outward clinching staples at 6 inches o.c.; seal seam with pressure-sensitive tape. At underside of ducts greater than 24 inches wide, secure insulation with mechanical fasteners and speed clips spaces 18 inches o.c.; cut fasteners flush with surface and seal with seam tape.

B. Rigid and Semi-Rigid Insulation: Apply insulation to clean, dry, tightly sealed ducts with edges tightly butted and impaled over stick clips or pins welded to the duct and secured with speed clips. Space pins as required to hold insulation firmly in place, maximum 18 inches o.c. both ways. Seal joints and penetrations of the vapor barrier with 3 inch wide strips of heat-sensitive tape.

C. Where reinforcing angles are greater than the insulation thickness specified, increase insulation thickness equal to the angle depth.

3.04 PROTECTION:

A. Protect installed insulation materials from inclement weather using approved waterproof sheeting. Remove and replace water-damaged insulation.

3.05 PIPING INSULATION SCHEDULE:

A. Insulate all piping, fittings, valves, flanges and unions unless factory insulated or otherwise excluded. Maintain visibility and accessibility of testing laboratory labels, equipment nameplates, and access panels. Do not insulate the following unless specifically scheduled:
   1. Automatic air vent and discharge piping.
   2. Drain and discharge piping downstream of system drain valves and relief valves.
   3. Unions, on hot lines (65 to 250 degrees F) except for personnel protection from floor to seven feet above floor.
   4. Chrome plated pipe fittings and valves at fixtures.
   5. Bonnet on screwed valve bodies.
   6. Removable plates on check valves, strainers, etc.
   7. Flexible connectors and vibration control devices.

B. Exposed Piping: 1½ inch fiberglass or 1 inch closed cell.

C. Concealed Piping: 1 inch closed cell.

D. Where piping is exposed to outdoor ambient temperatures, provide insulation thickness ½ inch greater than scheduled thickness.

3.06 DUCTWORK INSULATION SCHEDULE:

A. Insulate all ductwork unless otherwise indicated. Maintain visibility and accessibility of testing laboratory labels, equipment nameplates, and access panels.

B. Schedule of Ductwork to be Externally Insulated:
   1. Supply Ducts: 1½ inch thickness.
   2. Return Ducts: 1½ inch thickness.
   3. Exhaust Ducts: 1 inch thickness.

END OF SECTION

## SECTION 23 0900 – INSTRUMENTATION AND CONTROL

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Control wiring (less than 50 volts AC) to HVAC equipment.
   2. Controls for HVAC systems.

B. Related Requirements:
   1. Section 23 0500 – Common Work Results for HVAC.
   2. Division 23 – HVAC: HVAC Equipment.
   3. Division 26 – Electrical: Materials and methods for electrical wiring; power wiring (50 volts AC and above) to equipment.

1.02 CLOSEOUT SUBMITTALS: In accordance with Section 01 7700.

A. Project Record Documents: Indicate locations of all components.

B. Operation and Maintenance Data: Submit at substantial completion.

1.03 QUALITY ASSURANCE:

A. Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience.

B. Obtain shop drawings, product data, wiring diagrams, installation instructions and all other relevant data from HVAC equipment suppliers and Electrical Contractor. Coordinate layout of control systems with this information.

C. Install wiring in accordance with National Electrical Code.

D. Provide assistance and coordination to HVAC manufacturer's start-up representatives.

## PART 2 PRODUCTS

2.01 CONTROL WIRING:

A. Furnish and install wire, conduit, and material to complete the HVAC controls.

B. Wire, Conduit and Related Materials: As specified in Division 26.

2.02 HVAC CONTROLS:

A. Manufacturers: In accordance with Section 01 6000.
   1. The Trane Company.
   2. Honeywell.
   3. Siebe Environmental Controls; Barber-Colman/Robertshaw.

4. Emerson Electric Co.; White-Rodgers Div.

B. Controls for Heating and Cooling Systems: Low voltage electronic programmable thermostat; touchscreen LCD display; single stage heating, single stage cooling; Off/Heat/Auto/Cool system modes; On/Auto fan modes; auxiliary relay outputs for control of outdoor air damper or economizer; lockout switch; battery backup; capable of remote communications using open network protocol.

1. Sequence of Operation: 7 day programming with 2 occupied and 2 unoccupied periods per day; proportional plus integral temperature control; override control for temporary setpoint changes; recovery feature to optimize start time depending on building load; minimum on and off times to prevent equipment short cycling.
   a. Occupied Mode: Maintain temperature between occupied heat and occupied cool setpoints; operate fan continuously.
   b. Unoccupied Mode: Maintain temperature between unoccupied heat and unoccupied cool setpoints; operate fan only on call for heating or cooling.

C. Exhaust Fan Controls: Operate exhaust fan continuously when room lights are on, with adjustable time delay shutoff.

## PART 3 EXECUTION

3.01 INSTALLATION:

A. Wire equipment and control devices according to manufacturer's wiring diagrams, to operate in the proper mode sequence.

B. Conceal low voltage wiring (less than 50 volts AC) within wall cavities, or in conduit to avoid physical damage. Run line voltage wiring (above 50 volts AC) in conduit. Install wiring in accordance with Division 26.

C. Locate in-space thermostats or controllers on vertical interior surfaces not exposed to immediate effects of sun or outside weather; away from surfaces subject to vibration or jarring by closing doors and immediate effects of lights, appliances, air outlets or air drafts from entrances. The location selected shall be representative of the thermal requirements of the entire zone or space.
   1. Mounting Height: 48 inches above finish floor.

3.02 TRAINING: In accordance with Section 01 7700.

A. Upon completion, instruct Owner's maintenance personnel in the operating and maintenance characteristics of all equipment and systems installed under this Section.
   1. System Operation.
   2. Filter Replacement and Lubrication.
   3. Belt Driven Equipment.
   4. Owner's Manual.

END OF SECTION

## SECTION 23 2000 – HVAC PIPING

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes: Piping materials and installation methods applicable to all HVAC piping work.

B. Related Requirements:
   1. Section 07 9200 – Joint Sealants.
   2. Section 23 0500 – Common Work Results for HVAC.
   3. Section 23 0529 – HVAC Hangers and Supports.

1.02 CLOSEOUT SUBMITTALS: In accordance with Section 01 7700.

A. Valve Directories: Include in Operation and Maintenance binders. For each piping system, indicate identification (correlated with record documents), location and purpose of each valve.

1.03 QUALITY ASSURANCE:

A. Pipe: Identify with marking including size, material classification, and ASTM specification. Include water pressure rating and potable water certification where applicable.

B. Valves: Manufacturer's name and pressure rating marked on valve body.

C. Welding Procedures: Conform to ASME SEC IX, AWS D1.1, NCPWB Procedure Specifications for Pipe Welding, and applicable state labor regulations.

D. Brazing Procedures: Conform to ANSI B31.5 and ASME Boiler and Pressure Vessel Code requirements.

E. Soldering Procedures: Conform to ANSI B16.18.

F. Welders Certification: In accordance with ASME SEC IX and NCPWB.

1.04 DELIVERY, STORAGE AND HANDLING: In accordance with Section 01 6000.

A. Store piping and specialties elevated above grade, protected from moisture and dirt.

B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

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.

E. 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

2.01 PIPE AND PIPE FITTINGS:

A. Refer to individual specification Sections for piping materials, fittings and related requirements for specific piping systems.

B. Pipe Threads: ANSI B1.20.1.

C. Pipe Flanges:
   1. Full Face Type: Class 125, cast iron and cast bronze.
   2. Narrow Face Type: Class 250, cast iron and cast steel.
   3. Gasket Materials: ANSI B16.21, nonmetallic, flat, non-asbestos.
   4. Bolts and Nuts: ANSI B18.2.1.

D. Welding Materials: AWS D10.12.

E. Brazing Materials: AWS A5.8.

F. Solder Materials: ASTM B32, Alloy Sn95 and Sn94.

2.02 PIPING SPECIALTIES:

A. Unions For Copper Pipe:
   1. Sizes to 3 Inch: Class 150 bronze unions with soldered joints.
   2. Sizes 3½ Inch and Over: Class 150 slip-on bronze flanges; preformed neoprene gaskets.

B. Dielectric Unions:
   1. Sizes to 2 Inch: Steel body and nut with insulating gasket (250 lb at 210 degrees F) and copper connector. (EPCO Models FX, EA, and FB)
   2. Sizes 2½ Inch and Over: Cast iron body flanges with insulating gasket (250 lb at 210 degrees F) and copper connector. (EPCO Model GX and GA)

C. Floor, Wall, and Ceiling Plates (Escutcheons):
   1. Finished Areas and Casework: Chrome plated brass.
   2. Unfinished and Concealed Areas: Stamped brass, split hinged type.

D. Pipe Sleeves:
   1. Existing Construction: 22 gauge galvanized steel.
   2. Roofs, Interior Walls, and Floors (Concealed): 22 gauge galvanized steel.
   3. Exterior Walls, and Floors (Exposed): Galvanized steel pipe, ASTM A53, Type E, Grade A, Schedule 40.
   4. Isolate sleeves from copper piping materials.

E. Mechanical Sleeve Seals: Interlocking rubber link type, shaped to continuously fill annular space between pipe and sleeve; with connecting bolts and pressure plates.

## PART 3 EXECUTION

3.01 PIPING INSTALLATION:

A. Verify piping and tubing is round and straight prior to installation. Prevent deformation during cutting and threading. Do not permit tool marks on exposed piping in finished areas.

B. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

C. Remove scale and foreign material from inside and outside before assembly.

D. Prepare piping connections to equipment with flanges or unions, arranged for quick disconnect for maintenance.
   1. Install unions adjacent to each valve on the downstream side, and at connection to each piece of equipment.
   2. Use the same material and finish as the piping system.
   3. Use non-conducting dielectric connections wherever joining dissimilar metals.
   4. Do not use unions or flanged unions in straight runs of pipe or in concealed locations except for flanged valve applications.

E. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.

F. Install piping to conserve building space, to not interfere with use of space and other work, and to maintain required headroom and clearances for equipment, door and window swings, ceiling panel removal, and related conditions.

G. Place piping in concealed spaces above finished ceilings. In areas without finish ceilings, route piping through spaces in open web joists, trusses, or girders.

H. Conceal vertical piping in stud wall cavities where possible. Except in unfinished spaces, obtain approval prior to installing exposed piping.

I. Group piping whenever practical at common elevations. When installing piping in parallel, leave sufficient space between pipe lines to facilitate future work on any line.

J. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Utilize offsets, changes in direction and expansion loops, constructed to allow maximum anticipated variation in piping length.

K. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.

L. Install valves at service connections to equipment and at branch connections to main lines.

M. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.

N. Prime coat and prepare for finish painting exposed pipe, fittings, supports, and accessories scheduled for field painting. Refer to Section 09 9000.

O. Do not penetrate building structural members unless indicated.

P. 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.

Q. Die cut threaded joints with full cut standard taper pipe threads with non-toxic joint compound applied to male threads only.

R. Install valves with stems upright or horizontal, not inverted. Remove protective coatings after installation.

S. Provide valves for shut-off and to isolate service equipment, parts of systems, or vertical risers.

T. Install valves for throttling, bypass, or manual flow control services.

U. Install unions downstream of valves and at equipment or apparatus connections.

V. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.

W. Clean and flush piping systems prior to testing system or connecting equipment.

3.02 JOINING PIPE AND FITTINGS:

A. Copper Pipe and Fittings: 95-5 tin-antimony solder and soldering flux paste.
   1. Thoroughly clean the tube end and fitting portions of the joint prior to assembly.
   2. When applying flux, prevent excess paste from entering joint.
   3. Remove excess flux from outside of assembly before applying heat.

3.03 PIPE SLEEVES:

A. Provide sleeves and escutcheons when penetrating walls. Cut escutcheons as necessary to fit in close quarters.

B. Size sleeves to provide minimum ¾ inch clearance around all sides of piping and insulation.

C. Maintain sleeves plumb, level, and in proper position throughout construction.

D. Seal pipe and sleeve penetrations with waterproof sealant in accordance with Section 07 9200.

E. Exterior Wall Sleeves: Install sleeves reamed with welded flanged ends flush with wall.

F. Stud Wall Sleeves: Terminate ends flush with wall.

END OF SECTION

## SECTION 23 2300 – REFRIGERANT PIPING

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes: Refrigerant piping and charging for HVAC systems.

B. Related Requirements:
   1. Section 23 0500 – Common Work Results for HVAC.
   2. Section 23 0700 – HVAC Insulation.
   3. Section 23 2000 – HVAC Piping.
   4. Section 23 5417 – Gas Fired Furnaces.
   5. Section 23 8126 – Air Conditioning Units.

1.02 SYSTEM DESCRIPTION:

A. Provide pre-charged and pre-insulated refrigerant piping when available.

B. Provide field charged and field insulated refrigerant piping and required accessories for complete and operable HVAC systems.

