PROJECT MANUAL

ADMINISTRATIVE OFFICE RENOVATIONS

BRYAN CITY SCHOOLS
1350 Fountain Grove Drive
Bryan, Ohio 43506

November 15, 2017

Kraig A. Beilharz
Registered Architect #9482

BEILHARZ
ARCHITECTS
INCORPORATED

Project B7-4565

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ADVERTISEMENT FOR BIDS

Sealed Bids will be received by the Bryan City School District Board of Education, in their office, 1350 Fountain Grove Drive, Bryan, Ohio 43506, until 1**2:00 noon EST, Tuesday, December 5, 2017**, when they will be opened and read, for the **Bryan City Schools Administrative Office Renovation**s, located at 1350 Fountain Grove Drive, Bryan, Ohio, in accordance with the Drawings and Specifications prepared by Beilharz Architects, Inc.

A pre-bid meeting will be held in the conference room at the job site at 10:00 am EST, Monday, November 20, 2017.

Contract Documents may be reviewed without charge during business hours at the office of the Architect and various plan rooms requesting documents. Contract Documents may be purchased from Newfax Corporation, 333 W. Woodruff, Toledo, OH 43604, 419-241-5157 or 800-877-5157, 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 (base bid plus all add alternates) or a certified check, cashier's check, or an irrevocable letter of credit in an amount equal to 10% of the bid (base bid plus all add alternates), 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).

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.

This Notice is posted on the Board of Education's internet web site at www.bryan.k12.oh.us/Board; click on Public Notices.

Advertising Date: November 15, 2017.

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 made at the convenience of each Bidder during regular office hours, 7:00 am to 3:30 pm.

2. PROJECT SCHEDULE:

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

3. BIDDERS' QUESTIONS:

A. Questions and technical communications during bidding should be directed to the Architect by email (architects@beilharzinc.com). Requests for bid documents and lists of bidders, and other communications of an administrative nature, should be directed to the Architect by email. A list of bidders and plan holders will be posted at www.newfaxcorp.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 or erasure is corrected as herein provided. An alteration or erasure may be crossed out without obscuring the original information and the correct information 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. 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.

B. 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 responsible 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. The Bidder understands that the Owner has included alternates, which may include deduct

alternates as well as add alternates, to give it the flexibility in building the Project with the funds that are available. The Bidder further understands and acknowledges that use of add and deduct alternates is a long held customary practice in the construction industry in the State of Ohio. The Bidder also acknowledges that the Owner will not make a decision about what alternates on which to base the award of contracts until the bids are received, and the Owner can compare its available funds with the base bids and the cost or savings from selecting different alternates. The Bidder understands that the award to the lowest responsible and responsive Bidder will be based on the lowest base bid plus selected alternates, and may result in an award to a Bidder other than the Bidder that submitted the lowest base bid. Refer to Section 01 2300 for further provisions related to Alternates.

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.

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

COMBINED BID FORM

(Submit two copies of Bid Form and all attachments)

ITEMS:

- ☐ General Work
- ☐ Mechanical Work
- ☐ Electrical Work

☐ The undersigned Bidder does not wish to be considered for the award of any of the individual contract items included in the Combined Bid. Submit only this Bid Form.

☐ The undersigned Bidder does wish to be considered for the award of individual contract items included in the Combined Bid. Submit this Bid Form and attach separate Bid Forms for each contract item to be considered individually.

BIDDER: _____

PROJECT:
Bryan City Schools
Administrative Office Renovations
1350 Fountain Grove Drive
Bryan OH 43506

BIDS DUE AT:
Bryan City Schools
1350 Fountain Grove Drive
Bryan OH 43506

BIDS DUE BY: Tuesday, December 5, 2017, 12:00 Noon EST

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 as Indicated Above 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)
- ☐ Out-of-State Corporation Information
- ☐ Hourly Rates and Markups

SIGNED:

_____ (Signature)	_____ (Name of Company or Corporation)
_____ (Printed Name)	_____ (Business Address)
_____ (Title)	_____ (Date of Signature) _____ (Phone)

BID FORM

(Submit two copies of Bid Form and all attachments)

ITEM: **GENERAL WORK**

BIDDER: _____

PROJECT:
Bryan City Schools
Administrative Office Renovations
1350 Fountain Grove Drive
Bryan OH 43506

BIDS DUE AT:
Bryan City Schools
1350 Fountain Grove Drive
Bryan OH 43506

BIDS DUE BY: **Tuesday, December 5, 2017, 12:00 Noon EST**

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 General 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)
- ☐ Out-of-State Corporation Information
- ☐ Hourly Rates and Markups

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

_____ _____
(Printed Name) (Business Address)

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

BID FORM

(Submit two copies of Bid Form and all attachments)

ITEM: **MECHANICAL WORK**

BIDDER: _____

PROJECT:
Bryan City Schools
Administrative Office Renovations
1350 Fountain Grove Drive
Bryan OH 43506

BIDS DUE AT:
Bryan City Schools
1350 Fountain Grove Drive
Bryan OH 43506

BIDS DUE BY: **Tuesday, December 5, 2017, 12:00 Noon EST**

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 Mechanical 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)
- ☐ Out-of-State Corporation Information
- ☐ Hourly Rates and Markups

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

_____ _____
(Printed Name) (Business Address)

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

BID FORM

(Submit two copies of Bid Form and all attachments)

ITEM: **ELECTRICAL WORK**

BIDDER: _____

PROJECT:
Bryan City Schools
Administrative Office Renovations
1350 Fountain Grove Drive
Bryan OH 43506

BIDS DUE AT:
Bryan City Schools
1350 Fountain Grove Drive
Bryan OH 43506

BIDS DUE BY: **Tuesday, December 5, 2017, 12:00 Noon EST**

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 Electrical 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)
- ☐ Out-of-State Corporation Information
- ☐ 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 Education of Bryan City School District, 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 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)

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 Fax

_____
email

By: _____
Signature

_____
Printed Name

PRIME BIDDER/CONTRACTOR:
(must be completed)

_____
Name of Company or Corporation

_____ _____
Phone Fax

_____
email

By: _____
Signature

_____
Printed Name

ARCHITECT'S RESPONSE:

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

By: _____ Date: _____

Notes: _____

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; maximum 10 percent)

Materials and Supplies: _____ %

Equipment Rental: _____ %

Subcontracts: _____ %

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 Education of Bryan City School District, Williams County, Ohio, 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 Education of Bryan City School District, Williams County, Ohio, for the

_____ Bid Package(s)

in connection with the construction of _____,
(Project)
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)

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

O.R.C. 5719.042

STATE OF OHIO

TO: Bryan City School District
Bryan, Ohio 43506

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

_____, _____.

_____
(Notary Public)

My commission expires:

_____

APPLICATION AND CERTIFICATE FOR PAYMENT

TO OWNER: **Bryan City Schools**
1350 Fountain Grove Drive
Bryan OH 43506

PROJECT: **Administrative Office Renovations**
1350 Fountain Grove Drive
Bryan OH 43506

APPLICATION NO:
PERIOD TO:
ARCHITECT'S PROJECT NO: **B7-4565**

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** $ _____
   e. Percent Complete (Line 4d/Line 3) _____ %
5. **RETAINAGE**
   a. Completed Labor (8% of Line 4a) $ _____
      (same as previous application if Line 4e 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)
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: **Administrative Office Renovations**
ARCHITECT'S PROJECT NO: **B7-4565**

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					
00 6113	**Bonds**													
00 7200	**Insurance**													
01 1000	**General Requirements**													
01 3300	**Submittals**													
01 7000	**Progress Cleaning**													
01 7700	**Final Cleaning**													
01 7700	**Punch List Work**													
01 7700	**Project Record Submittals**													
01 7700	**Training**													
	SHEET TOTALS													
	PROJECT TOTALS													

SCHEDULE OF VALUES

CONTRACTOR:
CONTRACT FOR:

APPLICATION NO:
APPLICATION DATE:

PROJECT: **Administrative Office Renovations**
ARCHITECT'S PROJECT NO: **B7-4565**

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					
	SHEET TOTALS													
	PROJECT TOTALS													

STATE OF OHIO
DEPARTMENT OF TAXATION
CONSTRUCTION CONTRACT EXEMPTION CERTIFICATE

Identification of Contract:

Contractee's (Owner's) name: Bryan City Schools

Exact location of job/project: 1350 Fountain Grove Drive, Bryan OH 43506

Name of job/project as it appears on contract documentation: Administrative Office Renovations

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

- ☒ real property under a construction contract with the United States government, its agencies, the State of Ohio, or an Ohio political subdivision.
- ☐ real property which is owned, or will be accepted for ownership at the time of completion, by the United Stales government, its agencies, the State of Ohio, or an Ohio political subdivision.
- ☐ a house of public worship or religious education.
- ☐ a building used exclusively for charitable purposes by a nonprofit organization operated exclusively for charitable purposes as defined in section 5739.02(B)(12) of the Revised Code.
- ☐ the original construction of a sports facility under section 307.696 of the Revised Code.
- ☐ a hospital facility entitled to exemption under section 140.08 of the Revised Code.

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		**Owner/Contractee**	
Name		Name	Bryan City Schools
Signed by		Signed by	
Title		Title	
Address		Address	1350 Fountain Grove Drive
City, State, Zip		City, State, Zip	Bryan OH 43506
Date		Date	
Subcontractor		**Political Subdivision**	
Name		Name	same as Owner
Signed by		Signed by	
Title		Title	
Address		Address	
City, State, Zip		City, State, Zip	
Date		Date	

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

OWNER:	**Bryan City Schools** **1350 Fountain Grove Drive** **Bryan OH 43506**	PROJECT:	**Administrative Office Renovations**
		ARCHITECT'S PROJECT NO:	**B7-4565**
		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 012900.

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 A201-2007, 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. Contractors shall consult this document and become intimately familiar with its contents before submitting proposals. Copies are available for purchase from the American Institute of Architects, 1735 New York Avenue, N.W., Washington, D.C. 20006, and from local AIA offices.

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 1.1.3: 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. All Drawings issued, including but not limited to architectural, structural, mechanical, electrical, and civil/site Drawings, are included in the Contract Documents for each Prime Contract.

   c. 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 a volume 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 – The Architect: The Architect is Beilharz Architects, Inc., 701½ West First Street, Defiance, Ohio 43512, phone 419-782-6211.

c. 1.1.11 – The Owner: The Owner is the Board of Education of Bryan City School District, 1350 Fountain Grove Drive, Bryan, Ohio 43506.

d. 1.1.12 – Contractor: The term "Contractor" shall refer to each Contractor with which the Owner has entered into a written agreement for Work related to the Project and shall apply to each such Contractor, unless a reference is made to a specific Contractor by trade.

(1) 1.1.12.1 – General Contractor: The General Contractor is responsible, as provided in the Contract Documents, for scheduling the Project, coordinating the Work of the other Contractors, and providing other services related to the Project as identified in the Contract Documents.

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.

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 applicable section of the Ohio Revised Code and provide a copy to the Contractor or a subcontractor or material supplier upon written request within a reasonable time following receipt of that request. The Contractor shall provide a copy of the Notice of Commencement within fifteen days of its receipt of a written request for a copy of the Notice of Commencement from any Subcontractor or Material Supplier to such Subcontractor or Material Supplier.

B. 2.2 – INFORMATION AND SERVICES REQUIRED OF THE OWNER

1. Revise 2.2.1 to read as follows: The Owner shall attach to the Agreement with the Contractor, the certificates of available resources required by Ohio Revised Code Sections 5704.41 and 5704.412, as evidence of available funds to fulfill the Owner's obligations under the Contract.

2. Add the following at the end of 2.2.5: The Contractor may purchase additional copies of the Contract Documents at the cost of reproduction and delivery.

C. 2.4 – OWNER'S RIGHT TO CARRY OUT THE WORK

1. Add 2.4.1 – 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. 3.1 - GENERAL

1. Add 3.1.4 – The award of separate Contracts for the Project requires sequential, coordinated, and otherwise interrelated Contractor operations and may involve delays in the progress of any individual Contractor's Work. Each Contractor with whom the Owner executes a Contract shall cooperate with the General Contractor, the Architect, and other Contractors to minimize interference, disruption, hindrance, or delay of any Work on the Project.

B. 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 work is indicated or specified in such a manner as will make it impossible to produce first class work, or should discrepancies appear in the Contract Documents, the Contractor shall refer same to Architect in writing for interpretation before proceeding with the work. If Contractor fails to make such reference, no excuse will therefore be entertained for failure to carry out work in a satisfactory manner.
3. Add 3.2.6 – Should 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.

C. 3.3 – SUPERVISION AND CONSTRUCTION PROCEDURES

1. Modify 3.3.1 by replacing the period at the end of the first sentence with a comma and adding the following: “in conformity with the coordination of the General Contractor; and shall take orders and directions from the General Contractor and the Architect, to the extent appropriate.”
2. Delete the last sentence of 3.3.1.
3. 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 remove such components when the work is completed. The Contractor shall take all necessary precautions for the safety of employees at the job site at all times.
4. Add 3.3.5 – Neither the Architect’s authority to act under conditions of the Contract Documents nor any decision made to exercise or not to exercise such authority shall give rise to any duty or responsibility of the Architect to the Contractor, any Subcontractor, any of their agents or employees, or any other person performing any of the Work.

D. 3.10 – CONTRACTOR’S CONSTRUCTION SCHEDULES

1. Modify 3.10.3; change “submitted to” to “approved by.”

E. 3.11 – DOCUMENTS AND SAMPLES AT THE SITE

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

F. 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 shall be performed by the Contractor under 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.

G. 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 the required area necessary for construction. Contractor shall confine construction activities to these agreed areas.

H. Add 3.19 – WORKMANSHIP

1. Add 3.19.1 – The workmanship shall be of the highest quality in every respect, as usually recognized in the building industry. Poor or inferior workmanship (as determined by the Architect or inspecting authorities) shall be removed and replaced to conform to the highest 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. 4.2.4 – COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

a. 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 material 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 bind Subcontractors to the Contractors by the terms of the General Conditions and other Contract Documents, insofar as applicable to the work of Subcontractors and 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 Prime Contractor, Subcontractor, or Sub-subcontractor desires to obtain the services of any other Prime Contractor, Subcontractor or Sub-subcontractor, the party hired to do the work shall become a Subcontractor or Sub-subcontractor under the party who has hired him, 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 EXTENSION 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 15.1.6."

2. Add 8.3.4 – Extensions of Contract Time will be granted for legitimate cause to a Contractor on an individual basis. Granting of a time extension to one Contractor does not imply, constitute, or require granting similar time extensions to other contractors.

9. ARTICLE 9 – PAYMENTS AND COMPLETION

A. 9.9 – PARTIAL OCCUPANCY OR USE

1. Add 9.9.4 – The Contractor agrees to let the Owner place and install as much equipment, machinery, fixtures, and merchandise during the process of the work as it is possible before the completion of the various parts of the work. Contractor further agrees that such placing and installation of same does not in any way evidence the completion of the work or any portion of it, nor signify the Owner's acceptance of the work or any part of it. The Owner will attempt to interfere as little as possible with the work of the trades in and about the building, but no Contractor or Subcontractor shall make any claims to the Owner due to such necessary interferences.

2. Add 9.9.5 – 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. 10.3 – HAZARDOUS MATERIALS

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 any 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 furnish complete professional documentation for each product to be used for this Project, certifying that all materials are 100% free of asbestos fibers and other hazardous carcinogenic ingredients.

B. 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.

C. Add 10.5 – RESPONSIBILITIES OF CONTRACTORS

1. Add 10.5.1 – The General 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. These safety precautions shall comply with OSHA regulations.

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 comply with Ohio Industrial Commission Chapter IC-3, Specific Safety Requirements for Construction, and Federal OSHA Safety and Health Regulations for Construction.
5. Add 10.5.5 – The Contractor shall be responsible for any loss or damage caused by the workers of the Contractor and Subcontractors to the equipment or materials of any other Contractor or Subcontractor engaged on the Work.
6. Add 10.5.6 – The Contractor shall adequately protect all public and private utilities and services, and all streets, roads, drives, curbs, walks, pavement, and existing construction, and shall be responsible for all damages sustained to same.
7. Add 10.5.7 – 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.
8. Add 10.5.8 – 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.
9. Add 10.5.9 – The Contractor shall make good any such loss or damage without expense to Owner.
10. Add 10.5.10 – 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.
11. Add 10.5.11 – 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.
12. Add 10.5.12 – 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, material suppliers, and other parties under its control.