C. Obtain and follow equipment manufacturer's recommendations for pipe sizes, schematic system layout, and required accessories and specialties.

1.03 WARRANTY:

A. Provide written guarantee of a leak-proof refrigerant system for 90 days after start-up.

## PART 2 PRODUCTS

2.01 PIPE AND FITTINGS:

A. Piping: ASTM B88, Type L; ACR hard copper tubing.

B. Fittings: ANSI B16.22; wrought copper solder joint type.

2.02 VALVES AND ACCESSORIES:

A. Manufacturers: In accordance with Section 01 6000.
   1. Alco.
   2. Sporlan.
   3. Henry.
   4. Mueller Industries, Inc.

B. Line Valve Sizes to 5/8 Inch: Bronze body solder end, diaphragm, packless. (Mueller Linemaster)

C. Line Valve Sizes 7/8 Inch and Over: Bronze body solder end globe valves, backseating. (Mueller Globemaster)

D. Solenoid Valves: Brass body, packless, with manual opening stem; coils and pressure controls as required.

E. Back Pressure Regulators: Bronze body, welded stainless steel diaphragm, sensitive waterproof pressure adjustment; tight, oil-resistant composition seat. (Alco EPR series)

F. Thermostatic Expansion Valves: Compatible with equipment; with remote bulb, external equalizer, and external superheat adjustment.

G. Strainers: Angle or Y-type with removable strainer screens of 60 to 80 mesh Monel wire cloth, reinforced with 10 mesh brass screen, or stainless steel with brass ring to suit intended size and service.

## PART 3 EXECUTION

3.01 PIPING INSTALLATION:

A. Install piping and fittings in accordance with Section 23 2000. Insulate piping in accordance with Section 23 0700.

3.02 CLEANING AND FLUSHING:

A. Clean and flush system prior to testing.

B. Blow out all piping with compressed air through dirt pockets and open ends of piping until air shows no evidence of contamination.

C. Remove and clean control valves. Clean debris from strainers and dirt pockets.

3.03 TESTING AND INSPECTION:

A. Test piping system in accordance with Section 23 0500 and ANSI B31.5.

B. Pressure Test: Charge system to 400 psi (high side) and 150 psi (low side). Maintain pressure for 24 hours without pressure loss. Check for leaks using electronic or halide leak detector. Repeat entire test procedure until all leaks have been repaired.

C. Vacuum Test: Provide auxiliary heat as required to maintain ambient temperature of minimum 60 degrees F during evacuation. Evacuate system to 2.5 mm Hg absolute. This evacuation is to be broken with dry nitrogen. Open compressor service valve for final evacuation. Maintain minimum vacuum of 2.0 mm Hg for 12 hours. Check vacuum with electronic gauge.

3.04 CHARGING:

A. After testing is complete, charge system with scheduled refrigerant in the amount recommended by equipment manufacturer, or the amount required to clear the sight glass under all operating conditions plus 20 percent, whichever is greater. Do not overcharge system.

END OF SECTION

## SECTION 23 3100 – HVAC DUCTS

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Ductwork materials, construction, supports, and cleaning.
   2. Ductwork accessories.

B. Related Requirements:
   1. Section 07 9200 – Joint Sealants.
   2. Section 09 9000 – Painting and Coating: Painting of ductwork visible behind outlets and inlets.
   3. Section 23 0500 – Common Work Results for HVAC.
   4. Section 23 0700 – HVAC Insulation.
   5. Section 23 0900 – Testing, Adjusting, and Balancing.
   6. Section 23 3700 – Air Outlets and Inlets.

1.02 PERFORMANCE REQUIREMENTS:

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

1.03 CLOSEOUT SUBMITTALS: In accordance with Section 01 7700.

A. Project Record Documents: Record actual locations of ducts, fittings, accessories, access doors and test holes. Record changes in fitting location and type. Show additional fittings used.

1.04 QUALITY ASSURANCE:

A. Perform Work in accordance with SMACNA Standards.

B. Construct ductwork to NFPA 90A and NFPA 90B standards as applicable.

1.05 QUALIFICATIONS:

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

B. Installer: Company specializing in performing the work of this section with minimum three years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING: In accordance with Section 01 6000.

A. Protect dampers from damage to operating linkages and blades.

1.07 ENVIRONMENTAL REQUIREMENTS:

A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.

B. Maintain temperatures during and after installation of duct sealants.

**PART 2 PRODUCTS**

2.01 METAL DUCT MATERIALS:

A. Galvanized Sheet Steel: ASTM A653, lock forming quality; G60 zinc coating in accordance with ASTM A90.

B. Fasteners: Rivets, bolts, or sheet metal screws.

C. Sealant: Silicone type.

2.02 DUCTWORK FABRICATION:

A. Fabricate and support in accordance with SMACNA Standards, and as indicated.

B. Minimum Sheet Metal Thickness: In accordance with SMACNA Standards and applicable mechanical code.

C. Provide duct material, gauges, reinforcing, and sealing for minimum 2.0 inch pressure class unless otherwise indicated.

D. Construct tees, bends, and elbows with radius of not less than 1½ times width of duct on centerline. Where not possible and where rectangular elbows are used, provide air foil turning vanes.

E. Solder air tight all vertical ducts through roof, and 10 feet of adjoining horizontal ductwork in building.

F. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

G. Fabricate continuously welded round and oval duct fittings two gauges heavier than duct gauges indicated in SMACNA Standards. Joints shall be minimum 4 inch cemented slip joint, brazed or electric welded. Prime coat welded joints.

H. Provide standard 45 degree lateral wye takeoffs unless otherwise indicated where 90 degree conical tee connections may be used.

I. Fabricate vertical ducts and risers to be self-supporting.

J. Single thickness partitions between adjacent ducts are not permitted.

2.03 DUCTWORK ACCESSORIES:

A. Manufacturers: In accordance with Section 01 6000.
   1. Greenheck Corp.
   2. American Warming & Ventilating.
   3. Ductmate Industries, Inc.
   4. Ruskin Manufacturing.
   5. Vent Products Co., Inc.

B. Duct Hangers and Supports: In accordance with SMACNA standards.
   1. All hanger strap material shall be galvanized.
   2. Hanger Rod: ASTM A36; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

C. Air Turning Devices/Extractors: Multi-blade device with blades aligned in short dimension; steel or aluminum construction; with individually adjustable blades, mounting straps.

D. Backdraft Dampers:
   1. Gravity Backdraft Dampers, Size 18 x 18 Inches or Smaller, Furnished with Air Moving Equipment: Air moving equipment manufacturer's standard construction.
   2. Multi-Blade, Parallel Action Gravity Balanced Backdraft Dampers: 16 gauge thick galvanized steel, with center pivoted blades of maximum 6 inch width, with felt or flexible vinyl sealed edges, linked together in rattle-free manner with 90 degree stop, steel ball bearings, and plated steel pivot pin; adjustment device to permit setting for varying differential static pressure.

E. Volume Control Dampers: Fabricate in accordance with SMACNA Standards.
   1. Single Blade Dampers:
      a. For Round Duct Sizes Less Than 16 Inch Diameter: Ruskin CDRS25; Vent Products 5301.
      b. For Rectangular Duct Sizes Less Than 12 Inches High: Ruskin CD35; Vent Products 5101.
   2. 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.
   3. Quadrants: Provide locking, indicating quadrant regulators on single and multi-blade dampers.
      a. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.
      b. Where rod lengths exceed 30 inches, provide regulator at both ends.

F. Duct Access Doors: Fabricate from galvanized steel in accordance with SMACNA Standards; rigid and close-fitting, with sealing gaskets and quick fastening locking

devices. For insulated ductwork, install minimum one inch thick insulation with sheet metal cover.
   1. Less Than 12 Inches Square: Secure with sash locks.

G. Duct Test Holes:
   1. 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.
   2. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

H. Flexible Duct Connections: Fabric crimped into metal edging strip; fabricate in accordance with SMACNA Standards.
   1. Fabric For Interior Connections: NFPA 90A, UL listed, fire retardant neoprene coated woven glass fiber fabric, minimum density 30 oz/sq yd.
   2. Net Fabric Width: Approximately 3 inches wide.
   3. Metal: 3 inch wide, 24 gauge thick galvanized steel.

## PART 3 EXECUTION

3.01 DUCTWORK INSTALLATION:

A. Install in accordance with manufacturer's instructions.

B. Install and seal ducts in accordance with SMACNA Standards. Allow assembled components to cure for at least 48 hours before pressure testing for leaks.
   1. Joint Seals: Class B, unless noted otherwise.

C. Insulate ductwork in accordance with Section 23 0700.

D. Duct sizes indicated are inside clear dimensions unless specifically indicated. For lined ducts, maintain sizes inside lining.

E. Support ductwork from structural building framing, plumb and parallel to building lines.
   1. Do not exceed maximum hanger spacing per SMACNA.
   2. Hangers shall be readily removable.

F. Install ductwork to conserve building space, to not interfere with use of space and other work, and to maintain required headroom and clearances for door and window swings, ceiling panel removal, and related conditions. Maintain sufficient space around equipment to allow normal operating and maintenance activities.

G. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.

H. Use double nuts and lock washers on threaded rod supports.

I. Connect fans and motorized equipment to ducts with one foot maximum length of flexible connection. Do not use flexible connection to change direction.

J. Connect inlets and outlets to low pressure ducts with 4 foot maximum length of flexible duct held in place with strap or clamp.

K. Connect flexible ducts to rigid ducts with draw bands. Install flexible ducts as straight as practical with total of bends not to exceed 90 degrees. Install in a fully extended condition free of sags and kinks, using 2 feet minimum length.

L. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

M. Seal terminations and butt joints of ducts and plenums with building components.

N. Seal penetrations of wall assemblies with waterproof sealant in accordance with Section 07 9200.

O. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and SMACNA Standards.

P. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside.

Q. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, and elsewhere as indicated. Provide minimum 8 x 8 inch size for hand access, and as indicated. Provide 4 x 4 inch size for balancing dampers only. Review locations prior to fabrication.

R. Provide duct test holes where indicated and required for testing and balancing purposes; before and after air handling equipment; before exhaust fans.

S. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts and as required for air balancing. Install minimum 2 duct widths from duct take-off.

T. 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.

U. Verify operation of all dampers from fully closed to fully open; adjust to eliminate binding and interference. Clean and lubricate moving parts.

3.02 CLEANING:

A. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment which may be harmed by excessive dirt with temporary filters, or bypass during cleaning.

END OF SECTION

## SECTION 23 3400 – HVAC FANS

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes: Exhaust fans.

B. Related Requirements:
   1. Section 23 0500 – Common Work Results for HVAC.
   2. Section 23 0593 – Testing, Adjusting, and Balancing.
   3. Section 23 0900 – Instrumentation and Control.
   4. Section 23 3100 – HVAC Ducts.
   5. Division 26 – Electrical.

1.02 SUBMITTALS: In accordance with Section 01 3300.

A. Product Data: Provide component sizes, and electrical characteristics and connection requirements.

1.03 CLOSEOUT SUBMITTALS: In accordance with Section 01 7700.

A. Maintenance Data: Include spare parts lists and exploded assembly views.

B. Warranty: Submit manufacturer warranties and ensure forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE:

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

B. Disconnects: Factory mounted and wired; enclosure as scheduled in Section 26 0533.

## PART 2 PRODUCTS

2.01 EXHAUST FANS:

A. Manufacturers: In accordance with Section 01 6000.
   1. Carnes Company, Inc.
   2. Greenheck Corp.
   3. Loren Cook Company.
   4. PennBarry.

B. General Requirements: UL listed; AMCA certified. Refer to Section 23 0500 for additional general requirements for equipment.

C. Ceiling and Cabinet Fans:
   1. Housing: Galvanized steel with baked enamel finish; acoustically insulated casing; removable access panels.

2. Ceiling Grille: Aluminum with factory off-white enamel finish.
3. Motor and Fan: Centrifugal type aluminum impeller; direct or V-belt drive; vibration isolation mounting; motor located out of air stream.
4. Accessories: Mounting hangers with vibration isolators; backdraft damper; disconnect switch.

**PART 3 EXECUTION**

3.01 EQUIPMENT INSTALLATION:

A. Perform installation in accordance with manufacturer's instructions.

B. Install and ground electrical equipment in accordance with NFPA 70.

C. Install suspended equipment with suitable bracing and suspension rods with vibration isolators.

D. Where indicated or required, provide control stations, interlocks, relays and other equipment for proper completion of equipment installation.

END OF SECTION

## SECTION 23 3700 – AIR OUTLETS AND INLETS

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Air outlets and inlets.
   2. Roof and wall caps.

B. Related Requirements:
   1. Section 09 9000 – Painting and Coating.
   2. Section 23 0500 – Common Work Results for HVAC.
   3. Section 23 0900 – Testing, Adjusting, and Balancing.
   4. Section 23 3100 – HVAC Ducts.