11. ARTICLE 11 – INSURANCE AND BONDS

A. 11.1 – CONTRACTOR'S LIABILITY INSURANCE

1. Add 11.1.2.1 – The Contractor and each Subcontractor shall purchase and maintain the insurance required by this Section 11.1 in companies satisfactory to the Owner, with limits not less than those stated below.

   a. Worker's Compensation including Occupational Disease and Employer's Liability Insurance.

      (1) Statutory: Amounts and coverages as required by the state in which the work is to be done, including provisions for voluntary benefits as

required in labor union agreements and including the "All States" endorsement.

(2) Employer's Liability: At least $500,000 each accident.

b. Public Liability including coverage for direction, operations, sublet work, elevators, contractual liability and completed operations.

(1) Bodily Injury Liability including Personal Injuries and Death: $1,000,000 each person, $1,000,000 each occurrence.

(2) Property Damage Liability: $1,000,000 each occurrence, $1,000,000 aggregate. Include Broad Form Property Damage; remove "XCU" Exclusions (explosion, collapse, underground property damage).

(3) Completed Operations Liability: Continue coverage in force for one year after completion of the work.

c. Comprehensive Automobile Liability Insurance including coverage for owned, non-owned and hired vehicles.

(1) Bodily Injury Liability including Personal Injuries and Death: $1,000,000 each person, $1,000,000 each occurrence.

(2) Property Damage Liability: $1,000,000 each occurrence.

d. Liability Insurance may be arranged by Comprehensive General Liability and Comprehensive Automobile Liability policies for the full limits required; or by a combination of underlying Comprehensive Liability policies for less limits with the remaining limits provided by an Excess or Umbrella Liability policy. All liability policies shall be written by the same insurance company.

B. 11.3 – PROPERTY INSURANCE

1. Add 11.3.1.6 – The Owner's property insurance provided under this Section 11.3 is not intended to cover machinery, tools, or equipment owned or rented by the Contractor that are utilized in the performance of the Work but not incorporated into the permanent improvements. The Contractor shall, at the Contractor's own expense, provide insurance coverage for owned or rented machinery, tools, or equipment, which shall be subject to the provisions of Section 11.3.7.

12. ARTICLE 13 – MISCELLANEOUS PROVISIONS

A. 13.5 – TESTS AND INSPECTIONS

1. Add 13.5.7 – When any work is being performed away from the premises, the Contractor shall notify the Architect within a reasonable time 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 13.5.8 – 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.

13. 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, then failure to demand mediation or to file binding dispute resolution proceedings 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.

END OF DOCUMENT

SECTION 01 1000 – SUMMARY OF WORK

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Contract description.

B. Project estimate.

C. Contract time schedule.

D. Liquidated damages.

E. Scope of Work.

F. Work by Owner.

G. Owner-supplied Products.

H. Work restrictions.

I. Use of site.

1.02 CONTRACT DESCRIPTION:

A. Form of Contract: Document A101-2007, Standard Form of Agreement Between Owner and Contractor.

B. Award of Contracts: Contracts will be written with the following Prime Contractors:

1. General Work.
2. Mechanical Work.
3. Electrical Work.

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 $376,500.

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: March 23, 2018.
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 General 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.

1.06 SCOPE OF WORK:

A. Unless specifically noted otherwise, all work shown on the Drawings and described in the Specifications shall be furnished and installed by the appropriate Prime Contractor. Questions concerning the extent of responsibility of any Contractor, or the division of responsibilities between Contractors, shall be brought to the attention of the Architect before bid submission in accordance with the Instructions to Bidders. Each Prime Contractor shall be responsible for the work assigned to them by the Contract Documents, regardless of the location of the assignment.

B. General Conditions, Supplementary Conditions, and all Sections of Division 01 apply to all contracts.

1. Refer to Section 01 5000 for responsibilities of each Contractor for temporary facilities and controls.

C. Contract 1 – General Work:

1. All work shown on the Site (C-) drawings or Architectural (A-) drawings, or specified in Divisions 02 through 12 or 31 through 32, unless listed under the work of another Contract or otherwise excluded.

2. Earthwork related to work performed by other Contractors (e.g. mechanical and electrical piping, etc.) shall be performed by that Contractor under the provisions of Section 31 2000.
3. All work shown or specified elsewhere and specifically identified as being the responsibility of the General Contractor or Site Contractor.
4. All other work shown on the drawings or specified, and not specifically identified as being the responsibility of another Prime Contractor or the Owner.

D. Contract 2 – Mechanical Work:

1. All work shown on the HVAC (M-) drawings or specified in Divisions 22 through 23, unless listed under the work of another Contract or otherwise excluded.
2. All work shown or specified elsewhere and specifically identified as being the responsibility of the Plumbing Contractor, HVAC Contractor, or Mechanical Contractor.

E. Contract 3 – Electrical Work:

1. All work shown on the Electrical (E-) drawings or specified in Divisions 26 through 27, unless listed under the work of another Contract or otherwise excluded.
2. Electric Resistance Heating Units (Section 23 8240).
3. All work shown or specified elsewhere and specifically identified as being the responsibility of the Electrical Contractor, Communications Contractor, or Technology Contractor.

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. Data and voice switches and backbone cabling.

2.02 OWNER-SUPPLIED PRODUCTS:

A. Furnish and install all required structural framing, backing, and support; plumbing rough-in and final connections; and electrical power feeds, communications cabling, and final connections for the following items, which will be furnished and installed by others:

1. Appliances.
2. Board Room monitor and mounting bracket.

B. Furnish and install pathways and cabling for the following systems. System components and final connections will be furnished and installed by others:

1. Wireless access points.

C. Furnish and install conduit raceways and outlets for the following systems. System components, wiring, and final connections will be furnished and installed by others:

1. Fiber optic cabling to temporary offices.

PART 3 EXECUTION

3.01 WORK RESTRICTIONS:

A. Except for the area under renovation, the Owner will occupy the premises during the entire period of construction for the conduct of normal operations.

B. Schedule, coordinate and perform all Work to minimize disruption to Owner's activities.

1. Allow for Owner occupancy and use by the public.

2. 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 and to avoid peak traffic hours.

3. Maintain means of egress from existing building exits at all times designated for public occupancy.

4. Shutdowns of existing systems shall be limited to minimum time required and scheduled with other involved parties. Provide two days written notice of shutdown to Architect and Owner. Shutdowns shall not interfere with scheduled activities.

C. Except as otherwise limited in the Contract Documents, the Prime Contractors jointly 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 each Prime Contractor's use of the premises.

D. Maintain strict separation between the school activities of students and staff from the activities of the construction project.

1. The Owner intends to instruct students, teachers, and staff to refrain from communications with Contractors' personnel working on this Project. All communication with Owner and staff shall be through the Architect.

3.02 USE OF SITE:

A. The Lead Contractor designated in Section 01 3100, in cooperation with the other prime Contractors, shall prepare a proposed Project Use Site Plan, also referred to as a Site Logistics Plan, for approval by Architect and Owner.

B. Contractor shall confine operations at the site to areas within the boundaries indicated and as 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, parking for employees where possible, 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 parking lots and unpaved areas can be used for construction activities. Damage to existing parking lots or unpaved areas 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 SECTION INCLUDES:

A. Contract modification procedures.

B. Schedule of values.

C. Notices of commencement and furnishing.

D. Application for payment.

1.02 RELATED SECTIONS:

A. Section 01 7700 – Closeout Requirements.

1.03 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.

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

1.04 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 provided with this Project Manual. 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.

1.05 NOTICES OF COMMENCEMENT AND FURNISHING:

A. Owner 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 General Contractor.

B. General 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 Prime Contractors, 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.

1.06 APPLICATION FOR PAYMENT:

A. Submit three copies of each Application for Payment to the Architect on the forms provided with this Project Manual. 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 applications. Notarize each copy, keeping embossed seals away from areas intended for Architect's signature and notations.

C. Content and Format:

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. 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.

F. 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.

G. 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. List of Subcontractors and List of Products in accordance with Section 01 3300.

H. Submit the following additional forms in duplicate 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.

I. Submit the following additional forms in duplicate 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. As-built construction progress schedule in accordance with Section 01 3200.

3. Closeout submittals in accordance with Section 01 7700.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 3100 – PROJECT MANAGEMENT AND COORDINATION

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Project coordination.

B. Requests for interpretation.

C. Facility services coordination.

D. Project meetings.

E. Alteration project procedures.

1.02 PROJECT COORDINATION:

A. The General Contractor is designated as the "Lead Contractor" and shall have primary responsibility for coordinating Prime Contractors with each other and with materials furnished by others.

B. Each Prime Contractor shall assign one person who will be on site whenever the work of any trade is in progress 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 their work with other Contractors and Subcontractors.

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.

C. Each Contractor shall coordinate all suppliers and Subcontractors included in their scope of work, and provide adequate labor, equipment and materials as needed.

D. 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 any other

Contractor; afford others every reasonable opportunity for installation and execution of their work and storage of their materials.

E. Alterations to work already placed and necessitated by Contractors' failure to properly coordinate work shall be accomplished at the expense of the negligent Contractor.

F. 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.

G. Provide on-site supervision for material delivery, off-loading, storage, protection, installation and coordination with other Contractors affected by this work.

H. 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. If Contractor fails 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.

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

J. 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, the Contractor shall submit a Request for Interpretation in writing on forms approved by the Architect.

B. The Contractor 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 Prime Contractors 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. Contractor will not be entitled to time extension 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. In the event the Contractor believes that a response constitutes a change to the Contract Documents, Contractor shall promptly give written notice.

G. If a Contractor submits an excessive number of RFIs where the requested information is available to the Contractor 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 Communications) 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 equipment and piping. 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 finish beams, columns, pilasters, walls, casework, and other structural or architectural members as shown on the Drawings. If any work is installed and it later develops that the architectural design cannot be followed, the Contractor installing the conflicting work shall bear the expense of making 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. Readjustment shall be made as directed by the Architect, at the expense of the Contractor causing such conflict. The Architect's decision shall be final in regard to the arrangement 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. Should the Contractor fail to ascertain such locations before proceeding with the work, the work shall be changed at the Contractor'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. The Contractor shall 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 all fixtures, equipment, devices, switches, outlets, and related components, to avoid interferences with and to assure proper coordination with work of all other trades, partitions, walls, cabinets, counters, wall, floor and ceiling patterns, 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 switchgear or panelboards, nor in or above the access space in the immediate vicinity of the electrical switchgear or 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 Contractor.
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. Each Contractor shall verify voltage, amperage, and phase requirements for their work with the service available at the building.

2. All Contractors are cautioned to check with Electrical Contractor to order electrically operated items so that they will operate on the voltage, amperage, and phase provided for them.

3. All Contractors are cautioned to check with Plumbing Contractor to order gas fired items 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 furnishing the item will stand the expense of changing the wiring or piping to accommodate the equipment.

E. Structural Supports: Except as otherwise noted, the Lead Contractor will 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, with the Lead Contractor 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 roof deck, or from open web framing members at any locations other than panel points.

F. Access Panels: Where valves, traps, water hammer arrestors, dampers, electrical equipment, or other specialties are concealed in construction or behind a wall or ceiling surface, Contractor installing components requiring access shall 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 in masonry or gypsum board surfaces 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.

4. Where acoustical ceiling systems with removable panels are used, access doors need not be supplied. Indicate the presence and type of concealed components with a color coded sticker on the ceiling grid.

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.

H. Scope of Work Coordination:

1. Certain motors, disconnects, controls, etc., are provided by HVAC Contractor, who unless otherwise noted, will also provide all controls and control and main line wiring from outlet boxes and final connections. Electrical Contractor shall verify requirements for all other trades to avoid duplicating work to be provided by others.

2. The Electrical Contractor shall furnish all necessary starters and disconnect switches, except on equipment which is to be provided with starters or disconnect switches as part of the assembly. The Electrical Contractor shall furnish all power wiring through starters and disconnect switches to motors.

3. Request copies of approved submittals from other Contractors whose work connects to or interfaces with the work of the Contractor. Alterations to installed work required because of failure to obtain shop drawings and related submittals will not be considered as a basis for adjustment of Contract Sum or Contract Time.

1.05 PROJECT MEETINGS:

A. Preconstruction Meeting:

1. Architect will schedule a meeting after Notice of Award.

2. Attendance Required: Owner, Architect, and all Prime Contractors.
3. 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.
4. Lead Contractor shall record minutes and distribute copies within two days after meeting to Architect, Owner, participants, and those affected by decisions made.

B. Progress Meetings:
1. Lead Contractor shall 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.
2. Attendance Required: Representatives of each Prime Contractor, major Subcontractors and suppliers, as appropriate to agenda topics for each meeting.
3. 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.

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

C. Preinstallation Meetings:

1. When required in individual specification sections, convene a preinstallation meeting prior to commencing work of the section.

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

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

4. Prepare agenda and preside at meeting:

a. Review conditions of installation, preparation and installation procedures.

b. Review coordination with related work.

5. Lead Contractor shall 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, each respective Contractor and subcontractor shall be responsible for removal, rerouting, or replacement of all 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 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 asbestos 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 installers 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. Distribute initial schedule and each revision to all Prime Contractors and each Subcontractor. Coordinate with schedules received from other Prime Contractors.

E. 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.

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

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

H. 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.

I. 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 SECTION INCLUDES:

A. General requirements for submittals.

B. List of subcontractors and products.

C. Shop drawings, product data and samples.

D. Manufacturer's installation instructions and certificates.

1.02 RELATED SECTIONS:

A. Section 01 6000 – Product Requirements: Submittals for substitutions.

B. Section 01 7700 – Closeout Requirements: Contract warranties, operation and maintenance data, and closeout submittals.

1.03 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 and DWF 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. Provide the number of paper submittals required for use by authorities having jurisdiction.

4. Submittals shall be accompanied by a statement from the Contractor 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 for Contractor, 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. Contractor assumes 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.

2. Architect will accept no responsibility for the review of submittals even though they are marked to indicate approval. Architect's review and approval in no way relieves the Contractor of full responsibility for completion of the Work in accordance with the Contract Documents.

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. Architect's review of submittals is a gratuitous assistance, and the Architect does not thereby nor by any other act or omission assume responsibility for errors or omissions. Such errors or omissions shall be made good by the Contractor, 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.

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. Insurance certificates and bonds.

5. Test reports.

6. Environmental product declarations.

7. Engineering calculations.

8. Installation instructions and maintenance recommendations.
9. Manufacturer's field reports.
10. Construction photographs.

1.04 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, items requiring coordination between Contractors, and submittals that may affect final plan approval.

1.05 LIST OF SUBCONTRACTORS:

A. Within 15 days after date of Notice to Proceed, submit list of Subcontractors proposed for use, with 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.

1.06 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.

1.07 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. Electronic Base Drawings: Contractors may obtain drawings from the Architect in Autocad format for use in preparing shop drawings. Drawings will remain the property of the Architect, and will be subject to a License Agreement which must be completed prior to distribution of the Drawings.

1. Cost for the model space base plan file for the project is $250. Additional files, if available, are $50 each.

2. The Architect makes no representation regarding the accuracy or completeness of electronic drawings. Addenda, Change Orders, and other revisions may or may not be included. Electronic drawings are not contract documents, and in case of discrepancy or conflict, the contract documents shall govern.

3. Use of electronic drawings does not relieve the Contractor of duty to check, confirm, and coordinate all dimensions and details, field verify dimensions and conditions, and coordinate the work with that of other Contractors.

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.

1.08 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.

1.09 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.

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.

1.10 MANUFACTURER'S INSTALLATION INSTRUCTIONS:

A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to Architect.