1.02 SUBMITTALS: In accordance with Section 01 3300.

A. Product Data: Indicate type, size, finish, mounting details, installation instructions, and noise level.

1.03 CLOSEOUT SUBMITTALS: In accordance with Section 01 7700.

A. Project Record Documents: Record actual locations of air outlets and inlets.

1.04 QUALITY ASSURANCE:

A. Test and rate air outlet and inlet performance in accordance with ADC Equipment Test Code 1062 and ASHRAE 70.

## PART 2 PRODUCTS

2.01 MANUFACTURERS: In accordance with Section 01 6000.

A. Carnes Company, Inc.

B. Dynamics Corporation of America, Anemostat Products Division.

C. Krueger.

D. Lindab, Inc.

E. Price Industries.

F. Titus.

2.02 AIR OUTLETS:

A. Supply Registers/Grilles: Fully adjustable double deflection type; ¾ inch minimum depth, ¾ inch maximum blade spacing. (Price 620 series; Titus 300F series)
   1. Size: 10 x 4 inch.

2. Frame: Minimum one inch margin with countersunk screw mounting and gasket.
3. Fabrication: Aluminum extrusions with factory off-white enamel finish.
4. Damper: Integral, gang operated, opposed blade type with removable key operator, operable from face.

2.03 AIR INLETS:

A. Louvered Return Registers/Grilles: Fixed louvers with 45 degree deflection and ½ inch spacing. (Price 635 series)
   1. Size: 20 x 24 inch.
   2. Frame: Minimum one inch margin with countersunk screw mounting and gasket.
   3. Fabrication: Aluminum extrusions with factory off-white enamel finish.

2.04 ROOF AND WALL CAPS:

A. Manufacturers: In accordance with Section 01 6000.
   1. Greenheck Corp.
   2. PennBarry.
   3. Manufacturer of exhaust fans, Section 23 3400.

B. Exhaust Cap for Sloped Roof: Galvanized steel with baked enamel finish; low profile shape; compatible with roofing materials; with ½ inch square mesh bird screen and backdraft damper. (PennBarry SL20)

C. Exhaust Cap for Walls: Galvanized steel with baked enamel finish; low profile shape; compatible with adjacent construction; with ½ inch square mesh bird screen and backdraft damper. (PennBarry SL20)

**PART 3 EXECUTION**

3.01 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 arrangements.

C. Install diffusers to ductwork with air tight connection.

D. Provide edge gaskets for surface mounted components; install tight to finish mounting surfaces to prevent leakage.

E. Paint ductwork visible behind air outlets and inlets matte black. Refer to Section 09 9000.

END OF SECTION

## SECTION 23 5123 – GAS VENTS

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes: Vents for gas fired equipment.

B. Related Requirements:
   1. Section 23 0500 – Common Work Results for HVAC.
   2. Section 23 5417 – Gas Fired Furnaces.

1.02 REGULATORY REQUIREMENTS:

A. Products and installation shall be in accordance with NFPA 211 and UL 959.

B. Each vent section and fitting shall be labeled for UL compliance.

## PART 2 PRODUCTS

2.01 MANUFACTURERS: In accordance with Section 01 6000.

A. Selkirk LLC; Metalbestos.

B. Duravent.

C. Metal-Fab, Inc.

D. ProTech Systems, Inc.

E. Z-Flex.

2.02 FLUE VENTS:

A. Vent Piping:
   1. General Locations: Type B; 18 gauge prefabricated galvanized steel pipe with slip fittings. (Metalbestos GV-22 series)
   2. Single thickness prefabricated steel pipe vents are permitted where approved in unfinished spaces for gas-fired heating equipment. (Metalbestos Model G)
   3. For high efficiency gas appliance venting, provide corrosion resistant non-metallic plastic pipe where required.
   4. For combination flue vent and combustion air intake piping, provide double wall flue fabricated from stainless steel, Type AL29-4C. (Metalbestos Model DCV)

B. Accessories: Approved prefabricated roof jackets and flashing; storm collar; prefabricated wind, rain and bird proof round top.

C. Verify system requirements with equipment manufacturer.

## PART 3 EXECUTION

3.01 INSTALLATION:

A. Install independent flues from each piece of gas fired vented equipment through finished areas and above concealed ceilings to the outside of the building, as indicated.

B. Support flues from the building structure, not from or on the equipment.

C. Mechanically fasten piping joints with locking or sheet metal screws. Slope piping toward outlet minimum ¼ inch per foot.

D. Install capped tee section with drain in the first section below roof.

E. Install backdraft diverters where scheduled or required.

F. Extend vents minimum 3 feet above the highest point of the roof within 10 feet, and terminate in manufacturer's approved cap. Maintain required distances from air intakes.

END OF SECTION

## SECTION 23 5417 – GAS FIRED FURNACES

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes: Gas fired furnaces with cooling coils.

B. Related Requirements:
   1. Section 22 1400 – Drainage Piping: Condensate drain piping.
   2. Section 22 2123 – Natural Gas Piping.
   3. Section 23 0500 – Common Work Results for HVAC.
   4. Section 23 0593 – Testing, Adjusting, and Balancing.
   5. Section 23 0900 – Instrumentation and Control.
   6. Section 23 2300 – Refrigerant Piping.
   7. Section 23 3100 – HVAC Ducts.
   8. Section 23 5123 – Gas Vents.

1.02 SYSTEM DESCRIPTION:

A. Performance Requirements: HVAC systems are designed to maintain indicated temperatures and humidities in all areas during heating and cooling seasons at the ambient design conditions scheduled. Maintain design temperatures at thermostat locations with outdoor air volumes indicated.

1.03 SUBMITTALS: In accordance with Section 01 3300.

A. Product Data: Provide component sizes and weights, utility and piping connection requirements and locations, service clearances, and electrical characteristics and connection requirements.

1.04 CLOSEOUT SUBMITTALS: In accordance with Section 01 7700.

A. Maintenance Data: Include spare parts lists and exploded assembly views.

B. Warranty: Submit manufacturer warranties and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE:

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

1.06 WARRANTY: In accordance with Section 01 7700.

A. Provide 2 year manufacturer warranty on complete units; 20 years on heat exchangers.

## PART 2 PRODUCTS

2.01 GAS FIRED FURNACES:

A. Manufacturer: In accordance with Section 01 6000.
   1. York International Corporation.
   2. Carrier Corporation.
   3. The Trane Company.

B. General Requirements: UL listed, AGA certified, factory tested. Refer to Section 23 0500 for additional general requirements for equipment.

C. Unit Enclosure: Sheet steel, minimum 20 gauge, insulated, with baked enamel finish; removable access panels; blower door interlock switch; suitable for upflow installation.

D. Blower: Centrifugal type, direct drive, multi-speed, with permanent split capacitor type motor; overload protection; flexible motor mounts.

E. Heat Exchanger: Aluminized steel; tubular design.

F. Burner and Controls: Electronic hot surface ignition system; computerized control module with diagnostics; control transformer with cooling relay; auxiliary control terminals for humidifier and electronic air cleaner; induced combustion system; main gas valve with 100 percent shut-off.

G. Cooling Coil: Slant or V-type; sized for scheduled cooling capacity to coordinate with air conditioning unit; copper tubes mechanically expanded into aluminum fins; refrigerant flow controls; galvanized steel condensate drain pan; quick connect refrigerant line fittings; full factory charge of refrigerant.

H. Filters: Permanent cleanable type pleated media; minimum 65 percent efficiency.

## PART 3 EXECUTION

3.01 EQUIPMENT INSTALLATION:

A. Perform installation in accordance with manufacturer's instructions.

B. Install gas fired equipment in accordance with ANSI Z223.1. Vent gas fired equipment in accordance with Section 23 5123.

C. Install and ground electrical equipment in accordance with NFPA 70.

D. Where indicated or required, provide control stations, interlocks, relays and other equipment for proper completion of equipment installation.

E. Provide start-up, inspection and training services in accordance with Section 23 0500.

END OF SECTION

## SECTION 23 8126 – AIR CONDITIONING UNITS

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes: Air conditioning units.

B. Related Requirements:
   1. Section 23 0500 – Common Work Results for HVAC.
   2. Section 23 0593 – Testing, Adjusting, and Balancing.
   3. Section 23 0900 – Instrumentation and Control.
   4. Section 23 2300 – Refrigerant Piping.

1.02 SYSTEM DESCRIPTION:

A. Performance Requirements: HVAC systems are designed to maintain indicated temperatures and humidities in all areas during heating and cooling seasons at the ambient design conditions scheduled. Maintain design temperatures at thermostat locations with outdoor air volumes indicated.

1.03 SUBMITTALS: In accordance with Section 01 3300.

A. Product Data: Provide component sizes and weights, utility and piping connection requirements and locations, service clearances, and electrical characteristics and connection requirements.

1.04 CLOSEOUT SUBMITTALS: In accordance with Section 01 7700.

A. Maintenance Data: Include spare parts lists and exploded assembly views.

B. Warranty: Submit manufacturer warranties and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE:

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

1.06 WARRANTY: In accordance with Section 01 7700.

A. Provide 5 year manufacturer warranty on complete units; 10 years on compressors.

## PART 2 PRODUCTS

2.01 AIR CONDITIONING UNITS:

A. Manufacturers: In accordance with Section 01 6000.
   1. York International Corporation.

2. The Trane Company.
3. Carrier Corporation.

B. General Requirements: UL listed, AHRI certified, factory tested. Refer to Section 23 0500 for additional general requirements for equipment.

C. Efficiency: Minimum 13.0 SEER.

D. Unit Enclosure: Galvanized steel, minimum 18 gauge, with baked enamel finish; corrosion resistant fan grille and coil guard; removable access panels; weather protected electrical compartment.

E. Mechanical Components: Isolator mounted compressor; immersion type crankcase heater; high and low pressure switches; hard start components; anti-short cycle timer; expansion valve where required; copper tube coil mechanically expanded into aluminum fins; liquid line filter-drier; full factory charge of refrigerant; service access valves; vertical air discharge.

**PART 3 EXECUTION**

3.01 EQUIPMENT INSTALLATION:

A. Perform installation in accordance with manufacturer's instructions.

B. Install and ground electrical equipment in accordance with NFPA 70.

C. Where indicated or required, provide control stations, interlocks, relays and other equipment for proper completion of equipment installation.

D. Provide start-up, inspection and training services in accordance with Section 23 0500.

END OF SECTION

## SECTION 26 0500 – COMMON WORK RESULTS FOR ELECTRICAL

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Materials and installation methods applicable to all Sections of Divisions 26 and 28.
   2. Identification.
   3. Painting.
   4. Testing.

B. Related Requirements:
   1. Section 01 5000 – Temporary Facilities and Controls: Temporary lighting and power.
   2. Section 07 9200 – Joint Sealants.
   3. Section 09 9000 – Painting and Coating.
   4. Section 26 0526 – Grounding and Bonding.

1.02 CLOSEOUT SUBMITTALS: In accordance with Section 01 7700.

A. Project Record Documents: Record actual locations of components and circuits; indicate routing of conduits, locations and elevations of outlets, circuit numbers of all lighting and power circuits, panel schedules, grounding system components and electrodes, and other pertinent information.

1.03 QUALITY ASSURANCE:

A. Regulatory Requirements and Reference Standards: Comply with applicable requirements of ANSI, ASTM, AWS, FM, NEMA, NFPA, OSHA, UL, in addition to specific applications listed in individual Sections.

B. All electrical materials shall be UL listed for the use intended and shall bear the label of approval.

## PART 2 PRODUCTS

2.01 MATERIALS:

A. Supplemental Support Framing: Light gauge galvanized steel channel framing systems or other approved components. Supports composed of channel iron, conduit, wire or other non-approved material are not acceptable.

   1. Manufacturers: In accordance with Section 01 6000.
      a. Tyco Electrical & Metal Products; Unistrut.
      b. Eaton B-Line; 4Dimension.
      c. Thomas & Betts; Superstrut.

B. Identification Nameplates: Laminated phenolic with white engraved letters on black background; 1 x 3 x 1/16 inch thick minimum size. Use 1/16 inch thick material for plates up to 2 x 4 inch size; for larger sizes use 1/8 inch thick material.

1. Copy: Include name of equipment, the specific unit number, and reference to "ON," "OFF," or other instructions as applicable.

2. Lettering: Condensed Gothic; minimum size ¼ inch high, 4 letters per inch; increase letter size to ¾ inch high on largest plates. The space between lines shall be equal to the width of the letters.

C. Identification Labels: Plastic stick-on adhesive type.

1. Arc Flash Hazard Labels: Minimum 3½ x 5 inch.

2. Where surface contaminants or other conditions make permanent adhesion unlikely, apply label to 1/8 inch thick clear plastic back plate installed to the mounting surface with permanent fasteners.

## PART 3 EXECUTION

3.01 EXAMINATION:

A. Verify that field conditions are as indicated.

B. Examine work of other trades which comes in contact with or is covered by electrical work. Do not attach to, cover up, or finish against defective work.