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

1.11 MANUFACTURER CERTIFICATES:

A. When specified in individual specification sections, 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 SECTION INCLUDES:

A. Regulatory requirements.

B. References.

C. Quality assurance and control.

1.02 RELATED SECTIONS:

A. Section 01 3300 – Submittal Procedures: Submittals of manufacturer's instructions and certificates.

B. Section 01 6000 – Product Requirements: Requirements for material and product quality.

1.03 REGULATORY REQUIREMENTS:

A. General Requirements:

1. Perform all Work in conformance with the codes and standards listed in this Section, and with the requirements of all federal, state and local authorities having jurisdiction.

2. It is the Contractor's responsibility to become familiar with all regulatory requirements which may affect his portion of 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.

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 that the Contractor purchases for incorporation into the improvements will be exempt from the state sales and use taxes, if the Contractor provides a properly completed sales tax exemption certificate executed by the Contractor and the Owner 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 by the Contractor 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, including City of Bryan.

E. Permits and Fees:

1. The Architect will apply for Building Plan Approval including General, Mechanical, and Electrical work. The Architect will apply for Plumbing Plan Approval. Contractor will not be responsible for initial filing fees.
   a. All communications related to plan approval, including shop drawing submittals, are required to be made through the Architect.

b. General Contractor shall coordinate shop drawing submittals and correction letter responses with the project schedule, planned not to exceed the allowable number of resubmittals. Fees for additional resubmittals resulting from delinquent, incomplete, or incorrect information will be charged against the Contractor responsible for the resubmittal.

2. Prior to beginning work, Lead Contractor identified in Section 01 3100 shall conduct a meeting with the building inspector, fire chief, and Owner to develop an approved egress plan for existing building exits affected by new construction. Include costs for temporary construction necessary to implement the plan.

3. Except as noted above, each 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.

   a. All costs shall be borne by the Contractor responsible for the work.

   b. 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.

   c. Do not cover or conceal work requiring inspection until inspection has been performed.

   d. At the conclusion of the installation, secure a certificate of final inspection and approval by enforcement authorities.

1.04 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.

1.05 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. Should 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.

B. Personnel:

1. Perform work by persons qualified to produce workmanship of specified quality.
2. The Owner may direct the removal and replacement of any Contractor 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.
   g. Other activity, though lawful, which in the Owner's opinion is not proper construction practice or suitable for an educational environment, including, without limitation, smoking on school property.
   h. Any visible or audible actions initiated or responded to by any employees or Contractors on this Project toward any students, teachers, or staff members at the school system.
3. Upon receipt of a written directive from the Owner requiring removal of an employee for one of the above causes, the Contractor shall 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
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
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.	Mechanical 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
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.	Wolmanized
WT	weight
WWF	welded wire fabric
XFMR	transformer
XFR	transfer
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
AHRI	Air Conditioning, Heating, and Refrigeration Institute
AISC	American Institute of Steel Construction
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
CISPI	Cast Iron Soil Pipe Institute
CRSI	Concrete Reinforcing Steel Institute
CSI	Construction Specifications Institute
DHI	Door Hardware Institute

DOC	Department of Commerce
ECIA	Electronic Components Industry Association
EPA	Environmental Protection Agency
FM	Factory Mutual
FSC	Forest Stewardship Council
GA	Gypsum Association
IES	Illuminating Engineering Society
MBMA	Metal Building Manufacturers Association
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
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NFRC	National Fenestration Rating Council
NRCA	National Roofing Contractors Association
NWWDA	National Wood Window and Door Association
OBBC	Ohio Basic Building Code
ODOT	Ohio Department of Transportation
OSHA	Occupational Safety and Health Administration
PDI	Plumbing and Drainage Institute
PS	Product Standards
SDI	Steel Deck Institute
SDI	Steel Door Institute
SJI	Steel Joist Institute
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SSPC	Society for Protective Coatings
TIA	Telecommunications Industry Association
TPS	Technical Preservation Services, National Park Service
UBC	Uniform Building Code
UL	Underwriters Laboratories
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 REFERENCES:

A. ACI 318 – Building Code Requirements for Structural Concrete.

B. ASTM C33 – Concrete Aggregates.

C. ASTM C39 – Compressive Strength of Cylindrical Concrete Specimens.

D. ASTM C42 – Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.

E. ASTM C143 – Slump of Hydraulic-Cement Concrete.

F. ASTM C150 – Portland Cement.

G. ASTM C172 – Sampling Freshly Mixed Concrete.

H. ASTM C173 – Air Content of Freshly Mixed Concrete by the Volumetric Method.

I. ASTM C231 – Air Content of Freshly Mixed Concrete by the Pressure Method.

1.03 TESTING AND INSPECTING SERVICES:

A. Coordinate inspection and testing work with independent testing firm employed by Owner. The independent firm will perform inspections, tests, and other services scheduled in this Section and as required by the Architect.

1. 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 independent 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 independent firm at Contractor's expense on instructions from the Architect.

3. The independent firm is not authorized to revoke, alter, relax, enlarge, or release any requirement of the Contract Documents.

D. Cooperate with independent 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 independent firm 48 hours prior to expected time for operations requiring services.

2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.

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

1.04 SUBMITTALS:

A. The independent 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. 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. Scope of testing work is subject to modification at the discretion of the Owner and authorities having jurisdiction.

B. Concrete Testing:

1. Independent firm shall test all 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) Should 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 SECTION INCLUDES:

A. Temporary Utilities: Electricity; lighting; heat and ventilation; telephone service; water.

B. Construction Facilities: Sanitary facilities.

C. Access facilities.

D. Isolation of work areas in occupied facilities.

E. Temporary barriers, enclosures, fencing, and security.

F. Temporary Controls: Fire protection; snow removal; water control.

1.02 RELATED SECTIONS:

A. Section 01 5214 – Temporary Offices.

B. Section 01 7000 – Execution Requirements: Progress cleaning, waste management and disposal; protecting installed construction.

C. Section 01 7700 – Closeout Requirements: Final cleaning.

1.03 REFERENCES:

A. ODOT SS 832 – Temporary Sediment and Erosion Control.

1.04 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.

3. Obtain easements to bring temporary utilities to the site where the Owner's easements cannot be used for that purpose.

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

1.05 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.

1.06 COORDINATION OF MULTIPLE PRIME CONTRACTORS:

A. Electrical Contractor shall install, maintain, and remove temporary electrical power and lighting.

1. General Contractor shall be responsible for the conservation of electrical energy, and shall turn off all lights, except those required for security purposes, at the end of each work day.

2. Electrical Contractor shall provide power outlets for construction operations, in excess of the minimum facilities specified, at the expense of the Contractor requiring same.

3. Each Contractor shall provide plug-in power cords and extension cords, supplementary plug-in task lighting, and special lighting necessary exclusively for its own activities.

4. Each Contractor requiring power for welding operations shall provide generators or other temporary power source as required.

B. HVAC Contractor shall install and maintain temporary heat and ventilation systems.

1. HVAC Contractor shall pay for electrical work necessary for installation of temporary heat and ventilation systems, including controls.

2. Electrical wiring for permanent HVAC equipment mounted in its permanent location for temporary use shall be provided by the Electrical Contractor.

3. Owner will pay for fuel and electricity required for operation of the temporary heat and ventilation systems. Exercise all measures directed by Owner for the conservation of energy.

C. Each Contractor shall provide, maintain, and pay for telephone and internet service and provide access to Architect and Owner as requested.

D. Plumbing Contractor shall install, maintain, and remove temporary water service.

1. Each Contractor shall provide temporary hoses and other means of conveying water from temporary water outlets to work areas.

E. General Contractor shall install, maintain, and remove temporary sanitary facilities.

F. General Contractor shall install, maintain, and remove temporary barriers, fencing, water control, enclosures, fire extinguishers and access facilities.

1. Where temporary locks are provided, provide access to all Prime Contractors, Architect, and Owner.

2. General Contractor shall assume primary responsibility for security and access control, and shall keep doors and gates locked during nights, weekends and other times when construction is not in progress.

G. General Contractor shall assume primary responsibility for snow removal, progress cleaning and construction waste management and disposal in accordance with Section 01 7000, and final cleaning in accordance with Section 01 7700.

1. General Contractor shall provide and maintain dumpsters or containers for the collection of small trash and debris, for use by all Prime Contractors.

2. Each Prime Contractor shall perform progress cleaning daily in areas where construction is in progress. Collect non-hazardous waste materials, debris, packaging materials, and rubbish in dumpsters or other approved locations designated by General Contractor.

3. Progress cleaning not performed by others shall be performed by the General Contractor at the expense of the negligent party.

1.07 TEMPORARY ELECTRICITY:

A. Cost: By Owner; 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 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.

1.08 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES:

A. Provide and maintain lighting for construction operations to achieve a minimum lighting level of 2 watt/sq ft or 5 footcandles per sq ft, whichever is greater.

1. At corridors, provide minimum one 200 watt fixture at 20 foot maximum spacing.
2. Provide lighting at each fire extinguisher location, 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 watt/sq ft.

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

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 lamps are operable at Substantial Completion.

1.09 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. 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. 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:

a. Utilize existing HVAC equipment where present. Extend and supplement 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.

b. Provide and pay for maintenance, lubrication, regular replacement of filters, and replacement of worn or consumed parts as necessary.

c. 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:

a. Assemble and set in place permanent HVAC system components. 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.

F. 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.

1.10 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.

1.11 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.

B. Owner will pay cost of water used. Exercise measures to conserve water.

C. 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.

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

E. 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.

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

1.12 TEMPORARY BUILDINGS:

A. 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, and each Prime Contractor. Provide first aid kit and portable fire extinguisher.

1. Temporary construction offices may be located in the renovation area. Schedule work and relocate offices as required to avoid disruption of activities.

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.

1.13 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.

1.14 ACCESS FACILITIES:

A. Construct and maintain 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. Provide and maintain access to fire hydrants, free of obstructions.

C. 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.

D. Vehicular Access and Parking:

1. Limit construction traffic on existing on-site roads to designated routes.

2. Limit parking for private vehicles of Contractors, Subcontractors and their personnel to designated areas.

3. When site space is not adequate, provide additional off-site parking.

E. Staging Areas and Material Storage:

1. Construct and maintain temporary gravel areas to accommodate staging and outdoor storage of construction materials.

2. Locate to coincide with permanent paved areas where applicable. Coordinate with grading and compaction of subgrade, installation and stabilization of subbase.

F. 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.

1.15 ISOLATION OF WORK AREAS IN OCCUPIED FACILITIES:

A. Provide temporary partitions and ceilings as indicated and as necessary to separate work areas from Owner occupied areas, to prevent penetration of dust and moisture into Owner occupied areas, and to prevent damage to existing materials and equipment.

1. Construction: Framing and plywood or gypsum board sheet materials with closed joints and sealed edges at intersections with existing surfaces. Paint surfaces exposed to view from Owner occupied areas.

B. Prevent dust, fumes, and odors from entering occupied areas.

1. Disconnect supply and return ductwork in work area from HVAC system serving occupied areas.

2. Maintain negative air pressure within work area using HEPA-equipped air filtration units.

3. Use vacuum collection attachments on dust producing equipment.

4. Where limited work is required within occupied areas, use portable dust containment devices.

5. Perform progress cleaning and final cleaning using vacuum equipment equipped with HEPA filters.

1.16 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 construction 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.

1.17 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.

1.18 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.

1.19 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. Prime Contractors and their 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.

1.20 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. 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, 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.

1.21 SNOW REMOVAL:

A. Owner will provide snow removal from Owner occupied roads, parking areas and building entrances.

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

1.22 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.

1.23 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 5214 – TEMPORARY OFFICES

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Prefabricated modular units for temporary office use.

1.02 RELATED SECTIONS:

A. Section 03 3000 – Cast-in-Place Concrete.

B. Division 26 – Electrical: Electrical connections to building.

1.03 REFERENCES:

A. ADA (Americans with Disabilities Act) – Standards for Accessible Design.

1.04 DESIGN REQUIREMENTS:

A. Design members to withstand dead load, applicable snow load, seismic loads, and design loads due to pressure and suction of wind calculated in accordance with the applicable building code, 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.

B. Perform heating and cooling load calculations for the building; design HVAC systems to maintain 72 degrees F in the heating system and 75 degrees F in the cooling season, with adequate heating and cooling for operation with the ventilation system on days in which the design temperature limits are reached.

1.05 SUBMITTALS FOR INFORMATION:

A. Submit under provisions of Section 01 3300.

B. Industrialized Unit Drawings: Indicate State of Ohio approval; footing dimensions and tie-down locations; building plans, elevations, sections, and details; dimensions, connections, attachments, openings; HVAC and electrical component layout and details.

1.06 QUALITY ASSURANCE:

A. Regulatory Requirements:

1. Buildings shall be approved for use in the State of Ohio under the following classifications:

a. Occupancy: Business Group B.

b. Construction Type: VB.

2. Ensure building dimensions and properties of individual components are in conformance with applicable requirements of ADA.

3. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., or other testing firm acceptable to authority having jurisdiction, as suitable for the purpose specified and indicated.

B. Manufacturer Qualifications: Modular building manufacturer with minimum 10 years experience; approved by the State of Ohio as an industrialized unit manufacturer, with completed installations of existing approved models of similar construction within the state.

PART 2 PRODUCTS

2.01 MANUFACTURED UNITS:

A. 12 x 60 foot minimum nominal size; open office area and two private offices.

2.02 COMPONENTS:

A. Structural Frame: Steel beams, channels, angles, plates, tubing, and other components engineered to support required loads; detachable hitch with bolt-on coupler and leveling jack.

B. Perimeter Skirting: Vinyl.

C. Floor and Wall Construction: Wood framing and sheathing; insulated exterior and interior walls; interior walls finished with gypsum board or plywood paneling.

D. Roof Construction: Wood framing and sheathing as required to meet roof assembly requirements in accordance with applicable building code; insulated; finished gypsum board ceiling.

E. Exterior Doors: Insulated hollow metal doors and frames, 36 x 84 inch; office function lever lockset; parallel arm closer; weatherstripping; accessible threshold.

1. Keying: Provide 10 keys to Owner.

F. Interior Doors: Wood doors, 36 x 84 inch, with wood or hollow metal frames; lever lockset.

G. Flooring: Carpet.

H. Fire Extinguishers: Provide 10 lb. ABC type fire extinguisher at each exterior door, with wall bracket.

I. HVAC: Capacity as required by project conditions; electric heat and cooling, with programmable electronic wall thermostat.

J. Electrical:

1. Service Entrance Panelboard: 120/208 volt, minimum 150 amp, three phase, 60 Hz, with separate exterior disconnect.

2. Wiring Devices: Minimum twenty 15 amp duplex receptacles.

3. Lighting:
    a. General Lighting: 40 footcandles at 30 inches above floor; one of the following types:
        (1) Fluorescent fixtures with F32T8 lamps, prismatic acrylic diffusers, and electronic ballasts.
        (2) LED.
    b. Provide weatherproof exterior light at each building exit, minimum 850 lumens.
    c. Provide exit and emergency fixtures with 90 minute battery backup as required by code.

K. Crawl Space: 6 mil clear polyethylene vapor retarder with granular cover.

PART 3 EXECUTION

3.01 EXAMINATION:

A. Verify installation of foundation piers and tie down anchors in accordance with Section 03 3000.

B. Verify installation of vapor retarder and granular crawl space surfacing.

C. Verify that site utilities are installed and ready for connection to units.

3.02 INSTALLATION:

A. Transport unit to site. Place unit in final position, firmly supported and level.

B. Install tie downs to secure unit substructure to footings.

C. Connect site utilities to unit.

D. Install skirting, with provisions for access and ventilation.

E. Coordinate installation of stairs, ramps, and walkways to meet accessibility and means of egress requirements.

F. Install materials provided for field installation.

3.03 ADJUSTING:

A. Reattach or repair components damaged or disturbed by transportation to site.

3.04 CLEANING:

A. Provide final cleaning of building interior and exterior in accordance with Section 01 7700.

3.05 CLOSEOUT ACTIVITIES:

A. After termination of Owner occupancy, disconnect unit from utilities and foundations; remove from site.

B. Remove foundations and tie-downs, underground utilities, vapor retarder and granular crawl space surfacing. Grade site as indicated.

END OF SECTION

SECTION 01 6000 – PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Basic product requirements.

B. Product options.

C. Product substitution procedures.

D. Product delivery requirements.

E. Product storage and handling requirements.

1.02 BASIC PRODUCT REQUIREMENTS:

A. Provide new equipment and materials meeting first-class 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. Do not use materials containing asbestos.

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

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

G. 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: Products of manufacturers named and meeting specified criteria, standards and description. Where provision for substitution is referenced, submit a request for substitution in accordance with the following article for any manufacturer not named. Where no provision for substitution is listed, no options or substitutions are allowed.

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 of listed manufacturers 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 article. No substitutions are permitted unless specifically approved in writing for this Work by the Architect.

1.04 PRODUCT 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, 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 (Document 00 4325) 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. Substitution requests made after contract award shall be accompanied by statements from each Prime Contractor identifying the coordination requirements and related impact on Contract Sum and Contract Time, or certifying that Contract Sum and Contract Time will not be affected.
6. Architect will notify submitter of decision to accept or reject request. Architect's decision is final.
7. 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

[CMR] 3.01 ATTACHMENTS:

A. Substitution Request Form.

[not CMR] Not Used

END OF SECTION

SECTION 01 7000 – EXECUTION REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Examination.

B. Preparation.

C. Execution.

D. Progress cleaning.

E. Construction waste management and disposal.

F. Protecting installed construction.

1.02 RELATED SECTIONS:

A. Section 01 7700 – Closeout Requirements: Final cleaning.

B. Section 02 4119 – Selective Demolition.

1.03 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

B. 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.

1.04 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.

1.05 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.

1.06 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: General Contractor shall provide chases, openings, and recesses in new construction, where so indicated by each Contractor requiring such provisions. Each Contractor shall furnish information to General Contractor as to size, location, and related requirements, and shall provide and set in place, all boxes, sleeves, inserts, and similar components.

   a. If any Contractor fails to give the required data to other Contractors in time for openings to be left, or if he fails to set boxes, sleeves, inserts, forms, and similar components, he shall perform required cutting and restoring at his expense. Openings shall be accurately located, neatly cut and no larger than necessary.

2. Existing Walls, Floors and Ceilings: Where cutting and patching is required in existing construction, such work shall be done at the expense of the Contractor requiring same, unless specifically noted otherwise. All 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, Contractor requiring same shall employ a skilled and experienced Roofing Subcontractor acceptable to the Architect and Owner to perform such work.

   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. Minimize cutting and patching in construction with fire or smoke separation requirements, where shown on the Drawings. Execute work by methods which will not reduce fire ratings or permit passage of smoke.

9. Cut masonry and concrete materials using masonry saw or core drill.

10. Do not cut, notch, or bore holes in metal framing members without approval; utilize factory punch-outs or holes where present. Do not cut or notch flanges.

11. Restore Work with new Products in accordance with requirements of Contract Documents.

12. 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.

13. Identify hazardous substances and conditions exposed during the Work to the Architect for decision or remedy.

C. Above-Ceiling Work: Where work is required above existing suspended ceilings scheduled to remain, or where new suspended ceilings are installed before overhead work is complete, remove and protect ceiling panels as required for access to work areas. Use caution to avoid damage to ceiling grid. Reinstall ceiling panels when work is complete and tested. Coordinate and pay for repair or replacement of grid, panels, and related components damaged during performance of the work.

D. 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 pipe chases, plenums, attics, crawl spaces, shafts, trenches, equipment vaults, manholes, 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.

E. Collect non-hazardous waste materials, debris, packaging materials, and rubbish on a daily basis 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 SECTION INCLUDES:

A. Final cleaning.

B. Training and demonstration.

C. Closeout procedures.

D. Project record documents.

E. Operation and maintenance data.

F. Warranties.

G. Spare parts and maintenance materials.

1.02 RELATED SECTIONS:

A. Section 01 2900 – Payment Procedures.

B. Section 01 3100 – Project Management and Coordination.

C. Section 01 7000 – Execution Requirements: Progress cleaning.

1.03 FINAL CLEANING:

A. Execute final cleaning when indicated, 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), to a polished condition; remove vision-obscuring materials and substances. Replace broken glass and damaged materials.

3. Clean exposed hard-surfaced materials to a dirt-free condition, free of dust, stains, films, and noticeable distracting substances.

4. Wipe surfaces of mechanical and electrical equipment clean; remove excess lubrication and other substances.

5. Remove spatters or other deposits of paint, concrete, adhesives, roofing, dirt, soil, oil, or any other material foreign to the surface involved.

6. Vacuum clean carpeted and soft surfaces.
7. Clean plumbing fixtures to a sanitary condition, free of stains, including those resulting from water exposure.
8. Clean light fixtures and lamps to function with full efficiency.
9. Wet mop hard surface floors.
10. Replace filters of operating equipment.
11. Clean debris from roofs and drainage systems.
12. 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.
13. 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.

1.04 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.

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.

E. Training and demonstration must be completed prior to Substantial Completion, except that for equipment requiring seasonal operation, training and demonstration may be delayed up to 6 months subject to Owner's approval.

F. 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.

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

H. 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.

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

1.05 CLOSEOUT PROCEDURES:

A. The Lead Contractor as designated in Section 01 3100 shall schedule and coordinate final inspections and testing with each Prime Contractor to obtain approval of all applicable regulatory agencies.

1. Lead Contractor's supervisory personnel shall remain on site full-time whenever the work of any trade is in progress, until final inspections have been completed.

B. 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.

C. 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.

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

1.06 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 Shop Drawings, Product Data, and Samples.
   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. 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 locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.

2. Changes made by Addenda and modifications.
3. Field changes of dimension and detail.
4. Details not on original Contract drawings.

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

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

1.07 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 equipment, clearly identifying specific product or part installed, with product options and accessory items indicated.
   c. Shop drawings and product data.

d. Schematic drawings, wiring diagrams, and flow diagrams for each system, with parts list for each component.

e. Step-by-step procedures for start-up, seasonal changeover, and shut-down of each system and piece of equipment.

f. Equipment engineering manuals.

g. Installation instructions.

h. Operating instructions.

i. Maintenance instructions for equipment and systems, including lubrication and filter replacement requirements, recommended service intervals, and troubleshooting procedures.

j. Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.

k. 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.

1.08 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 have punch 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's warranty shall include coverage for labor required to remove defective Work and install replacement materials.

5. 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.

1.09 SPARE PARTS AND MAINTENANCE MATERIALS:

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

B. 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 SECTION INCLUDES:

A. Minor demolition and removal for remodeling.

1.02 RELATED SECTIONS:

A. Section 01 3100 – Project Management and Coordination: Alteration project procedures.

B. Section 01 5000 – Temporary Facilities and Controls: Temporary enclosures.

C. Section 01 7000 – Execution Requirements: Cutting and patching; items removed for reinstallation; progress cleaning; construction waste management and disposal.

1.03 REFERENCES:

A. RFCI (Resilient Floor Covering Institute) – Recommended Work Practices for Removal of Resilient Floor Coverings.

1.04 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 all requirements of the Ohio Environmental Protection Agency and the 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. This Contractor's base bid shall be submitted on the basis that the amount of regulated asbestos-containing material (RACM) to be removed or disturbed, if any, will 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.

1.05 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.

1.06 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 all 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 Slabs: Saw cut existing materials to provide a neat joint at removal limits, except where removal terminates at an existing joint.

D. Removal of 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.

E. 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.

F. 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.

G. 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.

H. 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. Transportation and disposal fees for removed materials shall be paid by the Contractor.

1. Dispose of materials removed from the site in a legal location and manner.

2. 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.

3. 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.

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

J. 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. Coordinate utility service outages with Utility Company and Owner.

3. Provide temporary wiring and connections to maintain existing systems in service during construction.

4. 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.
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. 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 3000 – CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Cast-in-place concrete.

1. Foundations.
2. Floors and slabs on grade

B. Concrete reinforcing.

C. Concrete curing.

D. Concrete finishing.

1.02 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION:

A. Divisions 22 through 27: Facility Services items for casting into concrete.

1.03 RELATED SECTIONS:

A. Section 01 4520 – Testing and Inspecting Services.

B. Section 01 5214 – Temporary Offices.

1.04 REFERENCES:

A. ACI 301 – Structural Concrete for Buildings.

B. ACI 302 – Guide for Concrete Floor and Slab Construction.

C. ACI 304 – Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.

D. ACI 305R – Hot Weather Concreting.

E. ACI 306R – Cold Weather Concreting.

F. ACI 308 – Standard Practice for Curing Concrete.

G. ACI 318 – Building Code Requirements for Structural Concrete.

H. ACI SP-66 – Detailing Manual.

I. ASTM A184 – Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.

J. ASTM A1064 – Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

K. ASTM A615 – Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

L. ASTM C33 – Concrete Aggregates.

M. ASTM C94 – Ready-Mixed Concrete.

N. ASTM C150 – Portland Cement.

O. ASTM C171 – Sheet Materials for Curing Concrete.

P. ASTM C260 – Air-Entraining Admixtures for Concrete.

Q. ASTM C309 – Liquid Membrane-Forming Compounds for Curing Concrete.

R. ASTM C494 – Chemical Admixtures for Concrete.

S. ASTM C618 – Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.

T. ASTM C881 – Epoxy-Resin-Base Bonding Systems for Concrete.

U. ASTM C920 – Elastomeric Joint Sealants.

V. ASTM C989 – Slag Cement for Use in Concrete and Mortars.

W. ASTM C1017 – Chemical Admixtures for Use in Producing Flowing Concrete.

X. ASTM C1602 – Mixing Water Used in Production of Hydraulic Cement Concrete.

Y. ASTM D994 – Preformed Expansion Joint Filler for Concrete (Bituminous Type).

Z. ASTM D1751 – Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

AA. ASTM D4819 – Flexible Cellular Materials Made From Polyolefin Plastics.

BB. ASTM E154 – Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.

CC. ASTM E1643 – Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

DD. ASTM E1745 – Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

EE. CRSI – Manual of Practice.

FF. CRSI 63 – Recommended Practice for Placing Reinforcing Bars.

GG. CRSI 65 – Recommended Practice for Placing Bar Supports, Specifications and Nomenclature.

1.05 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

B. Shop Drawings:

1. Reinforcing: Indicate bar sizes, spacings, locations, and quantities of reinforcing steel and wire fabric, bending and cutting schedules, and supporting and spacing devices.

2. Joint Layout: Indicate layouts and joint locations for slabs. Indicate locations of all construction joints.

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

D. Submittals For Information:

1. Submit certified copies of mill test report of reinforcement materials analysis.

2. Delivery Slips: For each delivery of ready mix concrete, include data on concrete mix and admixtures, with signature of Contractor's or Subcontractor's representative accepting delivery.

1.06 QUALITY ASSURANCE:

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

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.

1.07 DELIVERY, STORAGE AND HANDLING:

A. Deliver, store, protect, and handle products to site under provisions of Section 01 6000.

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

1.08 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.

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.

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 minimum cement content for each concrete mix.

b. Other Locations: Fly ash may be substituted for up to 25 percent of the minimum 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 minimum 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: Admixtures shall be the products of a single manufacturer.

1. GCP Applied Technologies.

2. Master Builders Solutions.

3. Premiere Concrete Admixtures.

4. Sika Corporation.

5. Substitutions: Refer to Section 01 6000.

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:

a. Master Builders; Set Grout.
b. Sonneborn Building Products; Sonogrout.
c. Sika Corporation; Sika Grout 212.
d. Substitutions: Refer to Section 01 6000.

C. Bonding Agent: Polymer resin emulsion.

1. Manufacturers:

a. GCP Applied Technologies; Daraweld-C.
b. Master Builders Solutions; MasterEmaco A660.
c. Sika Corporation; Sika Bond.
d. Substitutions: Refer to Section 01 6000.

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.

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:

a. Heckmann Building Products, No. 95.

b. Substitutions: Refer to Section 01 6000.

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:

a. Master Builders Solutions; MasterSeal SL 2.

b. Quaker Sealants & Coatings Company; QSC-231.

c. Sika Corporation; Sikaflex-2c SL.

d. Tremco, Inc.; THC 900/901.

e. Substitutions: Refer to Section 01 6000.

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. Exterior Concrete, and Concrete Exposed to Weather:

a. Compressive Strength (28 day): 4500 psi.

b. Minimum Cement Content: 564 lbs. per cubic yard.

c. Air Entrained: In accordance with ACI 301.

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

2. Interior Concrete Slabs, and Concrete Work Not Otherwise Scheduled:

a. Compressive Strength (28 day): 3500 psi.

b. Minimum Cement Content: 520 lbs. per cubic yard.

c. Aggregate Size (maximum): 1 inch.

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

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

E. The use of calcium chloride is not permitted.

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

G. 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:

a. Euclid Chemical Co.; Kurez DR VOX.

b. Laticrete International.

c. Tamms Industries.

d. W. R. Meadows, Inc.

e. Substitutions: Refer to Section 01 6000.

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 all 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.

D. Coordinate floor slab elevations and hold downs with finish flooring materials scheduled.

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 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.

   a. 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.

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 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. Interior Slabs Not Otherwise Scheduled: Troweled finish.

B. Tool exposed slab edges, expansion joints, and tooled control joints with ¼ inch radius edging tool.

3.06 FLOOR FINISHING TOLERANCES:

A. Maximum Variation of Surface Flatness: ¼ inch in 10 ft, ACI 301 Class B.

B. Correct defects by grinding or removal and replacement of the defective work. Remeasure corrected areas by the same process.

3.07 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.

3.08 FIELD QUALITY CONTROL:

A. Testing firm will perform concrete testing in accordance with Section 014520.

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.

3.09 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 05 5000 – METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Shop fabricated steel items.

1.02 RELATED SECTIONS:

A. Section 09 9000 – Painting and Coating.

1.03 REFERENCES:

A. ASTM A36 – Carbon Structural Steel.

B. ASTM A307 – Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.

C. AWS D1.1 – Structural Welding Code - Steel.

D. SSPC 15 – Steel Joist Shop Primer.

1.04 PERFORMANCE REQUIREMENTS:

A. Conform to applicable building code for applicable loads.

1.05 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

B. Shop Drawings: Indicate materials, finishes, profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.

1. Indicate welded connections using standard AWS welding symbols. Indicate net weld lengths.

PART 2 PRODUCTS

2.01 MATERIALS:

A. Steel Sections and Plates: ASTM A36.

B. Bolts, Nuts, and Washers: ASTM A307.

C. Welding Materials: AWS D1.1; type required for materials being welded.

1. Welding Electrodes: E70XX.

D. Shop and Touch-Up Primer: SSPC 15, Type 1, red oxide.

E. All materials shall be new and free from rust.

2.02 FABRICATION:

A. Fit and shop assemble items in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured. Miter members at changes of direction, except where specifically noted otherwise.

C. Continuously seal joined members by continuous welds or by intermittent welds and plastic filler.

D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

E. Exposed Mechanical Fastenings: Flush countersink screws or bolts, unobtrusively located, consistent with design of component, except where specifically noted otherwise.

F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

G. Drill or punch all holes required for the attachment of work of other trades.

2.03 FABRICATION TOLERANCES:

A. Squareness: 1/8 inch maximum difference in diagonal measurements.

B. Maximum Offset Between Faces: 1/16 inch.

C. Maximum Misalignment of Adjacent Members: 1/16 inch.

D. Maximum Bow: 1/8 inch in 48 inches.

E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

2.04 FINISHES:

A. Surfaces to be Primed: Prepare in accordance with SSPC procedures.

1. Do not prime surfaces that will be field welded or in contact with concrete or grout.

2. Prime paint items with one coat.

PART 3 EXECUTION

3.01 EXAMINATION:

A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION:

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply items required to be cast into concrete or embedded in masonry with setting templates. Coordinate work with installer.

3.03 INSTALLATION:

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Field weld components indicated on shop drawings. Perform field welding in accordance with AWS D1.1.

D. Obtain approval prior to site cutting or making adjustments not scheduled.

E. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

3.04 SCHEDULE:

A. The following Schedule is a list of principal items only. Refer to Drawing details for items not specifically scheduled.