3.02 INSTALLATION:

A. Furnish and install fixtures and equipment to make a complete and working system as indicated in the Contract Documents. This includes wiring requirements from the service entrance to and including final outlets, fixtures, and equipment. Furnish necessary outlets and connections to equipment and controls furnished by others.

B. Electrical work shall be installed by journeyman electricians under the direct supervision of a competent supervisor. At no time shall electrical work be without the immediate on-the-job supervision of a journeyman electrician.

C. Lay out and arrange system components to provide ease of maintenance and replacement without major disassembly of adjacent components.

D. Properly attend the electrical work during the progress of adjacent construction to prevent misalignments or damage to the electrical work.

E. Furnish all material and labor to install and accomplish excavation, backfill, tamping, compaction, bases, concrete work, supports, braces, steel, inserts, anchors, chases, sleeves, holes, and other work required to accomplish the Electrical Work in accordance with the requirements of the applicable Sections, without relying upon other trades or inferring anything that is mentioned in other Divisions, unless it is specifically noted in the Contract Documents to be furnished or provided by others.

F. Perform cutting and patching, including concrete cutting and patching, required for proper and complete installation of the electrical work, in accordance with Section 01 7000.

G. Rough-in and provide final electrical connections for all equipment indicated on the Drawings, including equipment installed by others. Electrical outlets and approximate loads for the various items of equipment are noted on the Drawings. Verify exact locations of outlets serving various equipment units, and verify the equipment manufacturer's required circuit termination methods (e.g., blank box, plug-in, receptacles, etc.) to best suit requirements for each equipment item.
   1. Motors for building utility equipment furnished and installed by other trades shall be connected by the Electrical installer.
   2. Provide a 6 foot long cord with plug for each item of equipment served by a special purpose receptacle or drop cord. Plug configuration shall match that of the receptacle.
   3. If a specific item is indicated on both Electrical Drawings and other Drawings, request clarification in accordance with the Instructions to Bidders and Section 01 3100.

H. Seal openings around conduits with waterproof sealant in accordance with Section 07 9200.

I. Furnish and install appropriate sleeves and hangers required for the electrical work.

J. Check and tighten all plates, covers, doors, and trims used in conjunction with electrical equipment. All outlet openings not receiving a device shall be provided with a blank plate. There shall be no "open" boxes.

K. Balance load on feeders and main switch to within 10% under maximum load conditions.

3.03 IDENTIFICATION:

A. Equipment and Controls: Identify electrical equipment, panelboards, safety switches, pull boxes, junction boxes, and associated items with nameplates securely fastened with screws.
   1. Junction boxes, pull boxes, and future use raceways in unfinished areas may be hand lettered with marking pen; indicate circuit or other identification.

B. Panelboards: Provide typewritten directory indicating location, service and purpose of each breaker. Install directory in durable framed enclosure and mount in location directed by Owner.

C. Arc Flash Hazard Labels: Install permanent arc flash hazard labels at each electrical distribution point, located to be clearly visible to qualified persons before examination, adjustment, servicing or maintenance of equipment. Required locations include all panelboards, meter sockets, enclosures, disconnects, and other locations identified in NFPA 70.

3.04 PAINTING:

A. Prepare exposed fittings, boxes, supports, and panelboards for painting by removing oil, grease and dirt. Prevent scratching or defacing of electrical apparatus and devices.

B. Refinish electrical equipment damaged during shipping or installation. Remove rust, prime, and paint per manufacturer's recommendations for finish equal to original.

C. Finish painting of electrical equipment and exposed conduit, unless otherwise indicated, shall be done under Section 09 9000. Exposed conduit installed after finish painting is complete shall be painted to match adjacent finish by the painter at the expense of the Electrical Contractor.

D. In the event of damage to finish painting caused by the work of this Contractor, the necessary repainting shall be done by the painter at this Contractor's expense.

E. Coordinate with Section 09 9000 for installation of cover plates, recessed light fixture trims, and other items installed adjacent to painted surfaces. Do not install such items until painting and finishing work in the room or space is complete.

3.05 TESTING:

A. Refer to individual Sections for specific tests required for each system.

B. Pay for all required tests and inspections. Furnish labor, materials, and instruments; bear other costs in connection with all tests.

C. Notice of Tests: Give written notice in ample time to all concerned of date when tests will be conducted.

D. Prior Tests: Concealed work shall remain uncovered until required tests have been completed, but if construction schedule requires it, arrange for prior tests on parts of system as approved by the Architect.

E. Acceptance Testing: Demonstrate the compliance of the installation with the Contract Documents, NEC, and specified standards. Tests shall include operation of lights and equipment, continuity of the conduit system, grounding resistance and insulation resistance measurements on not more than ten representative circuits and any other circuits for which a justifiable reason exists for such tests. Furnish all labor and testing equipment for the performance of these tests.
   1. Inspect and test in accordance with International Electrical Testing Association (NETA) Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems (ATS), except Section 4.
   2. Perform inspections and tests listed in NETA ATS, Section 7.3.1.
   3. Adjust all equipment to proper operating condition.
   4. All wiring shall be tested and approved free of defective insulation and unintentional grounds.
   5. All system, equipment and other intentional grounds shall be proved to have sufficiently low resistance for proper service.

6. Megger Test: Test all wiring and connections for continuity and grounds. If the insulation resistance test indicates the possibility of faulty insulation, locate the conductor containing such faulty insulation, replace same with new, and demonstrate by further test the elimination of such fault.
7. Record feeder load currents and line voltages measured at each transformer, switchboard, and panelboard. Adjust single phase load connections to balance feeder loads. Provide the Owner with a complete copy of all load and voltage records.
8. Prior to substantial completion, turn on all equipment in the building including lighting, and using an amprobe, read the current drawn on each hot leg of feeder supplying each distribution panel. If the current in any one leg varies more than 5 percent plus or minus, from the arithmetic average of the current in all the hot legs, reconnect the branch circuits to obtain a balanced loading.

F. Adjustments, Repairs, and Retests:
1. Make adjustments, repairs, and alterations as required to meet specified test results.
2. Correct defects disclosed by tests or inspection, and replace defective parts when directed.
3. In replacing defective parts, use only new materials.
4. Repeat tests after defects have been corrected and parts replaced, as directed and until pronounced satisfactory.

G. Responsibility for Damage: Bear the cost of repairs and restoration of the work of other Contractors damaged by the tests or cutting required in connection with the tests.

END OF SECTION

## SECTION 26 0519 – CONDUCTORS

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes: Building wire and cable, 600 Volts or less.

B. Related Requirements:
   1. Section 26 0500 – Common Work Results for Electrical.
   2. Section 26 0533 – Raceway and Boxes.

1.02 QUALITY ASSURANCE:

A. Comply with applicable requirements of ASTM B1, B2, B3, B8, and D4247; FS A-A-59544; IEEE 82 and 241; NEMA WC 70; UL 83 and 486A.

B. Provide products which are ETL listed and labeled.

## PART 2 PRODUCTS

2.01 BUILDING WIRE AND CABLE:

A. Manufacturers: In accordance with Section 01 6000.
   1. Aetna Insulated Wire, LLC.
   2. Encore Wire.
   3. Prysmian Group.
   4. Southwire Co.

B. Conductors: Copper, 600 Volt rated; Type THHN/THWN, solid or stranded, with color impregnated insulation; minimum size 12 AWG for power and lighting circuits, and 14 AWG for control circuits.

C. Metal-Clad Cable: Type MC; insulated copper conductors, minimum size 12 AWG for power and lighting circuits, and 14 AWG for control circuits.

D. Nonmetallic-Sheathed Cable: Type NM; 600 Volt insulation rating; insulated copper conductors, minimum size 12 AWG for power and lighting circuits, and 14 AWG for control circuits; with grounding conductor.

2.02 ACCESSORIES:

A. Manufacturers: In accordance with Section 01 6000.
   1. 3M Electrical Products.
   2. Buchanan Construction Products, Inc.
   3. Ideal Industries, Inc.
   4. Thomas & Betts Corp.

B. Joint Connectors: UL listed; suitable for insulation temperature rating provided.
   1. Conductor Sizes 8 AWG to 14 AWG: Preinsulated locking connectors. (3M Scotchlok)
   2. Conductor Sizes 6 AWG and Larger: Pressure type mechanical connectors, insulated with three layers half-lapped electrical tape. (3M Scotch No. 33)
   3. Wet Locations and Exterior Junction Boxes: Twist and seal water resistant connectors. (Ideal Twister DB Plus or Buchanan BTS)

C. Terminal Connections: Solderless pressure type lugs and connectors. (Thomas & Betts Sta-Kon or 3M Scotchlok)
   1. At distribution equipment containing aluminum bus bars, use aluminum-copper connections rated and approved for the application.

D. Identification Tape: Epoxy film. (3M Scotchcode Epoxy)

E. Wire Pulling Lubricant: UL listed.

**PART 3 EXECUTION**

3.01 EXAMINATION:

A. Verify that work likely to damage installation has been completed.

B. Verify that raceway installation is complete and supported before installing wire and cable.

3.02 INSTALLATION:

A. Install cable in accordance with NECA Standard of Installation.

B. Where wire and cable destination is indicated and routing is not shown, determine exact routing and lengths required.

C. Branch Circuits Longer Than 75 Feet: Adjust conductor size in accordance with NFPA 70 requirements for voltage drop calculations.

D. Installation in Conduit and Raceway: Pull all conductors into raceway at same time. Do not injure insulation or conductor. Examine insulation during installation; discard sections of wire and cable with damaged insulation.
   1. Swab conduits free of moisture, dirt, and foreign materials before pulling wire. Replace damaged conduit.
   2. Use wire pulling lubricant for building wire sizes 4 AWG and larger.

E. Open Wiring Without Conduit or Raceway:
   1. Install all wiring in conduit or raceway unless specifically permitted by NFPA 70 for the following purposes:
      a. Type MC cable for branch circuits in existing construction.
      b. Type NM cable for branch circuits concealed in frame construction.
      c. Low voltage wiring for HVAC control systems in accordance with Division 23.

d. Low voltage wiring for electronic safety and security systems in accordance with Division 28.

2. Wiring systems otherwise approved for open wiring shall be installed in conduit, raceway, or cable tray at the following locations:
   a. Exposed locations below bottom of joists in areas without ceilings.
   b. Exposed areas subject to abuse.
   c. Areas above non-accessible ceilings.

3. Verify plenum rating requirements.
   a. All space above finished ceilings shall be considered plenum space unless otherwise noted.
   b. Install all non-plenum rated cables in conduit.

4. Route wiring in orderly manner; straight, plumb and parallel to building structure.
   a. Neatly bunch, bundle, and tie groups of cables at maximum 12 inches o.c.
   b. Support bundles separately from cable ties, at maximum 24 inches o.c. except where specifically approved for greater spacing up to 36 inches o.c.
   c. Support cables above accessible ceilings, using spring metal clips or plastic cable ties to support cables from structure at maximum 5 feet o.c. Do not rest cable on gypsum board ceiling, light fixtures, ductwork, piping, or equipment.

5. Protect exposed cable from damage.
   a. Provide metal conduit sleeves for concrete penetrations.
   b. Observe minimum bend radius and tension limitations, and other restrictions specified by the cable manufacturer.
   c. Where cable stress cannot be avoided, use wire mesh grips to distribute the strain over a longer length of cable.
   d. Prevent pinching, binding, crimping, sharp bends, twists, gouges, cuts, or other forms of physical or electrical characteristic damage.

F. Joints and Splices:

1. Do not splice conductors except where indicated on the Drawings or specifically approved.

2. Make joints and splices only at boxes and enclosures in accessible locations.

3. Clean conductor surfaces before installing lugs and connectors.

4. Make splices, taps and terminations to carry full ampacity of conductors with no perceptible temperature rise.

G. Neatly train and lace wiring inside boxes, equipment, and panelboards.

1. Protect free ends and loops of wire at boxes and enclosures by blank covers or other approved means until the interior painting and finishing work is complete.

2. Coil service loops and additional cable lengths at 200 percent of the minimum bend radius; secure coil with cable ties and attach to nearby support.

3. Test and permanently tag by circuit number each end of each control wire and circuit wire, except neutrals, using numbered identification tape.

H. Color code multi-wire branch circuits in accordance with NFPA 70.

1. Phase Conductors: Black and red.
2. Neutral: White. The identified neutral shall be insulated throughout and grounded only at the service entrance equipment.
3. Ground: Green.

I. Install a green ground wire, sized in accordance with NEC, in all flexible conduit, isolated from the neutral wire.

J. Branch circuits shall be installed with a dedicated neutral wire from the circuit source to the load connection.

END OF SECTION

## SECTION 26 0526 – GROUNDING AND BONDING

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes: Grounding for electrical systems.

B. Related Requirements:
   1. Section 03 3000 – Cast-in-Place Concrete.
   2. Section 26 0500 – Common Work Results for Electrical.
   3. Section 26 0519 – Conductors.