B. Loose Lintels: Steel sections as indicated; prime paint finish.

C. Equipment Frames: Steel sections as indicated; prime paint finish.

D. Joist Reinforcing: Steel sections as indicated; prime paint finish.

E. Supplemental Support Framing: Light gauge galvanized steel channel framing systems.

1. Manufacturers:

a. Tyco Electrical & Metal Products; Unistrut.

b. Cooper B-Line, Inc.; 4Dimension.

c. Thomas & Betts; Superstrut.

d. Substitutions: Refer to Section 01 6000.

END OF SECTION

SECTION 06 0573 – WOOD TREATMENT

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Preservative treatment of wood.

1.02 RELATED SECTIONS:

A. Section 06 1050 – Miscellaneous Rough Carpentry.

1.03 REFERENCES:

A. AWPA M4 – Standard for the Care of Preservative-Treated Wood Products.

B. AWPA P5 – Standard for Waterborne Preservatives.

C. AWPA U1 – Use Category System: User Specification For Treated Wood.

D. AWPA T1 – Use Category System: Processing and Treatment Standard.

1.04 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

B. Product Data: Provide technical data on wood preservative materials, and application instructions.

C. Manufacturer's Certificate: Certify that treated wood products, including both lumber and sheathing, comply with specified requirements and governing codes.

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. Exterior, Roof, and Parapet Locations: AWPA Use Category UC3B.

2. Applications Not Otherwise Scheduled: AWPA U1 Table 3-1.

END OF SECTION

SECTION 06 1050 – MISCELLANEOUS ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Miscellaneous framing and sheathing.

B. Blocking in wall and roof openings.

C. Concealed wood blocking for support of door stops, visual display boards, equipment, casework, furnishings, mechanical and electrical items, and other accessories.

1.02 RELATED SECTIONS:

A. Section 01 5000 – Temporary Facilities and Controls: Temporary enclosures and barriers.

B. Section 06 0573 – Wood Treatment.

1.03 REFERENCES:

A. AFPA (American Forest and Paper Association).

B. ALSC (American Lumber Standards Committee) – Softwood Lumber Standards.

C. DOC PS 1 – Construction and Industrial Plywood.

D. DOC PS 2 – Wood-based Structural-Use Panels.

E. NLGA (National Lumber Grades Authority).

F. SPIB (Southern Pine Inspection Bureau).

1.04 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 MATERIALS:

A. Lumber Grading Rules: AFPA, SPIB, and NLGA.

B. 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.

C. Wood Panel Materials: DOC PS 1 or DOC PS 2.

1. Miscellaneous Sheathing (Exterior): APA Rated Sheathing, preservative treated, Span Rating 48/24, Exposure Durability 1; sanded faces; thickness as indicated, 48 x 96 inch sized sheets, square edges.

2. Miscellaneous Sheathing (Interior): APA Rated Sheathing, fire retardant treated, Span Rating 48/24, Exposure Durability 1; sanded faces; thickness as indicated, 48 x 96 inch sized sheets, square edges.

2.02 ACCESSORIES:

A. Fasteners and Anchors:

1. Fasteners: Hot dipped galvanized steel for high humidity and treated wood locations, and all exterior locations; unfinished steel elsewhere.

2. Anchors:

a. Toggle bolt type for anchorage to hollow masonry.

b. Expansion shield and lag bolt type for anchorage to solid masonry or concrete.

c. Bolt or ballistic fastener for anchorage to steel.

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. Place horizontal members with crown side up.

D. Space framing and furring 16 inches o.c., except where indicated otherwise.

E. Construct load bearing members full length without splices.

F. Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members.

G. Coordinate curb installation with support of roof openings, roofing installation, and related construction.

H. Coordinate installation of furring, and blocking with requirements of items to be anchored thereto or supported thereby.

I. Secure sheathing with longer edge perpendicular to framing members and with ends staggered and sheet ends over bearing.

3.02 TOLERANCES:

A. Framing Members: ¼ inch from true position, maximum.

END OF SECTION

SECTION 07 8400 – FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Firestop systems for penetrations through fire resistance rated assemblies.

1.02 RELATED SECTIONS:

A. Division 22 – Plumbing.

B. Section 22 0700 – Plumbing Insulation.

C. Division 23 – Heating, Ventilating, and Air Conditioning.

D. Section 23 0700 – HVAC Insulation.

E. Division 26 – Electrical.

F. Division 27 – Communications.

1.03 REFERENCES:

A. ASTM E84 – Surface Burning Characteristics of Building Materials.

B. ASTM E814 – Fire Tests of Through-Penetration Fire Stops.

C. UL – Fire Resistance Directory.

D. UL 1479 – Fire Tests of Through-Penetration Firestops.

E. UL 2079 – Fire Resistance of Building Joint Systems.

1.04 PERFORMANCE REQUIREMENTS:

A. Provide systems in accordance with applicable UL listings that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire resistance rating of assembly penetrated.

B. F-Rated Systems: ASTM E814 or UL 1479; F-rating equal to or exceeding fire resistance rating of construction penetrated.

C. T-Rated Systems: ASTM E814 or UL 1479; provide for systems protecting penetrating items exposed to potential contact with adjacent materials in occupiable floor areas as follows:

1. Penetrations located outside wall cavities.

2. Penetrations located outside fire resistive shaft enclosures.

3. Penetrations located in construction containing fire protection rated openings.

4. Penetrating items larger than 4 inch diameter nominal pipe size or 16 square inch overall cross-sectional area.

D. For systems exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.

1. Piping Penetrations for Plumbing Systems: Moisture resistant.

2. Penetrations Involving Insulated Piping: Provide systems not requiring removal of insulation.

E. For systems exposed to view, provide products with flame spread ratings of less than 25 and smoke developed ratings of less than 450, as determined per ASTM E84.

F. Compatibility: Provide systems compatible with each other, with substrates forming openings, and with penetrating items, under conditions of service and application.

1.05 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

B. General Contractor shall receive and organize the firestopping submittals of each Contractor into a single submittal. Submit 3 copies in addition to the number required by Section 01 3300, or as required for distribution to governing authorities.

C. Shop Drawings: Where project conditions require modification of qualified testing agency's illustration to suit a particular condition, submit illustration, with modifications marked, approved by manufacturer's fire protection engineer.

D. Product Data: Documentation, including certified test reports and illustrations from qualified testing agency acceptable to authorities having jurisdiction, applicable to each system configuration for construction and penetrating items.

1.06 QUALITY ASSURANCE:

A. Installer Qualifications: Trained and approved by manufacturer; specializing in installation of work similar to that required for this project.

1.07 DELIVERY, STORAGE AND HANDLING:

A. Deliver, store, protect, and handle products to site under provisions of Section 01 6000.

B. Prevent deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.08 ENVIRONMENTAL REQUIREMENTS:

A. Do not install systems when ambient or substrate temperatures are outside limits recommended by manufacturer, or when substrates are wet.

B. Ventilate systems per manufacturer's instructions, by natural or mechanical means as required.

1.09 COORDINATION:

A. Coordinate construction of openings and penetrating items to ensure that systems are installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core drilled holes, or cut openings to accommodate systems.

C. Do not cover up system installations that will become concealed by subsequent construction until required inspections have been performed.

PART 2 PRODUCTS

2.01 MATERIALS:

A. Intumescent Sealants: Single component latex formulations that after cure do not re-emulsify during exposure to moisture.

1. Manufacturers:

a. Johns Manville Fire Protection Systems; Firetemp CI Caulk and Firetemp SI Spray.

b. Hilti Construction Chemicals, Inc.

c. Nelson Firestop Products.

d. Pecora Corporation.

e. Specified Technologies, Inc.

f. 3M Fire Protection Products.

g. Substitutions: Refer to Section 01 6000.

B. Packing Material: Mineral wool insulation, minimum 4 pcf density.

1. Manufacturers:

a. Hilti Construction Chemicals, Inc.

b. Owens-Corning Fiberglas Corporation; Paroc Safing Insulation.

c. Rock Wool Manufacturing Co.; Delta Safing Board.

d. Thermafiber, Inc.; Thermafiber Safing Insulation.

e. Substitutions: Refer to Section 01 6000.

2.02 ACCESSORIES:

A. Provide accessories as required to install materials and to comply with performance requirements. Use only components approved by manufacturer and qualified testing agency.

B. Permanent Forming, Damming and Backing Materials:

1. Sealants used in combination with other materials to prevent leakage of fill materials in liquid state.
2. Fire rated form board.
3. Fillers for sealants.

C. Other Accessories: Temporary forming materials, substrate primers, retaining angles, support plates, collars and steel sleeves.

PART 3 EXECUTION

3.01 EXAMINATION:

A. Verify substrate conditions for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance.

3.02 PREPARATION:

A. Surface Cleaning: Clean out openings immediately before installation.

1. Remove from surfaces of opening substrates, and from penetrating items, foreign materials that could interfere with adhesion.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with system materials. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form release agents from concrete.

B. Priming: Prime substrates where recommended by manufacturer, using recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking: Use masking tape to prevent system materials from contacting adjoining surfaces that will remain exposed and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to removed smears from firestop system materials. Remove tape as soon as possible without disturbing seal of system to substrates.

3.03 INSTALLATION:

A. Install systems in accordance with performance requirements and manufacturer's instructions.

B. Install systems to comply with listed fire rated assemblies in accordance with ASTM and UL requirements.

C. Install forming, damming and backing materials and other accessories of types required to support fill materials during application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

D. Install fill materials for firestop systems by proven techniques to produce the following results:

1. Fill voids and cavities as required to achieve fire ratings indicated.
2. Apply materials to contact and adhere to substrates formed by openings and penetrating items.
3. Finish fill materials that will remain exposed, to produce smooth, uniform surfaces flush with adjoining finishes.

3.04 IDENTIFICATION:

A. Identify through-penetration firestop systems with pressure-sensitive, self-adhesive vinyl labels. Attach labels permanently to both sides of penetrated construction where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:

1. Preprinted Copy: "Warning – Through-Penetration Firestop System – Do Not Disturb. Notify Building Management if Damaged.
2. Contractor's name, address and phone number.
3. Testing agency's system designation.
4. Manufacturer's name.
5. Installer's name and date of installation.

3.05 CLEANING AND PROTECTION:

A. Clean excess fill materials adjacent to openings as work progresses using methods and cleaning materials approved by manufacturer and that do not damage materials in which openings occur.

B. Protect installed products from damage during construction operations until final completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated materials and install new materials to produce systems complying with specified requirements.

3.06 SCHEDULES:

A. For each location where a fire rated assembly is penetrated, provide a UL listed through-penetration firestop system as scheduled below or as appropriate for project conditions, complying with specified requirements and suitable for penetration conditions indicated.

B. Metallic Pipe, Conduit or Tubing:

1. Masonry Walls (Single Penetration): UL C-AJ-1281.
2. Masonry Walls (Multiple Penetrations): UL C-AJ-1284.
3. Stud Walls: UL W-L-1149.

C. Nonmetallic Pipe, Conduit or Tubing:

1. Masonry Walls: UL W-J-2049.
2. Stud Walls (Through Penetrations): UL W-L-2169.

D. Insulated Pipes: Refer to Section 22 0700 and Section 23 0700 for insulation requirements.

1. Masonry Walls: UL C-AJ-5123.
2. Stud Walls: UL W-L-5088.

E. HVAC Ducts:

1. Masonry Walls (Round Ducts): UL C-AJ-7040.
2. Masonry Walls (Rectangular Ducts): UL C-AJ-7041.
3. Stud Walls (Round Ducts): UL W-L-7031.
4. Stud Walls (Rectangular Ducts): UL W-L-7030.
5. Penetrations Through Non-Rated Floor-Ceiling Assemblies: Mineral wool safing insulation or other approved noncombustible material.

F. Electrical Cables Not in Conduit:

1. Masonry Walls: UL C-AJ-3140.
2. Stud Walls: UL W-L-3121.

G. Wall Head Joints: UL 2079.

1. Metal Stud Wall Head at Metal Floor or Roof Deck: UL HW-D-0047.

H. Openings Without Penetrating Items:

1. Without Support Plates: UL C-AJ-0062.
2. With Support Plates: UL C-AJ-0063.

END OF SECTION

SECTION 07 9200 – JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Sealing of interior and exterior joints.

B. Sealing of glazing joints.

1.02 RELATED SECTIONS:

A. Caulking and sealant work performed under other Sections shall be performed in accordance with the provisions of this Section.

B. Section 03 3000 – Cast-in-Place Concrete: Joint fillers and sealants for floors.

C. Section 08 8000 – Glazing.

D. Section 09 8100 – Acoustic Insulation: Acoustical sealants.

E. Section 22 4000 – Plumbing Fixtures: Caulking around plumbing fixtures.

1.03 REFERENCES:

A. AAMA 800 – Sealants.

B. ASTM C834 – Latex Sealants.

C. ASTM C920 – Elastomeric Joint Sealants.

D. ASTM C1193 – Use of Joint Sealants.

E. ASTM C1311 – Solvent Release Sealants.

F. ASTM C1330 – Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.

1.04 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

B. Product Data: Provide manufacturer's standard details and installation instructions; identify substrates requiring primers, type of primer recommended by manufacturer, and surface preparation required.

C. Test Reports: Results of preconstruction field adhesion testing.

D. Samples: Submit full range of colors for selection.

1.05 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.

1.06 DELIVERY, STORAGE AND HANDLING:

A. Deliver, store, protect, and handle products to site under provisions of Section 01 6000.

B. Store materials between 40 and 90 degrees F, and under conditions and for a period of time not longer than that recommended by manufacturer.

1.07 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.

1.08 WARRANTY:

A. Section 01 7700 – Closeout Requirements: General warranty requirements.

B. 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.

PART 2 PRODUCTS

2.01 MANUFACTURERS:

A. Tremco, Inc.

B. Dow Corning Corporation.

C. Master Builders Solutions.

D. Momentive Performance Materials, Inc.

E. Pecora Corporation.

F. Schnee-Morehead, Inc.

G. Sherwin-Williams Co.

H. Sika Corporation.

I. Substitutions: Refer to Section 01 6000.

2.02 JOINT SEALERS:

A. Polyurethane Sealants: ASTM C920.

1. One-Part Modified Polyurethane: Type S, Grade NS, Class 25, Use NT, M, A, and O. (Tremco Dymonic; MasterSeal NP1; Sikaflex 15 LM)

2. Multi-Component Polyurethane: Type M, Grade NS, Class 50, Use T, I, M, A, and O. (Tremco Dymeric 240FC; Sikaflex 2c NS)

B. Silicone Sealants: ASTM C920.

1. Sanitary Type: Type S, Grade NS, Class 25. (Momentive GE SCS1700 series; Dow Corning 786; Tremco Tremsil 200)

2. Glazing Type: Type S, Grade NS, Class 25, Use NT, G, A, and O. (Tremco Proglaze; Tremco Tremsil 600; Dow Corning 790)

C. Acrylic Latex Caulk: ASTM C834. (Tremco Tremflex 834; Sherwin-Williams Magnum XL; Pecora AC-20)

D. 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)

E. Colors:

1. Joints Around Windows, Doors and Other Openings: Match color of frame material.

2. Other Locations: As selected from manufacturer's standard colors.

2.03 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. Manufacturers:

a. Backer Rod Manufacturing, Inc.

b. Dow Corning Corporation; Ethafoam.

c. Nomaco, Inc.

d. Substitutions: Refer to Section 01 6000.

2. 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. Alteration and Repair Projects: Include areas typical of those requiring removal of existing sealants.

3. 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.

4. Repeat testing until satisfactory adhesion is achieved. Evaluate and report results.

5. 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, storefront, 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 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 or partitions and adjacent casework, door frames, built-in or surface-mounted equipment and fixtures, and similar items.
2. Joints of interior walls and partitions which adjoin columns, pilasters, and exterior walls.
3. Interior locations not otherwise indicated or specified, where small voids exist between materials specified to be painted.
4. 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 1213 – HOLLOW METAL FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Hollow metal door frames.

1.02 RELATED SECTIONS:

A. Section 07 9200 – Joint Sealants.

B. Section 08 1400 – Wood Doors.

C. Section 08 7100 – Door Hardware.

D. Section 09 9000 – Painting and Coating.

1.03 REFERENCES:

A. ADA (Americans with Disabilities Act) – Standards for Accessible Design.

B. ANSI A115 – Door and Hardware Preparation.

C. ANSI A250.8 – Standard Steel Doors and Frames.

D. ASTM A1008 – Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.

E. ASTM B117 – Operating Salt Spray (Fog) Apparatus.

F. DHI – Door Hardware Institute: The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.

G. HMMA (Hollow Metal Manufacturers Association) 840 – Installation and Storage of Hollow Metal Doors and Frames.

1.04 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

B. Shop Drawings: Indicate frame elevations, internal reinforcement, anchor types and spacings, and finishes.

C. Manufacturer's Installation Instructions: Indicate special installation instructions.

1.05 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.

1.06 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.

1.07 PROJECT CONDITIONS:

A. Section 01 3100 – Project Management and Coordination.

B. Coordinate the work with door opening construction and hardware installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS:

A. Ceco Door Products.

B. Curries Company.

C. Core Industries, Inc.; Pioneer Industries Division.

D. Mesker Door, Inc.

E. Republic Doors and Frames.

F. Steelcraft Manufacturing Company.

G. Substitutions: Refer to Section 01 6000.

2.02 FRAMES:

A. Interior Frames: 16 gauge thick cold rolled steel.

2.03 ACCESSORIES:

A. Anchorages: Galvanized steel, minimum 18 gauge.

B. Fasteners: Concealed type.

C. Primer: Rust inhibitive, suitable to receive finish coatings specified.

D. Silencers: Resilient rubber or vinyl, fitted into drilled hole.

2.04 FABRICATION:

A. Fabricate frames as welded unit, mitered and ground smooth.

1. Knock down slip on type frames may be used at non-rated interior openings maximum 36 inches wide in gypsum board construction without acoustical requirements, at Contractor's option.

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 up to 88 Inches High: 1½ pair.

C. Prepare frames for silencers. Provide three single silencers for single doors. Silencers may be omitted at openings scheduled to receive acoustical seals.

2.05 FINISH:

A. Cold Rolled Steel Sheet: ASTM A1008, matte finish exposed, oiled.

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.

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 frames in accordance with ANSI A250.8, HMMA 840, and DHI.

B. Install acoustical assemblies to meet specified STC ratings.

C. Coordinate with wall construction for anchor placement. Install frames in stud walls with 8 anchors.

D. Brace frames placed prior to constructing walls; maintain plumb and planar. Remove braces after anchorages are permanently installed.

E. Coordinate installation of door hardware.

F. 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.

END OF SECTION

SECTION 08 1400 – WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Wood doors; flush design.

1. Non-rated.
2. Acoustical.

1.02 RELATED SECTIONS:

A. Section 08 1213 – Hollow Metal Frames.

B. Section 08 7100 – Door Hardware.

C. Section 08 8000 – Glazing.

1.03 REFERENCES:

A. ADA (Americans with Disabilities Act) – Standards for Accessible Design.

B. ASTM E413 – Standard Classification for Rating Sound Insulation.

A. AWI – Architectural Woodwork Standards.

C. WDMA IS-1A – Architectural Wood Flush Doors.

1.04 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

B. 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 and glazing.

C. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.

D. Samples: Submit two samples of door veneer, illustrating wood grain, stain color, and sheen.

E. Manufacturer's Installation Instructions: Indicate special installation instructions.

F. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE:

A. Perform work in accordance with WDMA IS-1A, Premium grade; Heavy Duty performance duty level.

B. Finish doors in accordance with AWI 1500 and WDMA.

C. Manufacturer: Company specializing in manufacturing the Products specified in this Section with minimum three years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING:

A. Deliver, store, protect, and handle products to site under provisions of Section 01 6000.

B. Accept Products on site in manufacturer's packaging. Inspect for damage.

C. Do not store in damp or wet areas, areas with uncured cement, 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.

D. Store flat on a level surface, minimum 3½ inches off the floor. Provide ¼ inch spaces between stacked doors to promote air circulation.

E. 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.

F. Handle with clean hands or gloves; do not drag doors across one another or across other surfaces.

1.07 PROJECT CONDITIONS:

A. Section 01 3100 – Project Management and Coordination.

B. Coordinate the work with door opening construction, door frame and hardware installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS:

A. Algoma Hardwoods, Inc.

B. Eggers Industries.

C. Marshfield Door Systems, Inc.

D. VT Industries, Inc.

E. Substitutions: Refer to Section 01 6000.

2.02 FLUSH WOOD INTERIOR DOORS:

A. Construction: 1¾ inches thick; solid core, 5-ply hot pressed.

1. Solid Core, Non-Rated: WDMA SLC-5 or SCLC-5; stave lumber core or structural composite lumber core.

2. Solid Core, Acoustical: WDMA SR; ASTM E413, STC rating as scheduled.

B. Veneer Facing for Transparent Finish: AWI Custom quality wood, grade A face veneer, white birch species, rotary cut, with book matched grain and running matched veneer assembly.

2.03 ACCESSORIES:

A. Glass: In accordance with Section 08 8000.

B. Glazing Stops: Wood, of same species as door facing; recessed or flush molding, beveled profile with mitered corners; prepared for countersunk style screws.

C. Acoustical Door Accessories: As required to meet specified STC ratings.

1. Glass and Glazing: Factory installed; type as specified in Section 08 8000.

2. Head and Jamb Seal: Double bulb type gasketing.

3. Bottom Seal: Door shoe, or automatic door bottom mortised into bottom edge of door.

4. Threshold: Extruded aluminum with clear anodized finish; configured to coordinate with bottom seal, with bumper gasket; profile in accordance with ADA.

2.04 FABRICATION:

A. Fabricate non-rated doors in accordance with AWI 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 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 finish doors in accordance with WDMA Finish System TR-6 catalyzed polyurethane, to match approved sample.

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 non-rated doors in accordance with AWI and WDMA requirements.

B. Install acoustical doors in accordance with AWI and WDMA requirements to meet specified STC ratings.

C. Trim non-rated door width by cutting equally on both jamb edges.

D. Trim door height by cutting bottom edge only a maximum of ¾ inch. Allow for installation of finish flooring materials as scheduled.

E. Coordinate installation of doors with installation of frames and hardware.

F. Coordinate installation of glass and glazing. Site finish glazing stops to match door facing.

G. Touch-up factory finished doors; remove protective wraps.

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:

A. Section 01 7000 – Execution Requirements: Adjusting installed work.

B. Adjust doors for smooth and balanced door movement.

END OF SECTION

SECTION 08 7100 – DOOR HARDWARE

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Hardware for wood doors.

B. Keying.

1.02 RELATED SECTIONS:

A. Section 08 1213 – Hollow Metal Frames.

B. Section 08 1400 – Wood Doors.

C. Section 10 1402 – Interior Signage.

D. Section 12 3000 – Casework: Cabinet hardware.

1.03 REFERENCES:

A. ADA (Americans with Disabilities Act) – Standards for Accessible Design.

B. ANSI A156.1 – Butts and Hinges.

C. ANSI A156.2 – Bored and Preassembled Locks and Latches.

D. ANSI A156.18 – Materials and Finishes.

E. DHI (Door and Hardware Institute) – A115 series.

1.04 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

B. Shop Drawings: Indicate locations and mounting heights of each type of hardware, schedules, keying schedule, and catalog cuts.

1.05 CLOSEOUT SUBMITTALS:

A. Submit under provisions of Section 01 7700.

B. Project Record Documents: Record actual locations of installed cylinders and their key code.

C. Maintenance Data: Include data on operating hardware, adjustment procedures, lubrication requirements, and inspection procedures related to preventative maintenance.

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.

1.06 QUALITY ASSURANCE:

A. Perform Work in accordance with applicable requirements of ADA, AWI, BHMA, and DHI.

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 an Architectural Hardware Consultant (AHC) or a similarly qualified person to assist in the work of this section.

1.07 DELIVERY, STORAGE AND PROTECTION:

A. Deliver, store, protect, and handle products to site under provisions of Section 01 6000.

B. Package hardware items individually; label and identify each package with door opening code to match hardware schedule.

1.08 PROJECT CONDITIONS:

A. Section 01 3100 – Project Management and Coordination.

B. Furnish hardware of proper design and function for the door and frame conditions, dimensions, profile, swing, and performance requirements indicated.

C. Coordinate the work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware and recessed items.

D. Sequence installation of surface applied hardware items with painting and finishing of the substrates involved.

E. Coordinate Owner's keying requirements during the course of the Work.

1.09 MAINTENANCE PRODUCTS:

A. Provide special wrenches and tools applicable to each different or special hardware component. Provide maintenance tools and accessories supplied by hardware component manufacturer.

PART 2 PRODUCTS

2.01 SUPPLIERS:

A. Central Indiana Hardware Co., Inc.

B. General Building Products, Inc.

C. Moss Building Products.

D. Stafford Building Products, Inc.

E. Substitutions: Refer to Section 01 6000.

2.02 COMPONENTS:

A. Butt Hinges: ANSI A156.1; 5 knuckle full mortise type; 4½ x 4½ inch unless noted otherwise.

1. Manufacturers:

a. Allegion PLC; Ives.

b. Bommer Industries, Inc.

c. Hager Hinge Co.

d. McKinney Products Co.

e. Stanley Security Solutions.

f. Substitutions: Refer to Section 01 6000.

2. Interior Type: ANSI A8112; steel. (McKinney TA2714, Bommer BB5000, Hager BB1279, Ives 5BB1, Stanley FBB179)

B. Latches, Locks, and Cylinders: ANSI A156.2, Series 4000, Grade 1.

1. Manufacturers:

a. Allegion PLC; Schlage.

b. Dorma USA, Inc.

c. Sargent Manufacturing Co.

d. Stanley Security Solutions; Best Access Systems.

e. Substitutions: Refer to Section 01 6000.

2. Lever Trim: Sargent LL; Schlage Rhodes; Dorma LR; Best 15D.

3. Office Type: ANSI F81 function. (Sargent 10G05, Schlage ND53PD, Dorma C853, Best 9K37EA)

4. Classroom Type: ANSI F84 function. (Sargent 10G37, Schlage ND70PD, Dorma C870, Best 9K37R)

5. Classroom Security Type: ANSI F88 function. (Sargent 10G16, Schlage ND75PD, Dorma C877, Best 9K37IN)

C. Overhead Stops: Extruded track, slide, arm, and frame bracket.

1. Manufacturers:

a. Allegion PLC; Glynn-Johnson.

b. Dorma USA, Inc.

c. Rixson Specialty Door Controls.

d. Sargent Manufacturing Co.

e. Substitutions: Refer to Section 01 6000.

2. Concealed Stop: Sargent 698S; Glynn-Johnson 104S; Rixson 1-336; Dorma 912S.

D. Plates and Trim:

1. Manufacturers:

a. Allegion PLC; Ives.

b. Baldwin Hardware Manufacturing Corp.

c. Hiawatha, Inc.

d. Rockwood Manufacturing Company.

e. Sargent Manufacturing Co.

f. Substitutions: Refer to Section 01 6000.

2. Kickplates: Stainless steel, 0.050 inch thick, 8 inch height; 2 inches less than single door width and pairs with mullions; 1 inch less than leaf width for pairs without mullions.

3. Interior Wall Stops: Metal body with resilient bumper; 2½ inch diameter plate with concealed mounting; concave bumper; ¾ inch projection. (Rockwood 409, Ives WS406CCV)

2.03 KEYING:

A. Keying Meeting: Convene after award of contract and before preparation of hardware submittals. Require attendance of Owner, Architect, General Contractor, and Hardware Supplier. Review preliminary keying schedule and number of each key to be supplied; revise as necessary to meet Owner's requirements.

B. Door Locks: Master keyed to existing system; field verify prior to submitting bid.

1. Key Blanks: Patented key control with side or bottom pins in addition to conventional pin tumbler keyway. (Schlage Everest Primus)

2. Cylinders: Provide conventional pin tumbler cylinders without side or bottom pins.

C. Include control keying with removable core cylinders.

1. Provide 4 keys for each master key and change key; minimum 2 keys per keyed cylinder.

2.04 FINISHES:

A. Butt Hinges and Latch Sets: US 26D; BHMA 626.

B. Plates and Stops: US 32D; BHMA 630.

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 A115 series.

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, pulls, and other hardware for proper clearance and function. Provide shims, blocking, or other components as necessary; coordinate finishes with Architect where exposed.

F. At locations where new hardware is applied to existing openings, remove existing hardware not compatible with new hardware, and prepare door and frame as required to receive new hardware.

1. Provide through-bolted hardware where doors are not fabricated to receive standard mounting hardware.

2. Where removal of existing hardware leaves minor holes or surface defects that will not be covered by new hardware, touch up and refinish door and frame as required to match previous appearance.

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 PROTECTION OF FINISHED WORK:

A. Do not permit adjacent work to damage hardware or finish.

3.05 SCHEDULE:

A. Set No. 1: Doors 101, 115.

1. Classroom security lock.

2. Balance of hardware existing.

B. Set No. 2: Door 115A.
   1. Butts (3): Interior type.
   2. Classroom security lock.
   3. Overhead stop.
   4. Kickplate.
C. Set No. 3: Doors 102, 109, 112.
   1. Butts (3): Interior type.
   2. Classroom lock.
   3. Wall stop.
D. Set No. 4: Doors 105, 106, 107, 108, 110, 111, 113, 114.
   1. Butts (3): Interior type.
   2. Office lock.
   3. Wall stop.

END OF SECTION

SECTION 08 8000 – GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Annealed glass.

B. Safety glazing.

C. Glazing accessories.

1.02 RELATED SECTIONS:

A. Section 07 9200 – Joint Sealants.

B. Section 08 1400 – Wood Doors.

1.03 REFERENCES:

A. ANSI Z97.1 – Glazing Materials Used in Buildings – Safety Performance Specifications and Methods of Test.

B. ASTM C864 – Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.

C. ASTM C1036 – Flat Glass.

D. ASTM C1048 – Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass.

E. ASTM D2287 – Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds.

F. FGMA – Flat Glass Marketing Association.

1.04 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.

1.05 DELIVERY, STORAGE AND HANDLING:

A. Deliver, store, protect, and handle products to site under provisions of Section 01 6000.

B. Deliver glazing with manufacturer's labels intact. Do not remove label until glazing has been installed.

PART 2 PRODUCTS

2.01 GLASS:

A. Manufacturers:

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.
7. Substitutions: Refer to Section 01 6000.

B. Annealed Glass: ASTM C1036, Type I, Class 1, Quality q3; clear.

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 before heat strengthening.
2. Fully temper float glass materials in accordance with ASTM C1048, Kind FT.

B. Glass for Acoustical Doors: Factory glazed; constructed as scheduled below, or as required to meet specified STC rating.

1. Outer Pane: ¼ inch thick; clear tempered glass.
2. Air Space: 1 inch thick.

3. Inner Pane: 1/8 inch thick; clear tempered glass.

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 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 so as 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. Interior Wet Method (Compound and Compound):

a. Place setting blocks at ¼ points; install glazing unit.

b. Install applied stops; center glass unit in space by inserting spacer shims both sides at intervals of 24 inches; set spacer shims ¼ inch below sight line.

c. Locate and secure glazing pane using glazer's clips.

d. Fill gaps between glazing and stops with glazing compound flush with sight line; tool surface to straight line.

3.04 CLEANING:

A. Remove excess glazing materials and sealants immediately after glazing operation is completed.

B. Remove labels from glass immediately after Substantial Completion.

C. Perform final cleaning in accordance with Section 01 7700.

3.05 SCHEDULE:

A. Safety Glazing: Provide tempered glass in doors, at locations required by applicable building code, and where indicated.

B. Installation Methods:

1. Wood Doors: Wet method.

2. Acoustical Wood Doors: Factory glazed.

END OF SECTION

SECTION 09 2210 – METAL SUPPORT SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Non-load bearing metal framing.