1.02 QUALITY ASSURANCE:

A. Manufacturer Qualifications: Companies regularly engaged in manufacture of electrical connectors, terminals and fittings, of types and ratings required, and ancillary grounding materials, including stranded cable, copper braid and bus, ground rods and plate electrodes, whose products have been in satisfactory use in similar service for minimum three years.

B. Regulatory Requirements and Reference Standards: Comply with applicable requirements of NFPA 70, UL 467 and 869, and IEEE 142 and 241.

## PART 2 PRODUCTS

2.01 MATERIALS:

A. Provide cables, wires, connectors, terminals (solderless lugs), grounding rods/electrodes and plate electrodes, bonding jumper braid, surge arresters, and additional accessories needed for a complete installation. Where materials or components are not indicated, provide products complying with NEC, UL, IEEE, and established industry standards for applications indicated.

B. Grounding Electrode Conductor: Copper clad steel, size to meet NFPA 70 requirements; minimum 5/8 inch diameter, minimum 10 foot length. When additional rod length is required, join rods with welded connection.

C. Grounding Conductors: Insulated copper, size to meet NFPA 70 requirements.

D. Splices and Terminations:
   1. Clamps and Pressure Connectors: In accordance with Section 26 0519.
   2. Welded Connections: Exothermic type.

## PART 3 EXECUTION

3.01 INSTALLATION:

A. Install grounding and bonding system to meet regulatory requirements.

B. Solidly ground all conduit systems, switch boxes, meters, cabinets, motor frames, switchgear, fixtures, and all other permanently installed equipment in accordance with NFPA 70 to form a continuous, permanent and effective grounding system. Expansion joints and metal raceway sections shall be bonded. Provide grounding conductors.

C. Install an insulated ground wire, sized in accordance with NEC Article 250, in all feeder, branch circuit and lighting circuit raceways.

D. Install separate ground wire, isolated from neutral, in all flexible conduits and connections to motors; sized in accordance with NEC Table 250.122, minimum size No. 12 AWG.

E. Install a green bonding jumper between the outlet box and the receptacle grounding terminal on flush mounted receptacles.

F. Utilize grounding bushings on each conduit which is not bonded to a grounded enclosure by means of properly installed conduit nuts, one on each side of the enclosure panel, properly tightened to cut through the panel paint and make bare metal-to-metal contact.

G. Install grounding bonding jumpers across building expansion joints and conduit expansion fittings.

H. Install building grounding electrode system in accordance with NEC Article 250 and as required by the local inspecting authority. The underground metal water piping, concrete encased reinforcing steel, and other made electrodes shall be sufficiently bonded together to form the grounding electrode system.
   1. Install grounding electrode conductor without joint or splice in 1 inch conduit from the service entrance equipment ground bus to the metal underground water piping system on the line side of the water meter at a point where the pipe enters the building, and to a grounding electrode as specified herein. Bond conduit and conductor at each end. Connect grounding electrode conductors to the water main, grounding electrode, and service entrance equipment ground bus, with approved pressure type ground clamps or welded connections. Connect service neutral to service entrance equipment ground bus.
   2. Natural gas piping shall not be utilized as a grounding conductor.

I. Bond gas piping to ground.

3.02 FIELD QUALITY CONTROL:

A. Demonstrate by testing that the electrical service grounding system to earth resistance value is 10 Ohms or less, utilizing a clamp-on or 3 point fall of potential tester.

B. Demonstrate by testing that the electrical service grounding system resistance from any grounded non-current-carrying conductor in the system to the electrical service entrance neutral/ground bonding conductor is less than 0.1 Ohms.

END OF SECTION

## SECTION 26 0533 – RACEWAY AND BOXES

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Conduit and fittings.
   2. Surface mounted raceway.
   3. Boxes and enclosures.

B. Related Requirements:
   1. Section 07 9200 – Joint Sealants.
   2. Section 09 9000 – Painting and Coating.
   3. Section 26 0500 – Common Work Results for Electrical.
   4. Section 28 4611 – Fire Sensors and Detectors.

1.02 DELIVERY, STORAGE AND HANDLING: In accordance with Section 01 6000.

A. Provide temporary end caps and closures on conduit and fittings. Maintain in place until installation.

B. Protect conduit and raceway systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

## PART 2 PRODUCTS

2.01 CONDUIT AND FITTINGS:

A. Rigid Steel Conduit: ANSI C80.5; UL 6; hot-dipped galvanized or electro-galvanized, inside and outside; bichromate finish; with zinc coated threads.
   1. Fittings, Couplings and Bushings: Threaded type.

B. Intermediate Metal Conduit (IMC): UL 1242; hot-dipped galvanized.
   1. Fittings, Couplings and Bushings: Split type, compression type, or set-screw type; concrete-tight.

C. Electrical Metallic Tubing (EMT): ANSI C80.3; UL 797; electro-galvanized; smooth aluminum lacquer or enamel interior coating; threadless.
   1. Fittings, Couplings and Bushings: Compression type or set-screw type; concrete-tight; indenter type devices are not acceptable.

D. Flexible Metallic Conduit: UL 1; hot-dip galvanized.
   1. Fittings, Couplings and Bushings: Steel or malleable iron.

E. Liquidtight Flexible Metallic Conduit: UL 360; Type UA with extruded PVC jacket.
   1. Fittings, Couplings and Bushings: Steel or malleable iron; watertight.

2.02 SURFACE MOUNTED RACEWAY:

A. Manufacturers: In accordance with Section 01 6000.
   1. Legrand; Wiremold.
   2. Panduit Corp.
   3. Square D.

B. Surface Mounted Metal Raceway: UL 5; single compartment galvanized steel with baked enamel finish, color as selected; minimum 5 foot lengths. (Wiremold 200, 500 and 700 series)
   1. Fittings and Accessories: TIA 569; sized to maintain minimum wiring space and cable bend radius requirements. Provide end caps, brackets, connectors, and other components supplied by raceway manufacturer, as required for a complete installation.
   2. Fasteners and Anchors: Pan head wood screws for attachment to wood; screws and metal anchors, or approved metallic anchoring system, for attachment to concrete or masonry. Mushroom headed nail anchors may be used where recommended by manufacturer. Plastic anchors are not acceptable.

2.03 BOXES:

A. Concealed Boxes: Galvanized steel, with cover as required; with knockouts.
   1. Size:
      a. Conduit Size to ¾ Inch: 4 inch square.
      b. Conduit Size 1 Inch and Larger: 4-11/16 inch square.
   2. Depth: As required by code for number of conductors.
   3. Provide extension rings for flush boxes in stud wall construction.

B. Exposed Boxes: Type FS, with matching galvanized steel plates.
   1. Exterior and Wet Locations: Type FD.

C. Pull Boxes: Galvanized steel, size to suit application; with cover secured by corrosion resistant screws; with knockouts.
   1. Sizes 4½ inches Square and Smaller: Blank covers to match switch plates.
   2. Sizes 5 Inches Square and Larger: Baked enamel finish to match electrical panel fronts.

2.04 ENCLOSURES:

A. Outdoor Locations: NEMA 250, Type 3R.

B. Wet or Damp Indoor Locations: NEMA 250, Type 4.

C. Other Indoor Locations: NEMA 250, Type 1.

2.05 ACCESSORIES:

A. Anchors and Fasteners:
   1. Cast-in-place inserts or expansion anchors in concrete.
   2. Toggle bolts in gypsum board partitions.
   3. Sheet metal screws in sheet metal and wood screws in wood elements.

B. Sleeves:
   1. Concrete Foundation Walls: Schedule 40 galvanized steel pipe with 3 concrete anchors.
   2. Exterior Walls: Schedule 40 galvanized steel pipe.

C. Conduit Straps for Surface Mounted Conduit: One-hole malleable type with clamp backs.

**PART 3 EXECUTION**

3.01 INSTALLATION:

A. Size conduits in accordance with NFPA 70 for the number and size of conductors to be run in the conduit.

B. Minimum Conduit Size:
   1. EMT Conduit: ½ inch; do not fill more than 25 percent.
   2. Surface Mounted Metal Raceway: ½ inch.
   3. Other Conduit Types: ¾ inch.

C. Verify conduit is round and straight prior to installation. Prevent deformation during cutting and threading. Do not permit tool marks on exposed conduit in finished areas.

D. Ream conduit ends. Remove burrs.

E. Completely and thoroughly swab raceway before installing wire.

F. Conduit Locations and Routing:
   1. Route conduit in orderly manner, plumb and parallel to building structure.
   2. Install conduit to conserve building space, to not interfere with use of space and other work, and to maintain required headroom and clearances for equipment, door swings, and related conditions. Do not run conduit on or directly in front of access doors, removable panels, or equipment.
   3. Place conduit in concealed spaces above finished ceilings. In areas without finish ceilings, route conduit through spaces in trusses, supported against the underside of the top chord.
   4. Conceal vertical conduit in stud wall cavities and furred wall spaces where possible. Except in unfinished spaces, obtain approval prior to installing exposed conduit.
   5. Group conduit whenever practical at common elevations. When installing conduit in parallel, leave sufficient space to facilitate future work on any conduit.
   6. Do not group conduit with plumbing, HVAC, or other piping systems. Locate conduit above piping where possible.

7. Maintain minimum 6 inch clearance from hot piping and surfaces including domestic hot water lines.
8. Do not mount conduit on equipment except where necessary to connect electrical devices mounted on the equipment. Provide 18 inches of flexible conduit in all runs "bridging" vibration mountings.
9. Do not penetrate building structural members unless indicated.

G. Hangers and Supports:
1. Secure conduit to building structure at maximum 8 foot intervals.
2. Support surface mounted conduit runs with galvanized pipe straps. Fasten pipe straps to wood surfaces with pan head sheet metal screws.
3. Support suspended conduit runs with minimum ¼ inch threaded rod and galvanized conduit hangers. Attach hanger rod to wood with suitable sized lag screws and angles. Multiple parallel conduit runs may be supported on trapeze hangers constructed of steel rod hangers and structural channel. Threaded rod hangers shall include 3 nuts jam-locked to rigidly support the conduit.

H. Sleeves: Provide sleeves and escutcheons when penetrating foundations, floors, walls and partitions. Cut escutcheons as necessary to fit in close quarters.
1. Size sleeves to provide minimum ¾ inch clearance around all sides of conduits.
2. Maintain sleeves plumb, level, and in proper position throughout construction. Inspect sleeves in cast-in-place concrete during and after concrete pour and correct any deviation from proper position.
3. Seal conduit and sleeve penetrations with waterproof sealant in accordance with Section 07 9200.
4. Exterior Wall Sleeves: Install sleeves reamed with welded flanged ends flush with wall.

I. Boxes and Enclosures:
1. Wall outlets shall be plumb and accurately aligned in rows. Mount ceiling boxes symmetrical with walls. Coordinate outlet box locations with paneling, trim, equipment and other exposed or existing features.
2. Locate switch boxes maximum 6 inches from door jamb in stud wall construction.
3. Do not install boxes back-to-back, or closer than 24 inches if outlets are in a common wall but in different rooms.
4. Provide minimum 3/8 inch center studs in boxes for direct fixture mounting. Provide special fixture hangers or auxiliary supports where fixture weight requires additional support.
5. Close openings in outlet boxes during concrete work and gypsum board finishing with plain paper or slip on plastic or metal plates. Do not use newspaper.
6. Provide pull boxes and junction boxes where required, located to be accessible after completion of the project. Do not locate pull boxes in finished spaces without the specific approval of the Architect.
7. Secure conduit to boxes with double locknuts and bushings.

J. Surface Mounted Raceway: Install in accordance with UL requirements and manufacturer's instructions; provide bonding jumpers where required.
   1. Feed power outlets from minimum ¾ inch conduit and recessed handy box.
   2. Run raceway perpendicular or parallel to walls and floors, neatly cut and trimmed, with mitered corners. No rough or exposed edges will be permitted. No exposed cables will be permitted.
   3. Securely anchor raceway to studs or blocking, using approved fasteners spaced at maximum 16 inches o.c., minimum 2 anchors per section, located within 6 inches of end of section.

K. Prime coat and prepare for finish painting exposed conduit, fittings, supports, and accessories scheduled for field painting. Refer to Section 09 9000. Components located in attic spaces are not considered exposed.

L. When installing more than one conduit system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings.

M. Seal around and within conduits where they pass through exterior walls and where they enter exterior fixtures.

N. Install 1/8 inch diameter nylon pull rope in all empty conduits.

3.02 CONDUIT LOCATION SCHEDULE:

A. Branch Circuits Above Grade:

   1. Exposed Locations:
      a. Locations Subject to Physical Damage: Rigid steel conduit or IMC. This category includes unfinished areas, mechanical and electrical equipment rooms, chases, and all locations within 8 feet above floor.
      b. Above Bottom Chord of Trusses: EMT.
      c. Finished Areas in Existing Construction: Surface mounted metal raceway; obtain Architect's approval of raceway location and routing prior to installation.

   2. Concealed Locations: EMT.

   3. Rigid steel conduit or IMC may be used at locations scheduled for EMT.

B. Final Connections:

   1. Equipment: Flexible metallic conduit.

   2. Motors and Transformers: Flexible metallic conduit; maximum length 18 inches.

   3. Recessed Light Fixtures: Flexible metallic conduit; maximum length 6 feet.

4. Liquidtight flexible metallic conduit is required for final connection to motors and equipment subject to vibration, where one or more of the following conditions exist:
   a. Exterior locations.
   b. Moist or humid atmospheres where condensation may occur.
   c. Corrosive atmospheres.
   d. Locations subject to water spray.
   e. Locations subject to dripping oil, grease, or water.

3.03 OUTLET BOX MOUNTING HEIGHT SCHEDULE:

A. Unless otherwise indicated, mount outlet boxes at the following distance above finish floor. Verify locations with ADA requirements.

B. Switches, Safety Switches, and Disconnects: 48 inches to top of box.

C. Receptacles: 16 inches to bottom of box or 48 inches to top of box.
   1. At Counters: 6 to 12 inches above counter to bottom of box, minimum 2 inches above backsplash to bottom of box; at accessible locations, maximum 46 inches to top of box.
   2. Mechanical Rooms and Unfinished Areas: 48 inches to top of box.

END OF SECTION

## SECTION 26 2726 – WIRING DEVICES

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Switches and receptacles.
   2. Cover plates.

B. Related Requirements:
   1. Section 26 0500 – Common Work Results for Electrical.
   2. Section 26 0533 – Raceway and Boxes.
   3. Section 26 5000 – Lighting.

## PART 2 PRODUCTS

2.01 MANUFACTURERS: In accordance with Section 01 6000.

A. General Electric; GE Wiring Devices & Specialty Products.

B. Hubbell Wiring Device - Kellems.

C. Leviton Manufacturing Co., Inc.

D. Legrand North America, LLC; Pass & Seymour.

E. Acuity Brands Lighting, Inc.; Synergy.

2.02 WIRING DEVICES:

A. Line Voltage Switches: NEMA WD 1, extra heavy duty industrial grade, AC only general-use snap switch.
   1. Manual Switches: 20 amp, 120-277 volt, quiet toggle type; pilot light, single pole, three-way or four-way as indicated. (Hubbell HBL1220 series; Pass & Seymour PS20AC series)

B. Wallbox Dimmers: 20 amp, 120 volt input and 0-10 volt dimming, compatible with indicated loads; linear slide intensity control and separate on/off switch. (Hubbell PSD710 series)
   1. Non-Dimming Wall Switches Adjacent to Dimmers: Single pole, three-way or four-way as indicated. (Hubbell DS-W series)

C. Receptacles: NEMA WD 1, extra heavy duty industrial grade; configuration in accordance with NEMA WD 6.
   1. Wall Receptacles: 20 amp, 120 volt, 3 wire self-grounding type, with wrap-around mounting strap; single, duplex, tamper resistant, arc fault circuit interrupt (AFCI),

or ground fault circuit interrupt (GFCI) type as indicated. (Hubbell HBL5300 series; Leviton 5362 series; Pass & Seymour 5362A series)

a. Dwelling Unit Locations: All receptacles shall be tamper resistant AFCI type.
b. Bathrooms, and Locations Within 6 Feet of a Sink: All receptacles shall be GFCI type.
c. Quadplex Receptacles: Two duplex receptacles mounted in double gang box.

D. Color: White.

2.03 COVER PLATES:

A. Finished Areas: Smooth molded nylon, high abuse grade; color to match device.

B. Unfinished Areas: Type 302 or 430 stainless steel, non-magnetic, satin finish.

C. Weatherproof Type: Polycarbonate with stainless steel hinge, gasket, and cord opening; provisions for padlock; UL wet location rated while in use.

D. Provide single piece ganged plates for gang mounted devices.

E. Identification: Provide pre-marked nylon or pre-engraved stainless steel cover plates where applicable for identification purposes.

1. Provide identification for all receptacles protected by remote GFCI receptacle or circuit breaker.

**PART 3 EXECUTION**

3.01 EXAMINATION:

A. Verify that field conditions are as indicated.

B. Verify that openings are neatly cut and will be completely covered by cover plates.

3.02 INSTALLATION:

A. Install devices plumb and level. Install single pole toggle switches with OFF position down.

B. Unless receptacles and outlets are specifically indicated to be switch controlled, connect to branch circuits ahead of local switches.

C. Install cover plates for switches and receptacles. Install blank cover plates on outlet boxes without devices. Use jumbo size plates where necessary to completely cover wall openings.

D. Alteration Project Procedures: Where new wiring devices are installed in existing rooms, replace all existing devices and cover plates not matching color and style of new components, with new devices and cover plates.

3.03 FIELD QUALITY CONTROL:

A. Verify that each receptacle is energized; test for proper polarity. Test each GFCI receptacle for proper operation. Operate each wall switch with circuit energized and verify proper operation.

END OF SECTION

## SECTION 26 2800 – CIRCUIT PROTECTIVE DEVICES

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Safety switches and disconnects.
   2. Circuit breakers for existing panelboards.

B. Related Requirements:
   1. Section 26 0500 – Common Work Results for Electrical.
   2. Section 26 0533 – Raceway and Boxes.

1.02 SUBMITTALS: In accordance with Section 01 3300.

A. Product Data: Indicate application conditions and limitations of use stipulated by product testing agency.

1.03 CLOSEOUT SUBMITTALS: In accordance with Section 01 7700.

A. Project Record Documents: Record actual locations of components, and other pertinent information.

## PART 2 PRODUCTS

2.01 SAFETY SWITCHES (DISCONNECTS):

A. Manufacturers: In accordance with Section 01 6000.
   1. Allen-Bradley Co.
   2. Cutler Hammer.
   3. General Electric; GE Electric Distribution & Control.
   4. Pass & Seymour.
   5. Siemens Energy & Automation.
   6. Square D.

B. Safety Switches: Surface mounted heavy-duty switch with quick-make, quick-break mechanism with positive interlock, or molded case switch; enclosure as scheduled for installed location. Provide disconnects for all utilization equipment.
   1. Motor Loads: Provide HP rated switches.
   2. Lugs: Marked as being suitable for 60/75 C or 75 C wire per UL Construction Materials Directory.

2.02 CIRCUIT BREAKERS:

A. Circuit Breakers: UL 489, NEMA AB1; snap-in type; molded case, non-adjustable, thermal-magnetic type; quick-make, quick-break circuit breakers; 20 amp minimum;

sized per NFPA 70 for connected load. Provide multi-pole breakers where required; handle ties are not acceptable.

1. Provide circuit breakers physically and electrically compatible with existing panelboards, by the panelboard manufacturer.
2. Short Circuit Current Rating: 10,000 amps RMS symmetrical at rated voltage.

**PART 3 EXECUTION**

3.01 INSTALLATION:

A. Install Products in accordance with manufacturer's instructions and NFPA 70.

B. Install safety switches and disconnects where indicated, and where required to provide a complete and working system.

C. Install circuit breakers in existing panelboards. Update circuit directory on interior of panel door. Where no directory exists, determine the loads served by each existing and new circuit, and provide new typed directory.

END OF SECTION

## SECTION 26 5000 – LIGHTING

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes: Light fixtures.

B. Related Requirements:
   1. Section 26 0500 – Common Work Results for Electrical.

1.02 SUBMITTALS: In accordance with Section 01 3300.

A. Product Data: Submit for each specified product, including each fixture type; indicate accessories.

B. Photometric Data: For fixtures other than the Basis of Design, provide IES files.

1.03 REGULATORY REQUIREMENTS:

A. Provide products complying with Energy Policy Act (EPACT) and applicable energy code.

B. Comply with applicable building code for flame spread and smoke density generation requirements for lenses.

1.04 WARRANTY: In accordance with Section 01 7700.

A. LED Fixtures: 5 years for all components including drivers.

## PART 2 PRODUCTS

2.01 LIGHT FIXTURES:

A. Manufacturers: As listed for each fixture type. The first model number listed is the Basis of Design.
   1. Substitutions: Refer to Section 01 6000.

B. General Requirements:
   1. Provide light fixtures complete with lamps, unless otherwise indicated.
   2. Surface mounted fixtures in finished areas shall contain no visible knockouts.
   3. Mounting hardware shall be concealed where feasible. Exposed fasteners, where approved, shall be flush with adjacent surface with matching finish.

C. LED Fixtures: IES LM-79; IES LM-80; minimum 70 percent initial lumens maintained at 50,000 hours; 120 volt; 3000K color temperature, minimum 85 CRI.
   1. Recessed Open Downlights (General Locations): IC rated, remodel housing; 4 inch nominal aperture with matte white baffle and trim ring; 900 nominal lumens, dimmable to 10 percent. (Juno IC1RLED-G4-14WWH series)

2. Recessed Lensed Downlights (Bathroom Locations): IC rated, remodel housing; 4 inch nominal aperture with white opal lens; 900 nominal lumens; wet location rated. (Juno IC1RLED-G4-11WH series)
3. Wall Mounted Lights (Bathroom Locations): 24 inch nominal length; 5 inch height, 4 inch projection from wall; brushed nickel housing and end caps; round acrylic diffuser; 1300 nominal lumens. (Lithonia FMVTRL series)
4. Wall Mounted Lights (Closet Locations): 24 inch nominal length; 5½ x 2¾ inch nominal cross section; metal housing with plastic end caps; white polycarbonate diffuser; 1400 nominal lumens. (Lithonia FMLWL series)
5. Exterior Wall Mounted Fixtures: UL listed for wet locations; aluminum housing, white color; prismatic polycarbonate lens with eyelid trim; 6¼ x 8¾ inch size, maximum 6 inch projection from wall; 1200 nominal lumens. (Lithonia LVP58-LPL series)

**PART 3 EXECUTION**

3.01 INSTALLATION OF LIGHT FIXTURES:

A. Install light fixtures and accessories in accordance with manufacturer's instructions.

B. Verify installation conditions, spacing between fixtures, and clearances from fixtures to adjacent construction, with manufacturer's requirements.

C. Support light fixtures heavier than 50 lbs. directly and securely from building structural members. Where necessary to span building structural members, support light fixtures from steel channel or approved supplemental framing in accordance with Section 26 0500, directly and securely attached to building structural members. Do not use wood or wire supporting members.

D. Provide felt or fiberglass gaskets on recessed lighting fixtures where necessary to prevent light leakage at the ceiling line.

E. Alteration Project Procedures: Where new light fixtures are installed in existing rooms, replace existing lamps of similar type not matching color temperature of new lamps, with new lamps as scheduled.

3.02 FIELD QUALITY CONTROL:

A. Test lighting for normal operation and illumination.

3.03 CLEANING:

A. Remove labels visible after installation of fixture, except UL labels.

B. Clean photometric control surfaces as recommended by manufacturer.

C. Final Cleaning: Clean light fixtures immediately prior to Substantial Completion; remove dirt, bugs, debris, stains, rust and foreign materials. Replace components operating at less than the mean rated lumen output.

END OF SECTION

## SECTION 28 4611 – FIRE SENSORS AND DETECTORS

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes: Interconnected single station detectors and alarms.
   1. Smoke alarms.
   2. Combination carbon monoxide and smoke alarms.

B. Related Requirements:
   1. Division 26 – Electrical: Power wiring.

1.01 SUBMITTALS: In accordance with Section 01 3300.

A. Product Data: Indicate components, wiring diagrams, and electrical connections.

## PART 2 PRODUCTS

2.01 MANUFACTURERS: In accordance with Section 01 6000.

A. Gentex Corporation.

B. Kidde.

2.02 COMPONENTS:

A. Smoke Alarms: UL 217; NFPA 72; 120 volt interconnected single station type; photoelectric smoke detection, nominal 2.5 percent sensitivity; alarm horn rated 85 dBA at 10 feet; 9 volt battery backup with low battery signal; auxiliary contacts; test button; LED status indicator; white housing and backplate for mounting on standard junction box. (Gentex S1209F; Kidde P12040)

B. Combination Carbon Monoxide and Smoke Alarms: UL 217; UL 2034; NFPA 72; 120 volt interconnected single station type; electrochemical carbon monoxide detection; photoelectric smoke detection, nominal 2.5 percent sensitivity; alarm horn rated 85 dBA at 10 feet; 9 volt battery backup with low battery signal; auxiliary contacts; test button; LED status indicator; white housing and backplate for mounting on standard junction box. (Gentex GN-503F; Kidde KN-COSM-IB)

C. Wiring: In accordance with Division 26.

## PART 3 EXECUTION

3.01 INSTALLATION:

A. Install in accordance with manufacturer's requirements, secured to ceiling or wall surfaces as indicated. Coordinate locations with architectural features and patterns.
   1. Locate each unit minimum 3 feet from adjacent supply air outlet, return air inlet, and ceiling fan.
   2. At each bathroom containing tub or shower, install smoke alarm within 3 feet horizontally outside door.