B. Metal furring.

1.02 RELATED SECTIONS:

A. Section 09 2900 – Gypsum Board.

B. Section 09 8100 – Acoustic Insulation.

1.03 REFERENCES:

A. ASTM A653 – Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

B. ASTM C645 – Nonstructural Steel Framing Members.

C. ASTM C754 – Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

D. ASTM E119 – Fire Tests of Building Construction and Materials.

1.04 REGULATORY REQUIREMENTS:

A. Conform to applicable building code and ASTM E119 for fire rated assemblies in conjunction with Section 09 2900.

PART 2 PRODUCTS

2.01 MANUFACTURERS:

A. ClarkDietrich Building Systems.

B. J. N. Linrose Manufacturing.

C. MRI Steel Framing, LLC.

D. State Building Products.

E. Steel Structural Products LLC.

F. Ware Industries, Inc.; Marino Ware.

G. Substitutions: Refer to Section 01 6000.

2.02 MATERIALS:

A. Materials: ASTM C645; fabricated from ASTM A653 sheet steel with minimum G40 galvanized coating, roll formed.

B. Interior Components: Minimum 20 gauge; 0.0312 inch minimum base metal thickness, or embossed pattern with equivalent structural properties documented by third party testing acceptable to authorities having jurisdiction.

2.03 NON-LOAD BEARING METAL FRAMING:

A. Studs and Framing Components: Channel shape, punched web; sizes as indicated on the Drawings.

B. Runners: Unhemmed channel shape, unpunched web; sizes as indicated on the Drawings, and as required to accommodate framing and furring members.

C. Headers and Jambs: Factory fabricated from unpunched components, with stiffened flanges.

D. Lateral Bridging:

1. Unhemmed channel shape, ¾ inch with ½ inch flanges; 16 gauge; 0.054 inch minimum base metal thickness.

2. Angle shape with prenotched slots to engage cutouts in framing member webs, 7/8 inch x 7/8 inch; 20 gauge; 0.0312 inch minimum base metal thickness

E. Hat Shaped Furring Channels: Minimum 25 gauge; 0.018 inch minimum base metal thickness; 7/8 inch depth.

1. Sound Isolation Clips: Designed for attachment of hat channel to framing member, with adjustment; rubber isolator.

a. Manufacturers:

(1) Kinetics Noise Control; IsoMax.

(2) Substitutions: Refer to Section 01 6000.

PART 3 EXECUTION

3.01 INSTALLATION:

A. Install metal support system products in accordance with standard construction practices and manufacturer's recommended methods. Install members plumb, straight, true, and level to the lines indicated on the drawings. Connect all members using welds, screws, or bolts.

3.02 FRAMING AND FURRING:

A. Install metal framing and furring in accordance with ASTM C754.

B. Handle and lift prefabricated panels in a manner to prevent distortion.

C. Securely anchor runners to supporting structure at maximum 24 inches o.c. and 2 inches from each end.

D. At butt joints of runners, securely anchor abutting pieces of runner to a common structural element, or butt-weld or splice components together.

E. Securely attach studs to the flanges or webs of both upper and lower runners, plumb and aligned, with open side of studs facing in same direction. Space framing and furring 16 inches o.c., except where indicated otherwise.

1. Install double studs at door and window jambs.
2. Install one stud at each side of expansion and control joints.
3. Install jack studs or cripples below window sills, above window and door heads, and elsewhere to furnish support. Securely attach to supporting members.
4. Position closed side of studs to be in direct contact with door frame jambs, abutting partitions, partition corners and masonry construction elements.

F. Where partition extends to underside of structure above, accommodate structural deflection by one of the following methods as approved by framing manufacturer:

1. Double deep leg head runner with studs secured to lower runner only.
2. Single deep leg head runner with studs secured to horizontal bridging within 12 inches of track.
3. Head runner with pre-attached UL classified galvanized steel clips and slotted holes for stud attachment with mechanical fasteners.

G. Where partition does not extend to underside of structure above, provide bracing at approximate 45 degree angle from top of partition to structure, using studs of same size as partition at maximum 32 inches o.c. on alternating sides of partition.

H. At bottom of bulkheads, provide bracing at approximate 45 degree angle from bottom of bulkhead to structure, using framing of same size as bulkhead framing at maximum 32 inches o.c. on alternating sides of bulkhead, or on one side of bulkhead where required by configuration of ceiling and structure.

I. Install bridging, blocking, and anchoring as required to secure the frame rigidly in place and to support the edges of all boards and panels.

J. Install all blocking required to support and anchor items installed by other trades.

K. Where indicated on the Drawings, install draftstops horizontally and secure to adjacent studs. Cut draftstops from continuous sections of metal framing members without holes or penetrations.

L. Install all lateral bridging required, including the following locations. Bridging may be omitted where spans do not exceed manufacturer's table of limiting heights.

1. Walls up to 10 ft high: One row at mid-span.
2. Walls from 10 to 14 ft high: Two rows equally spaced.
3. At hinge and strike plate locations of all doors.

4. At mid-span locations of all bulkheads.

END OF SECTION

SECTION 09 2900 – GYPSUM BOARD

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Interior gypsum board.

B. Gypsum board finishing.

1.02 RELATED SECTIONS:

A. Section 09 2210 – Metal Support Systems: Non-load bearing metal framing.

B. Section 09 8100 – Acoustic Insulation.

C. Section 09 9000 – Painting and Coating.

1.03 REFERENCES:

A. ANSI A97.1 – Gypsum Wallboard Interior Finishes.

B. ASTM C475 – Joint Compound and Joint Tape for Finishing Gypsum Board.

C. ASTM C840 – Application and Finishing of Gypsum Board.

D. ASTM C954 – Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. to 0.112 in. in Thickness.

E. ASTM C1002 – Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases.

F. ASTM C1047 – Accessories for Gypsum Wallboard and Gypsum Veneer Base.

G. ASTM C1396 – Gypsum Board.

H. ASTM E119 – Fire Tests of Building Construction and Materials.

I. GA 214 – Levels of Gypsum Board Finish.

J. GA 216 – Application and Finishing of Gypsum Panel Products.

K. GA 234 – Control Joints for Fire-Resistance Rated Systems.

L. GA 236 – Joint Treatment Under Extreme Weather Conditions.

M. GA 600 – Fire Resistance Design Manual.

1.04 QUALITY ASSURANCE:

A. Perform Work in accordance with ANSI A97.1.

1.05 REGULATORY REQUIREMENTS:

A. Conform to applicable building code, GA 600, and ASTM E119 for fire rated assemblies in conjunction with Sections 09 2210.

1.06 DELIVERY, STORAGE AND HANDLING:

A. Deliver, store, protect, and handle products to site under provisions of Section 01 6000.

B. Store materials in enclosed areas, protected from damage, moisture, and exposure to the elements. Protect ready-mixed joint compounds from freezing.

C. 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.

D. Do not install panels damaged by moisture or mold, including those with surface contamination, discoloration, swelling, or warping.

E. Exercise caution to prevent damage to windows, doors, floors and other finished work.

1.07 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:

A. CertainTeed Corp.

B. Continental Building Products.

C. Georgia-Pacific Corp.

D. National Gypsum Company, Gold Bond Building Products.

E. United States Gypsum Company.

F. Substitutions: Refer to Section 01 6000.

2.02 GYPSUM BOARD:

A. Interior Gypsum Panels: ASTM C1396; tapered edge; 48 inch width, 5/8 inch typical thickness, lengths as long as practical to minimize number of joints.

1. Fire-Rated Panels: Type X; 5/8 inch typical thickness. Install fire-rated panels at all fire rated assemblies.

2.03 FASTENERS:

A. Fasteners: ASTM C954 or C1002; bugle head screws, Type S; 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.

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. 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.

F. 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.

G. Cut ends, edges, scribe or make cutouts within field of panels with knife and straight edge; square and true to required dimension.

H. Install trim at all internal and external angles formed by the intersection of panels with adjacent panels or other surfaces. Apply corner bead to all external corners in accordance with manufacturer's directions.

I. Control Joints: Provide separate framing members on each side of joint.

1. Locations: Position to intersect door and window openings where possible. Coordinate with items indicated to be applied to wall surface.

   a. Aligned with control joints and expansion joints in masonry substrate or building structure.

   b. Where dissimilar substrates meet without change in surface plane.

   c. Where board surface forms L, U or T shape.

   d. Maximum 30 feet o.c. in all directions.

2. Where control joints occur in fire rated construction or acoustically insulated assemblies, follow GA 234 and manufacturer's instructions to maintain required fire and sound separation.

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. 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 (Except Fire Rated Assemblies): Level 0.

B. Surfaces Indicated as Unfinished (Fire Rated Assemblies): Level 1.

C. Surfaces Above Suspended Ceilings: Level 1.

D. Gypsum Board Indicated to Receive Paint or Wall Covering: Level 4.

E. Surfaces Not Otherwise Scheduled: Level 3.

END OF SECTION

SECTION 09 5100 – ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Suspended metal grid ceiling system and perimeter trim.

B. Acoustic panels.

1.02 RELATED SECTIONS:

A. Section 23 3700 – Air Outlets and Inlets.

B. Section 23 8240 – Electric Resistance Heating Units.

C. Section 26 5000 – Lighting.

1.03 REFERENCES:

A. ASTM C635 – Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.

B. ASTM C636 – Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.

C. ASTM E84 – Surface Burning Characteristics of Building Materials.

D. ASTM E1264 – Acoustical Ceiling Products.

E. ASTM E1414 – Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum.

F. CISCA (Ceilings and Interior Systems Contractors Association) – Acoustical Ceilings: Use and Practice.

G. UL – Fire Resistance Directory.

1.04 SYSTEM DESCRIPTION:

A. Design Requirements for Suspension System: Rigidly secure acoustic ceiling system including integral mechanical and electrical components with maximum deflection of 1/240 of span.

1.05 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

B. Shop Drawings: Indicate grid layout and related dimensioning, junctions with other work or ceiling finishes, and interrelation of mechanical and electrical items related to system.

C. Product Data: Provide data on metal grid system components, acoustic units, and accessories. Certify that Products meet or exceed specified requirements.

D. Manufacturer's Installation Instructions: Indicate special procedures; perimeter conditions requiring special attention; and recommendations for cleaning and refinishing acoustic units, including precautions against materials and methods which may be detrimental to finishes and acoustical performance.

1.06 QUALITY ASSURANCE:

A. Conform to CISCA requirements.

B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

C. Installer Qualifications: Company specializing in installing the Products specified in this section with minimum three years documented experience.

D. Regulatory Requirements: Conform to applicable building code for combustibility requirements for materials.

1.07 PROJECT CONDITIONS:

A. Sequence work to ensure acoustic ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Install acoustic units after interior wet work is dry.

C. Maintain uniform temperature of minimum 55 degrees F and maximum 70 degrees F, and maximum humidity of 75 percent, for minimum 25 hours prior to, during, and 25 hours after acoustic unit installation.

1.08 WARRANTY:

A. Section 01 7700 – Closeout Requirements: General warranty requirements.

B. Provide manufacturer's warranty that humidity resistant ceiling panels will be free from sagging or warping for a period of 10 years from Substantial Completion.

1.09 EXTRA MATERIALS:

A. Provide extra materials in accordance with Section 01 7700.

B. Provide 1 percent of total area of extra panels to Owner, for each type of acoustic unit and ceiling panel; in new, unopened, packaging with protective covering for storage, identified with appropriate labels.

PART 2 PRODUCTS

2.01 SUSPENSION SYSTEM MATERIALS:

A. Manufacturers:

1. Armstrong World Industries, Inc.
2. Rockfon; Chicago Metallic.

3. USG Interiors, Inc.

4. Substitutions: Refer to Section 01 6000.

B. Exposed Non-fire Rated Steel Grid: ASTM C635, intermediate duty; exposed T; commercial quality cold rolled steel with G30 hot dipped galvanized coating; components die cut and interlocking. (Armstrong Prelude; Chicago Metallic 200 Snap Grid System; USG Donn DX)

1. Exposed Grid Surface Width: 15/16 inch.

2. Grid Finish: White steel cap.

C. Accessories: Stabilizer bars, clips, splices, perimeter moldings, and other accessories required for suspended grid system.

D. Support Channels and Hangers: Galvanized steel; size and type to suit application and ceiling system flatness requirement specified.

2.02 ACOUSTIC UNIT MATERIALS:

A. Manufacturers:

1. Armstrong World Industries, Inc.

2. CertainTeed Corporation.

3. USG Interiors, Inc.

4. Substitutions: Refer to Section 01 6000.

B. General Requirements:

1. Fire Hazard Classification: ASTM E84, Class A.

a. Flame Spread Rating: Maximum 25.

b. Smoke Developed Rating: Maximum 10.

2. Humidity Resistance: Designed to withstand temperature of 104 degrees F and 90% relative humidity without visible sag.

3. Surface Color: White.

C. Abuse Resistant Panels (Type A): ASTM E1264, Type III, Form 2; 24 x 48 inches, ¾ inch thick; impact resistant. (Armstrong School Zone Fine Fissured 466; CertainTeed School Board SB-197; USG Radar 2407)

D. High-NRC Panels (Type B): ASTM E1264, Type III, Form 1; 24 x 48 inches, ¾ inch thick. (Armstrong Fine Fissured High NRC 1714; CertainTeed Fine Fissured High NRC HHF-497 DP; USG Radar 22441)

1. Noise Reduction Coefficient (NRC): ASTM E1264; UL Classified; minimum 0.70.

2.03 ACCESSORIES:

A. Touch-up Paint: Type and color to match acoustic and grid units.

B. Concealed Hold-Down Clips: Armstrong Universal Hold Down Clip or equal by suspension system manufacturer.

C. Hanger Wire: Steel, minimum 12 gauge.

PART 3 EXECUTION

3.01 EXAMINATION:

A. Verify existing conditions before starting work.

B. Verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION OF LAY-IN GRID SUSPENSION SYSTEM:

A. Install suspension system in accordance with ASTM C636 and manufacturer's instructions.

B. Locate system on room axis according to reflected ceiling plan.

C. Install after major above ceiling work is complete. Coordinate the location of hangers with other work.

D. Install main runners at 48 inches o.c. at right angles to structural framing, with cross tees at 24 inches o.c. spanning between main runners.

E. Hang suspension system from building structure independent of metal deck, walls, columns, ducts, pipes, and conduit. Install hangers at maximum 48 inches o.c. Provide supplemental steel framing, sized to carry imposed loads, where required to maintain specified hanger spacing.

F. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

G. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

H. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability. Support fixture loads by supplementary hangers located within 6 inches of each corner; or support components independently.

I. Do not eccentrically load system, or produce rotation of runners.

J. Perimeter Molding:

1. Install edge molding at intersection of ceiling and vertical surfaces.

2. Secure edge molding to substrate with screw anchors through holes provided in vertical leg, at maximum 3 inches from each end and maximum 16 inches o.c.

3. Use longest practical lengths.
4. Miter corners to provide hairline joints. Cope exposed flanges of intersecting members, so that faces will be flush.
5. Provide at junctions with other interruptions.

3.03 INSTALLATION OF ACOUSTIC UNITS:

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

B. Fit units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Lay directional patterned units one way with pattern parallel to shortest room axis. Fit border trim neatly against abutting surfaces.

D. Install units after work above ceiling is complete.

E. Install units level, in uniform plane, and free from twist, warp, and dents.

F. Cut units to fit irregular grid and perimeter edge trim. Cut edges to match factory edge treatment. Field paint exposed edges to match factory edges.

G. Where round or radiused obstructions occur, provide preformed closures to match perimeter molding.

H. Install concealed hold-down clips to retain panels tight to grid system at locations within 48 inches of HVAC supply diffusers.

3.04 ERECTION TOLERANCES:

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION

SECTION 09 6500 – RESILIENT FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Resilient floor tile.