B. Wire all alarms within each dwelling unit to a single circuit in local power panel in accordance with Division 26, without switches or disconnects.

C. Interconnect individual alarms so that detection of smoke or carbon monoxide by one device activates all alarms. When both smoke and carbon monoxide conditions are present, smoke condition shall have priority and shall be annunciated. Test for proper operation.

END OF SECTION

## SECTION 31 2000 – EARTH MOVING

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:

1. Excavation and fill.
   a. Excavating and backfilling for footings and foundations.
   b. Excavating and backfilling for utilities.
   c. Trenching and trench backfilling.
2. Compaction.
3. Rough grading and finish grading.

B. Related Requirements:

1. Section 01 4520 – Testing and Inspecting Services.
2. Section 01 7000 – Execution Requirements: Field engineering.
3. Section 03 3000 – Cast-In-Place Concrete: Concrete fill for overexcavated areas.
4. Division 22 – Plumbing: Earthwork for sanitary and domestic water piping within building.
5. Division 26 – Electrical: Earthwork for underground electrical work within building.

1.02 SUBMITTALS: In accordance with Section 01 3300.

A. Fill material shall be approved by the Architect and testing firm's Soils Engineer prior to delivery.

1.03 QUALITY ASSURANCE:

A. Excavator Qualifications: Trained in underground utility protection.

1.04 PROJECT CONDITIONS:

A. Safety: For the security or safety of persons in and adjacent to trenches or construction operations, the "Manual of Accident Prevention in Construction" published by the Associated General Contractors of America and the safety regulations of the Division of Industrial Compliance of the State of Ohio shall be followed when specifically applicable, or by similarity of operation or as necessary for adequate protection.

B. Maintain in place adequate structures, barricades, guards, warning lights, and other protection required by OSHA and other public authorities at cutting and filling and excavation and hazards created by this work, including shoring, bracing, planking, fences and forming as required.

C. Exercise due care and diligence in all cutting, digging, and backfilling operations. Protect from damage overhead and underground site features that are to remain, including utility piping, trees, buildings, fences and property. Bear responsibility for, and replacement costs of, all damage arising from all operations connected with this work.

D. Protection of Trees: Protect existing trees against unnecessary cutting, breaking or skinning of roots, skinning or bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within drip line, excess foot or vehicular traffic, or parking of vehicles within drip line. Provide temporary guards as required.
   1. Water trees and other vegetation to remain within limits of contract work as required to maintain their health during construction operations.
   2. Protect roots over 1½ inch diameter that are cut during construction operations; coat with emulsified asphalt or other acceptable coating formulated for damaged plant tissues.
   3. Temporarily cover exposed roots with wet burlap to prevent drying out; cover with earth as soon as possible.
   4. Protect tree root systems from damage due to noxious materials caused by run-off or spillage while mixing, placing, or storing construction materials; and from flooding, eroding, or excessive wetting caused by dewatering operations.

E. Carefully maintain benchmarks and other reference points; if disturbed or destroyed, replace as directed.

1.05 WARRANTY:

A. The Contractor shall be responsible for the condition of all trenches for a period of one year from the date of Substantial Completion.

**PART 2 PRODUCTS**

2.01 FILL MATERIAL:

A. Granular Fill Under Slabs and Walks: ODOT 304; crushed stone or gravel.

B. Granular Backfill for Foundations (Except Under Slabs and Walks): ODOT 703.01, No. 57.

C. Granular Backfill for Utilities: ODOT 304; crushed stone or gravel.

D. Granular Material for Pipe Bedding: Natural gravel or stone; ODOT 703.01; No. 57, No. 67, or No. 8.

E. Granular Material for Bedding of Utility Structures: Natural gravel or stone; ODOT 703.01, No. 57.

F. Soil Materials: ASTM D2487, soil classification groups CL, GW, GP, GM, SW, SP, and SM.

1. Material shall be free of trash, refuse, waste, mulch, brush, leaves, grass and weeds, cinders, ashes, vegetable or organic matter, shale, large stones or masonry, frozen material, earth with an exceptionally high void content, deleterious matter, lumber or other debris. Fill material shall have a laboratory dry density of minimum 100 lbs/cu ft and shall contain no material larger than 6 inches in any dimension, and no rock or gravel larger than 2 inches in any dimension.

2. On-Site Soil Materials: Fill and backfill material for areas not otherwise indicated shall be material excavated in connection with the work, insofar as sufficient quantities of material of satisfactory character are available. Where excavated material is insufficient, provide off-site soil material.

G. Topsoil: ODOT 653 and ASTM D5268; fertile, friable, surface soil containing natural loam; organic content ranging between 5% and 20%; free of stones larger than ½ inch in any dimension; free of extraneous or toxic matter harmful to plant growth; obtained from well-drained sites where soil occurs in depth of 4 inches or more.

## PART 3 EXECUTION

3.01 EXAMINATION:

A. Prior to the work of this Section, inspect the site and become familiar with all portions of the work within this section.

B. Where existing ground elevations or existing utility locations are indicated, these are believed to be reasonably correct, but do not purport to be absolutely so, and are presented only as an approximation.

C. Site Conditions: If suitable bearing for foundation is not encountered at the depth indicated on the Drawings, immediately notify the Architect and do not proceed further until instructions are given.

3.02 PREPARATION:

A. Notification: Notify Owner and applicable utilities and utilities protection services at least two full working days prior to commencing work. Mark site to indicate proposed excavation area.

B. Protection of Utilities: Preserve in operating condition all active utilities traversing the site unless specifically indicated to be removed.

C. Provide construction layout staking in accordance with Section 01 7000 and ODOT 623.

D. Place stakes or other approved markers for visual indication of construction limits and site disturbance boundaries.

E. Where removal or abandonment of utilities is indicated or required, disconnect, remove, cap and plug utility services. Notify affected utility companies in advance and obtain approval before starting this work.

F. Place markers to indicated location of disconnected services. Identify service lines and capping locations on Project Record Documents.

3.03 EXCAVATING:

A. Excavate as required for the dimensions and elevations indicated. Excavation shall extend a sufficient distance to allow for placing and removal of forms, inspections, installation of services and related construction activities. Excavations carried below indicated depths will not be permitted except when authorized by the Architect.

B. Stockpile excavated material in approved locations that will not endanger the work or obstruct traffic or drainage flow.

C. Unless indicated otherwise, remove existing foundation walls, footings, and concrete floor slabs within building areas to minimum 12 inches below subgrade. Remove existing foundations to minimum 12 inches below finish grade in other areas. Remove all other obstructions as required within the developed areas.

D. Remove vegetation and topsoil, including surface fill with high organic and debris content, from the proposed developed areas.

E. Excavating for Footings:

1. Cut footing excavations to a flat bottom comprised of firm soil undisturbed by the method of excavating. Sides of the excavation may be used to form footing concrete; perform final trimming and cleaning of bottoms and sides of excavations immediately prior to placing concrete.

2. Where excavation is required within tree drip lines, hand excavate using narrow-tine spading forks; comb soil to expose roots and minimize damage to root systems.

3. Unauthorized excavation below bottom of footing elevations given shall be filled with lean concrete in accordance with Section 03 3000.

4. Do not permit a new footing to bear directly on an old existing footing or other rigid body when the new footing is otherwise soil supported.

5. Do not permit soil from footing excavations to be wasted and loosely spread in areas of floor slab or pavement support.

6. Footings shall be founded in the undisturbed virgin soils or engineered fill unless otherwise approved.

F. Trench Excavation: Cut trenches near to exact grade, minimum width to permit installation; scooped out for pipe hubs, with backfill bed laid to ensure complete support of underground piping.

1. Where trenching is required within tree drip lines, tunnel under or around roots by drilling, auger boring, pipe jacking, or digging by hand.

2. Length of Open Trench:
   a. Minimize amount of trench opened in advance of completed work; further limitations may be directed by Architect where deemed necessary.
   b. In general, begin backfilling and restoration of surfaces as soon as the constructed work is in approved condition to receive it; complete as rapidly as possible.
   c. Do not perform new trenching when earlier trenches need backfilling or labor is needed to restore surfaces of streets or other areas to safe and proper conditions.

3. Test Pits: Dig exploratory test pits where necessary, in advance of trench excavation, to determine exact locations of subsurface pipe lines, conduits and structures which are likely to be encountered; protect, support and maintain in operation all active utilities.

4. Trench Drainage:
   a. If water is encountered, furnish and operate suitable pumping equipment of capacity adequate to dewater the trench, dispose of such water, and to maintain satisfactory drainage conditions. Conduct pump discharge to natural drainage channels, drains or storm sewers. Removal and handling of water required to maintain dry trenches or other excavations for construction of pipe lines or other structures, shall be at Contractor's expense.
   b. Where trenches are dug through areas of lateral ground water seepage or in areas below ground water table, construct bulkheads within trench, consisting of compacted native clay soil or other fines, at intervals as required to resist movement of ground water along trench and prevent displacement of bedding and backfill materials. Extend bulkheads approximately three feet in a direction parallel to the pipe, and from bottom of trench to one-half foot above top of pipe.

G. Rock Excavation:

1. Definition: Rock excavation includes boulders and solid masonry, exceeding 12 cubic feet in volume, which requires removal by drilling and blasting, wedging, sledging or barring, or breaking up with a power operated hand tool. Rock excavation does not include soft or disintegrated rock which can be removed with a hand pick or power operated excavator or shovel, or back hoe of ¾ cubic yard capacity; loose, shaken or previously blasted rock or broken stone; or rock beyond the minimum limits of measurement, which may fall into the excavation.

2. Where trench excavation is made in rock or boulders, excavate trenches minimum 6 inches below the pipe barrel for pipes 24 inches in diameter or less, and 9 inches for pipes larger than 24 inches in diameter. Bed pipe in compacted granular material placed on the trench bottom in accordance with the piping installation requirements.
3. Perform drilling and blasting, where necessary, in accordance with ODOT 208. Contractor shall satisfy all claims for damages resulting from blasting and shall fully indemnify Owner and Architect from such claims.

3.04 FILLING, BACKFILLING AND COMPACTING:

A. Subgrade Preparation and Compaction: Prior to placing fill or backfill, proof compact subgrade with pneumatic or sheeps-foot compactor in accordance with ODOT 204. Where soft areas are encountered, excavate unsuitable material to the depth directed by the testing firm's Soils Engineer and replace with granular fill. Provide moisture control in accordance with ODOT 203; where necessary, reduce excess moisture using the following method:

1. Scarify subgrade to a depth of 12 inches; aerate and dry to within 2% of optimum moisture content; recompact to minimum 95% of maximum laboratory dry density in accordance with ASTM D1557.

B. General Filling and Backfilling:

1. Carefully place and compact fill material to ensure firm support and to prevent future displacement.
2. Do not place frozen fill material, or place fill material on frozen or snow-covered surfaces.
3. Fill excess cuts under slabs or paved areas with approved compacted fill material.
4. Where fill meets the natural grade of a slope, cut a bench in existing slope to serve as a key to connect existing grade with each lift of newly placed fill.
5. Place structural fills in layers of maximum 8 inches for the full width of the cross section. Thoroughly compact each layer with sheeps-foot roller with 200 psi rating.
6. Bring grades to underside of their respective surfacing. Grades not otherwise indicated shall be uniform levels or slopes between points where elevations are given or between such points and existing finished grades. Abrupt changes in slopes shall be rounded. Slope grades slightly away from buildings.
7. Fill planting areas to the top of adjacent curb or pavement with minimum 18 inches clean topsoil.

C. Site Filling and Rough Grading:

1. After completion of site preparation, prepare surface of areas to be filled by scarifying with a disc or harrow to a depth of 4 to 6 inches. Spread an initial 3 inch layer of fill material and compact entire area.

2. Recompact subgrade under paved areas to minimum 95% of maximum laboratory dry density in accordance with ASTM D698.

D. Backfill around foundation walls immediately after walls have thoroughly set and drainage piping, where scheduled, is in place. Backfill around walls with stone to within two feet of finish grade; fill remainder of excavation with top soil. Where concrete work or pavement occurs next to the foundation wall, backfill with stone in compacted layers to the underside of the slab or paving.

E. Backfilling for Utility Piping:

1. Exercise special care in backfilling trenches in which piping is laid to guard against disturbing the joints.

2. Place backfill evenly in 6 inch layers, carefully tamped, under and around the pipe. Place and tamp remaining backfill in 12 inch layers to finish grade. Backfill excavations under walks, slabs and pavements with concrete fill in accordance with Section 03 3000.

3. Backfill trenches and excavations immediately after pipe is laid therein, unless other protections of the pipe line are directed. Do not permit water to rise in unbackfilled trenches after pipe has been placed.

4. Deposit backfill material in horizontal layers; thoroughly compact each layer by mechanical methods before placing succeeding layers.

5. Do not allow material to fall from a bucket directly on a structure or pipe; lower bucket to prevent damage caused by falling material.

6. In backfilling around structures, remove all lumber, rubbish, braces and refuse before backfilling is started. Backfilling shall be made in a manner to prevent after-settlement, and shall be compacted by mechanical means to a density equal to the adjacent soil, but need not exceed 90% of the maximum dry density for native backfill material only.

F. Compacting:

1. Fill material placed in layers shall be within 2% of the optimum moisture content before compacting. Material which displays a pronounced deformation under construction equipment shall not exceed the optimum moisture content.
   a. Expedite drying of wet soil by use of plows, discs, harrows or other approved methods.
   b. Add water to dry soil, uniformly distributed by sprinkling wagons, pressure distributors, or other approved equipment. Manipulate material to secure a uniform moisture content throughout the layer.

2. Compact each layer of fill material to the following minimum percentage of maximum laboratory dry density as determined in accordance with the test method indicated.
   a. Granular Fill and Backfill under Slabs: ASTM D1557; 96%.
   b. Granular Backfill for Foundations: ASTM D698; 98%.
   c. Site Grading and Utility Backfilling: In accordance with ODOT 203.
3. Compact areas with approved equipment of design, weight, and quantity to obtain required density. Consolidate and compact areas inaccessible to a roller by mechanical tampers. Operate equipment in such manner that hardpan cemented gravel, clay, or other chunky soil material will be broken in the layer.

3.05 SITE GRADING AND DRAINAGE:

A. Control grading so that ground is pitched to prevent water from running into excavated areas. Maintain pits, trenches, and excavations free of water at all times.

B. Take all control measures necessary to prevent damage from flooding, erosion, and sedimentation to on-site and off-site areas throughout the entire period of the Contract, in accordance with ODOT SS 832 and applicable requirements of authorities having jurisdiction.

C. Rough Grading:
   1. Fill and compact areas as specified.
   2. Rough grade all areas to required subgrade, smooth and free from irregular surface changes. At lawn areas, rough grade to 4 inches below finish grade.
   3. Tolerances:
      a. Building Areas: ½ inch in 10 feet.
      b. Walks, Lawns, and Unpaved Areas: 0.10 foot.
   4. Roll all cut areas; check for soft, yielding material. Where such areas are encountered and cannot be satisfactorily stabilized by moisture control and compaction, excavate unstable material to extent directed by the testing firm's Soils Engineer; fill and compact as required.

D. Final Grading:
   1. Repair and reestablish rough grades to specified tolerances where eroded, rutted, settled, or decompacted due to construction operations or weather conditions; reshape and recompact to required density.
   2. Where surface elevations are not indicated, grade to drain with a minimum surface slope of 1 percent.
   3. As soon as the concrete work is completed, spread minimum 6 inches of stockpiled topsoil over planting and lawn areas to a level finish grade.

4. Compact exposed subgrade to 95% ASTM D698, Method D maximum dry density near optimum moisture content.
5. Remove stones, gravel, slag aggregate, and other objects 1 inch diameter and larger; remove roots, brush, wire, and other objects which may hinder fine grading operations.
6. Refill and compact excavations showing evidence of shrinkage, settlement, or wash.

E. Remove from the site and dispose of all debris and excess earth, and all excavated material not required or not suitable for fill.

3.06 FIELD QUALITY CONTROL:

A. Subsurface soil investigation reports were not conducted for this project. If deemed necessary, such an investigation shall take place with costs borne by the Owner.

B. Testing firm will perform testing of excavating and backfilling in accordance with Section 01 4520.

C. The footing excavations are to be inspected by the testing firm's Soils Engineer during construction and immediately prior to placement of concrete, to establish that the soil bearing conditions over the entire bearing area are in accordance with the minimum soil bearing pressure stated on the Drawings.

END OF SECTION

## SECTION 32 9200 – LAWNS AND GRASS

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes: Preparation, fertilizing, and seeding indicated areas including the following:
   1. Building perimeter.
   2. Material storage areas.
   3. Site areas disturbed as a result of construction.

B. Related Requirements:
   1. Section 31 2000 – Earth Moving: Rough and final grading; removal of stones during grading operations.

## PART 2 PRODUCTS

2.01 MATERIALS:

A. Fertilizer: ODOT 659.04; dry or liquid type; 10-20-10 analysis or as recommended by topsoil analysis.

B. Lime: ODOT 659.03; agricultural ground limestone.

C. Seed for Lawn Areas: ODOT 659.09, Class 1. Verify grass seed mixture with Owner prior to purchasing materials.
   1. Kentucky Bluegrass: 30% by weight.
   2. Creeping Red Fescue: 30% by weight.
   3. Annual Ryegrass: 20% by weight.
   4. Perennial Ryegrass: 20% by weight.

D. Mulch: ODOT 659.14; wheat or oat straw, free of seeds and foreign matter.

## PART 3 EXECUTION

3.01 PREPARATION:

A. Machine cultivate soil evenly to provide a firm seed bed four inches deep, free of hard clumps. No heavy objects except necessary lawn making equipment shall be moved over the lawn areas after the soil is prepared, unless it is again loosened and graded.

B. Remove stones, roots, brush, wire, and other foreign materials and objects larger than one inch in thickness or diameter.

C. Repair eroded areas to indicated grade elevations, with smooth transitions to adjacent areas. Hand rake adjacent to building where necessary.

D. Bio-Swales: Install temporary erosion control mats in accordance with ODOT 671.

3.02 FERTILIZER APPLICATION:

A. Apply fertilizer at a uniform rate of 20 pounds per 1000 square feet. Apply lime at a uniform rate of 92 pounds per 1000 square feet. Incorporate fertilizer and lime into subgrade to a minimum depth of two inches by discing, harrowing, or other approved methods.

B. At Contractor's option, fertilizer may be applied together with seed by mechanical machine spreading.

3.03 SEEDING:

A. Apply seed at a total rate of 10 pounds per 1000 square feet of area, in two equal applications at right angles to each other.

B. Mulch seeded areas at a rate of 100 pounds per 1000 square feet of area within 48 hours after seeding is completed. After application, cut straw into the seedbed using a disc roller; wet down to prevent displacement.

C. Perform seeding between April 1 and June 1, or between August 15 and November 1, unless otherwise approved.

D. Do not sow seed or spread mulch when wind speed exceeds 5 mph.

E. Rolling: Immediately after seeding, firm entire area with a roller not exceeding 90 lbs per foot of roller width. Rolling is not required for areas seeded with cultipacker-type seeder, or slopes in excess of 3 to 1.

3.04 LAWN ESTABLISHMENT AND MAINTENANCE:

A. Provide continued proper care of lawn areas for minimum 60 days and as long as necessary to establish a uniformly close stand of grasses, free of weeds and undesirable grasses, with bare spots no larger than 6 inch diameter totaling a maximum of 2 percent of the entire lawn area.

B. Mowing: When average grass height reaches 3½ inches, mow lawn areas with approved mowing equipment to a height of 2 inches; continue mowing at maximum 7 day intervals during growing seasons until Substantial Completion.

C. Weeding: Uproot and remove weeds and other undesirable vegetation.

D. Refertilization: Where areas are designated for refertilization, apply fertilizer between August 15 and October 15 during a period when the grass is dry.

E. Reseeding: Where areas are designated for reseeding, apply seed at a rate of 4 pounds per 1000 square feet of area, in a manner which will cause minimum disturbance to existing grass, and at a minimum 15 degree angle from the direction of prior seeding.

3.05 PROTECTION:

A. Protect all other finished areas during the work of this section.

B. Keep paved areas clean. Remove dirt, debris, waste materials, equipment and unused materials. Leave the grounds in a clean and orderly condition at the completion of the work.

C. Protect finished lawn areas against damage, including erosion and washouts. Promptly repair damaged areas.

END OF SECTION

## SECTION 33 4200 – STORMWATER DRAINAGE

## PART 1 GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Storm sewer piping.
   2. Structures and castings.

B. Related Requirements:
   1. Section 31 2000 – Earth Moving: Trenching and backfilling.

1.02 SUBMITTALS: In accordance with Section 01 3300.

A. Product Data: Indicate materials, sizes, dimensions and types.

1.03 REGULATORY REQUIREMENTS:

A. Comply with regulations and requirements of environmental agencies and local utilities.

1.04 DELIVERY, STORAGE, AND HANDLING:

A. Load and unload pipe, fittings, and accessories by lifting with hoists or skidding; avoid shock or damage; do not drop materials; do not skid or roll pipe against pipe already on the ground.

B. Handle pipe to prevent damage to coating and lining. If any part of the coating or lining is damaged, replace damaged material with new material of like kind.

## PART 2 PRODUCTS

2.01 STORM SEWER PIPE AND FITTINGS:

A. PVC Pipe: ASTM D3034, SDR 35; or ASTM F794; or ASTM F949.
   1. Joints: ASTM D3212; gasketed bell and spigot type, water tight.

B. Corrugated Polyethylene (PE) Pipe: ODOT 707.33; smooth interior; annular corrugated exterior; nonperforated.
   1. Joints: ASTM D3212; gasketed bell and spigot type, water tight.

C. Aluminized Steel Pipe: ODOT 707.12.
   1. Joints: Gasketed bell and spigot type, water tight.

D. Where connections to existing systems are required, verify materials and provide appropriate adapters.

E. Testing:

1. Test pipe and joints for quality of materials, crushing strength and absorption in accordance with ASTM test requirements. Crushing strength test may be made by three-edge-bearing method.

2. Furnish test specimens sufficient to perform minimum two tests for each period of manufacture for each size, type and class of pipe. In case of unsatisfactory test results, perform additional tests up to the maximum number stated in the referenced ASTM Specifications.

3. All tests shall be made by an approved testing laboratory at the Contractor's expense. Submit 3 copies of each test report to the Architect.

F. Inspection and Rejection: Pipe shall be considered ready for acceptance when they conform to the requirements indicated above. All materials, processes of manufacture and finished pipe shall be subject to rejection on account of failure to conform to any of the specified requirements. Individual sections of pipe may be rejected at any time because of variations in dimensions, fractures, or cracks, chips and blisters exceeding the permissible tolerances.

2.02 STRUCTURES AND CASTINGS:

A. Manufacturers: In accordance with Section 01 6000.
   1. Advanced Drainage Systems, Inc.; Nyloplast.
   2. NDS.

B. PVC Structures: ASTM D3034; drain body with pipe bell spigot; fabricated to the elevations, dimensions and conditions required for the specific location.
   1. Pipe Connection Stubs: ASTM D3212 and ASTM F1336; water tight.

C. Grates for PVC Structures: ASTM A536 ductile iron; black painted finish; sized to fit pipe end without frame or adapter.

## PART 3 EXECUTION

3.01 EXAMINATION:

A. Prior to the work of this Section, inspect the site and verify that all work can be installed in accordance with the original design. In the case of any discrepancy, immediately contact the Architect.

3.02 INSTALLATION:

A. Perform trenching and backfilling in accordance with Section 31 2000.

B. Pipe Bedding: Place granular bedding in 4 inch thick layers, thoroughly compacted, shaped to fit the outside pipe diameter, from at least 6 inches below bottom of pipe, around pipe, to an elevation of at least 6 inches above top of pipe.

C. Pipe Laying: Install pipe in accordance with ODOT 611.
   1. Lay pipe after the trench bottom is properly prepared and pipe bedding materials are placed and compacted. Begin laying pipe at the lowest point, with the bell end or groove end laid upgrade. Lay pipe with ends abutting and true to line and grade, carefully centered to form sewer with uniform invert.
   2. Before making pipe joints, verify that all surfaces and materials are clean and dry. Make joints using lubricants, primers, adhesives and related materials as recommended by the pipe or joint manufacturer. Place, fit, joint and adjust jointing materials or factory fabricated joints to obtain a watertight joint.
   3. Maintain trenches water-free and as dry as possible during bedding, laying and jointing. As soon as possible after the joint is made, place sufficient backfill material along each side of the pipe to prevent movement of the pipe from any cause.
   4. Lay pipe to lines and grades by means of laser beams, unless otherwise approved. Maintain minimum slope as directed by code or by accepted engineering standards for the size of pipe used.
   5. Pipe Deflection: ASTM D3034; horizontal and vertical deflection shall not exceed 5% of the nominal inside pipe diameter due to the imposed loads.

D. Drainage Structure Installation: Install drainage structures, castings and accessories in accordance with ODOT 611.
   1. Provide for temporary drainage by delaying permanent installation of castings, or similar methods, where construction grades are below final inlet elevations.

3.03 TESTING:

A. Furnish all labor, materials, and equipment required for making tests by approved methods.

B. Construct all sewers with tight joints. Repair joints that are leaking excessively, or where water is jetting through. Where directed, uncover small diameter sewers and repair defective joints from the outside.

END OF SECTION