B. Resilient base.

1.02 RELATED SECTIONS:

A. Section 01 5000 – Temporary Facilities and Controls: Temporary dehumidification.

B. Section 09 6800 – Carpeting.

C. Section 12 3000 – Casework.

1.03 REFERENCES:

A. ASTM E648 – Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.

B. ASTM E662 – Specific Optical Density of Smoke Generated by Solid Materials.

C. ASTM F710 – Preparing Concrete Floors and Other Monolithic Floors to Receive Resilient Flooring.

D. ASTM F1303 – Sheet Vinyl Floor Covering with Backing.

E. ASTM F1861 – Resilient Wall Base.

F. ASTM F1869 – Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

G. RFCI – Resilient Floor Covering Institute.

1.04 PREINSTALLATION MEETING:

A. Section 01 3100 – Project Management and Coordination.

B. Attendance: Flooring Installer, General Contractor, Owner, and Architect.

C. Review methods and procedures related to flooring work, including approved submittals, samples, substrate conditions, perimeter transitions, and manufacturer's written instructions.

D. Review schedule and planned sequence of installation; availability of materials and labor; equipment, facilities, and temporary protection.

1.05 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.

1.06 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

B. Product Data: Indicate physical and performance characteristics, and installation instructions.

C. Samples: Submit two sets of samples for each product scheduled, showing full range of standard colors and patterns.

1.07 CLOSEOUT SUBMITTALS:

A. Submit under provisions of Section 01 7700.

B. Maintenance Instructions: Include manufacturer's recommendations for each type of flooring.

C. Extra Tile Materials: Provide one box of each type, color, pattern, and size of tile installed, from same lot as installed materials; in new, unopened, packaging with protective covering for storage, identified with appropriate labels.

1.08 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.

1.09 DELIVERY, STORAGE AND HANDLING:

A. Deliver, store, protect, and handle products to site under provisions of Section 01 6000.

B. Store materials in original containers, at temperatures between 65 degrees F and 100 degrees F.

C. Protect roll materials from damage by storing on end.

1.10 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.

1.11 WARRANTY:

A. Section 01 7700 – Closeout Requirements: General warranty requirements.

B. Luxury Vinyl Flooring: Provide manufacturer warranty against wear; minimum 10 years.

PART 2 PRODUCTS

2.01 LUXURY VINYL FLOORING:

A. Manufacturers:

1. American Biltrite; Sonata.
2. American Biltrite; Mirra.
3. Shaw Contract.
4. Taj Flooring.
5. Substitutions: Refer to Section 01 6000.

B. Luxury Vinyl Flooring: ASTM F1303, Class III; smooth wearing surface; factory applied polyurethane finish.

1. Floor Tile: 18 x 18 inch; 3 mm thick; 20 mil polymerized vinyl wear layer. (Shaw Crete 0203V)
2. Color and Pattern: As scheduled.

2.02 RESILIENT BASE:

A. Manufacturers:

1. Tarkett Industries, Inc.; Johnsonite.
2. Armstrong Flooring, Inc.
3. R. C. Musson Rubber Co.
4. Nora Flooring Systems, Inc.
5. Roppe Corp.

6. Substitutions: Refer to Section 01 6000.

B. Wall Base: ASTM F1861, Type TS, Group I or II; rubber cove profile; 1/8 inch thick; lengths as long as practicable to minimize joints.

1. Height: 4 inch.
2. Color: As selected.
3. Where new base is installed adjacent to existing base, match existing in color and height.

2.03 ACCESSORIES:

A. Manufacturers:

1. Flooring or base manufacturer.
2. Dural USA, Inc.
3. Roppe Corp.
4. Schlüter Systems, Inc.
5. Tarkett Industries, Inc.; Johnsonite.
6. Substitutions: Refer to Section 01 6000.

B. Floor Transitions and Edge Protection: As recommended by resilient flooring manufacturer.

1. Resilient Flooring to Carpet: Rubber for glue down installation; butting gauge as required to accept approved carpet.

C. 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 this contractor 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 furniture and cabinets, pipes, outlets, permanent columns, and 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, plumbing lines and related items.

E. Extend resilient flooring into toe spaces, door reveals, 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, unless otherwise indicated.

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.

H. Resilient Base: Apply base to walls, columns, pilasters, casework, and permanent fixtures in rooms or areas where base is scheduled or required. Install base in lengths as long as practicable, with mitered or coped inside corners. Tightly bond base to substrate throughout length of each piece, with continuous contact at horizontal and vertical surfaces. On irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material. Locate joints minimum 3 feet from corners.

I. Place carpet edge strips tightly butted to flooring and secure with adhesive. Install edge strips at all areas where carpet abuts dissimilar flooring material.

3.04 CLEANING:

A. Perform final cleaning under provisions of Section 01 7700.

B. Sweep or vacuum floor thoroughly immediately upon completion.

C. Remove excess adhesives from flooring and adjacent surfaces using appropriate cleaner recommended by manufacturer.

D. Do not wash floor until time period recommended by manufacturer has elapsed, to allow resilient flooring to become well sealed in adhesive.

E. 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 SECTION INCLUDES:

A. Modular carpet.

B. Accessories.

1.02 RELATED SECTIONS:

A. Section 01 5000 – Temporary Facilities and Controls: Temporary dehumidification.

B. Section 09 6500 – Resilient Flooring: Rubber base, edge and transition strips.

1.03 REFERENCES:

A. AATCC (American Association of Textile Chemists and Colorists) 16 – Colorfastness to Light

B. AATCC 134 – Electrostatic Propensity of Carpets.

C. AATCC 165 – Colorfastness to Crocking: Textile Floor Coverings - Crockmeter Method.

D. AATCC 189 – Fluorine Content of Carpet Fibers.

E. ASTM D2859 – Ignition Characteristics of Finished Textile Floor Covering Materials.

F. ASTM E648 – Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.

G. ASTM E662 – Specific Optical Density of Smoke Generated by Solid Materials.

H. ASTM F1869 – Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

I. CRI 104 (Carpet and Rug Institute) – Installation Specification of Commercial Carpet.

1.04 PERFORMANCE REQUIREMENTS:

A. Modular Tile Dimensional Stability: Maximum 0.15 percent.

B. Colorfastness to Crocking: AATCC 165; minimum Class 4 color transfer, wet and dry.

C. Colorfastness to Light: AATCC 16E; minimum Grade 4 color change after exposure of 40 AFU.

D. Electrostatic Propensity: AATCC 134 Step Method; maximum 3.0 Kv.

E. 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).

F. Indoor Air Quality: CRI Green Label Plus.

G. Static Coefficient of Friction: Minimum 0.60.

1.05 PREINSTALLATION MEETING:

A. Section 01 3100 – Project Management and Coordination.

B. Attendance: Flooring Installer, General Contractor, Owner, and Architect.

C. Review methods and procedures related to flooring work, including approved submittals, samples, substrate conditions, perimeter transitions, and manufacturer's written instructions.

D. Review schedule and planned sequence of installation; availability of materials and labor; equipment, facilities, and temporary protection.

1.06 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

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.

1.07 CLOSEOUT SUBMITTALS:

A. Submit under provisions of Section 01 7700.

B. Maintenance Instructions: Include manufacturer's cleaning and spot removal recommendations for each type of carpet.

C. Extra Materials: Provide minimum one case of each style and color, with protective covering for storage, identified with appropriate labels.

1.08 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.

1.09 ENVIRONMENTAL REQUIREMENTS:

A. In areas to receive carpet, 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.

1.10 WARRANTY:

A. Section 01 7700 – Closeout Requirements: General warranty requirements.

B. Provide manufacturer's standard commercial wear warranty, minimum 10 years.

C. Provide 20 year warranty against edge ravel and backing delamination.

PART 2 PRODUCTS

2.01 MANUFACTURERS:

A. J & J Industries, Inc.

B. Substitutions: Refer to Section 01 6000.

2.02 MODULAR CARPET:

A. Modular Carpet: J & J "Scholar."

1. Construction: Patterned loop pile.
2. Size: 24 x 24 inch.
3. Backing: Fiberglass reinforced thermoplastic.
4. Yarn: 100% nylon.
   a. Soil Retardant Treatment: AATCC 189; minimum 350 ppm fluorine on pile fiber of 3 separate tests.
5. Gauge: 1/12.
6. Color: As scheduled.

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 carpet 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 carpet 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 carpet adhesive.

D. Vacuum clean substrate.

3.03 MODULAR CARPET INSTALLATION:

A. Install carpet by experienced carpet layers in an approved manner in accordance with carpet manufacturer's written instructions and CRI 104 Section 14.

B. Verify carpet match to ensure minimal variation between dye lots.

C. Install carpet tight and flat on subfloor, with uniform appearance, using the quarter-turn installation method.

D. Apply pressure sensitive adhesive to substrate uniformly at rate recommended by manufacturer. After sufficient open time, press carpet into adhesive.

E. Roll with appropriate roller for complete contact of adhesive to carpet backing.

F. Cut edges straight and true, and seal in accordance with manufacturer's instructions to form permanently non-raveling joints and seams.

G. Trim carpet neatly at walls and around interruptions. Make cuts straight, true, and unfrayed.

H. Install carpet 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.

I. 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 carpet 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 carpet 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 carpeted 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 8100 – ACOUSTIC INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Sound control wall insulation.

B. Acoustical sealants.

1.02 RELATED SECTIONS:

A. Section 09 2210 – Metal Support Systems.

1.03 REFERENCES:

A. ASTM C665 – Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

B. ASTM C764 – Mineral Fiber Loose-Fill Thermal Insulation.

C. ASTM C834 – Latex Sealants.

D. ASTM C919 – Use of Sealants in Acoustical Applications.

E. ASTM C1149 – Self-Supported Spray Applied Cellulosic Thermal/Acoustical Insulation.

F. ASTM E84 – Surface Burning Characteristics of Building Materials.

G. ASTM E119 – Fire Tests of Building Construction and Materials.

H. ASTM E136 – Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.

1.04 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

B. Product Data: Submit product data for each type of insulation product specified, indicating compliance with specified performance characteristics and physical properties.

1.05 QUALITY ASSURANCE:

A. Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience.

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.

b. Fire Resistance Ratings: ASTM E119.

c. Combustion Characteristics: ASTM E136.

1.06 DELIVERY, STORAGE, AND HANDLING:

A. Deliver, store, protect, and handle products to site under provisions of Section 01 6000.

B. Deliver materials in manufacturer's original, unopened, undamaged packaging with identification labels intact. Store materials protected from exposure to harmful conditions.

PART 2 PRODUCTS

2.01 INSULATION MATERIALS:

A. Batt Insulation: ASTM C665, Type I, glass fiber batts; unfaced.

1. Manufacturers:

a. CertainTeed Corporation; NoiseReducer Sound Attenuation Batts.

b. Johns Manville Building Insulation; Formaldehyde-Free Fiberglass Insulation.

c. Knauf Insulation GmbH.

d. Owens-Corning Fiberglas Corporation; Sound Attenuation Batts.

e. Thermafiber, Inc.; Sound Attenuation Fire Blankets.

f. Substitutions: Refer to Section 01 6000.

2. Size: 3 to 3½ inch thickness; width as required by framing member spacing; manufacturer's standard lengths.

3. Provide batt insulation only where sprayed fiber insulation cannot be installed or where fireblocking is required.

B. Sprayed Fiber Insulation: ASTM C764, Type I, Category 1, glass fiber, or ASTM C1149, cellulose fiber.

1. Manufacturers:

a. CertainTeed Corporation; Insul-Safe SP.

b. Ark-Seal International, Inc.; Blow-In-Blanket System.

c. International Cellulose Corp.; Celbar.

d. Substitutions: Refer to Section 01 6000.

2. Binder and Adhesive: Manufacturer's standard.

2.02 ACOUSTICAL SEALANT:

A. Manufacturers:

1. Franklin International; Titebond Professional Acoustical Smoke & Sound Sealant.
2. Hilti, Inc.; CP 506 Smoke and Acoustic Sealant.
3. Pecora Corp.; AC-20 FTR Acoustical and Insulation Sealant.
4. Saint-Gobain Performance Plastics Corp.; Norseal V730 Series Acoustical Sealant.
5. United States Gypsum Co.; Sheetrock Acoustical Sealant.
6. Substitutions: Refer to Section 01 6000.

B. Acoustical Sealant for Exposed and Concealed Joints: ASTM C834; nonsag, paintable, nonstaining latex sealant intended for sealing interior joints to reduce airborne sound transmission.

2.03 ACCESSORIES:

A. Manufacturers:

1. Kinetics Noise Control, Inc.
2. Substitutions: Refer to Section 01 6000.

B. Acoustical Outlet Seals: Putty pad for acoustical seal of electrical and communications boxes; UL classified; permanently resilient. (Kinetics IsoBacker)

PART 3 EXECUTION

3.01 INSTALLATION:

A. General:

1. Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions, and product carton instructions.
2. Install insulation to comply with acoustical requirements. Fit insulation to areas and conditions required, without voids.
3. Fit insulation to form a complete insulation barrier around indicated areas. Fit snugly around penetrations.
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. Batt Insulation:

1. Friction fit batts between framing members, installed neatly around and behind all electrical boxes, vent piping, duct work, and other obstructions. Butt insulation tight, covering the entire area without voids.

2. Pack loose insulation in narrow spaces where fasteners cannot be installed, to ensure complete insulation coverage.

C. Sprayed Fiber Insulation:

1. Perform installation with pneumatic equipment in accordance with manufacturer's recommendations. Distribute insulation material evenly.

2. Spray-force material into cracks, holes, and seams; seal around electrical boxes, ducts, and plumbing.

3. Provide natural or mechanical ventilation continuously until materials are properly cured.

D. Acoustical Sealant: Install acoustical sealant in accordance with ASTM C919; continuous around perimeter of acoustical assembly, between gypsum wall board and floor and ceiling substrate and adjacent wall construction, and between gypsum wall and ceiling boards.

E. Acoustical Outlet Seals: Hand form pad around outlet box.

3.02 PROTECTION:

A. Protect installed insulation 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 09 9000 – PAINTING AND COATING

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Exterior painting.

B. Interior painting.

1.02 RELATED SECTIONS:

A. Shop Priming: Unless otherwise specified, shop priming of ferrous metal items is included under other sections.

B. Section 05 5000 – Metal Fabrications.

C. Section 07 9200 – Joint Sealants.

D. Section 08 1213 – Hollow Metal Frames.

E. Section 08 1400 – Wood Doors.

F. Section 09 2900 – Gypsum Board.

G. Divisions 22 to 27: Facility services piping and equipment.

H. Section 22 2123 – Natural Gas Piping.

I. 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.

1.03 REFERENCES:

A. ASTM D3960 – Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings.

B. OTC (Ozone Transport Commission) – Model Rule.

1.04 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. Acoustic ceiling panels.
8. Concrete flatwork.

1.05 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

B. Do not begin work or deliver products to project site prior to approval of submittals.

C. 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.

D. 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.

1.06 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.

1.07 DELIVERY, STORAGE AND HANDLING:

A. Deliver, store, protect, and handle products to site under provisions of Section 01 6000.

B. Deliver products to the project site in original, unopened containers with all labels intact and legible at time of use.

C. Store materials at minimum ambient temperature of 45 degrees F in well ventilated area. Follow manufacturer's requirements for maximum temperatures.

1.08 ENVIRONMENTAL REQUIREMENTS:

A. VOC Content: ASTM D3960; comply with the most restrictive of the following requirements:

1. OTC Model Rule.

2. Applicable federal, state and local regulations.

B. Protect materials from freezing before, during, and after application.

C. Apply water-based paints only when temperatures of surfaces to be painted and ambient temperatures are between 50 degrees F and 90 degrees F.

D. Apply solvent-thinned paints only when temperature of surfaces to be painted and ambient temperatures are between 45 degrees F and 95 degrees F.

E. Do not apply paint in snow, rain, fog or mist, or when relative humidity exceeds 80%, or to damp or wet surfaces.

F. 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.

G. Provide adequate continuous ventilation to maintain humidity below dew point of coldest surface.

PART 2 PRODUCTS

2.01 PAINT AND STAIN MATERIALS:

A. Manufacturers:

1. Sherwin-Williams Co.

2. ICI Paints.

3. Benjamin Moore & Co.

4. PPG Architectural Finishes, Inc.

5. Pratt & Lambert.

6. Tnemec Co., Inc.

7. Substitutions: Refer to Section 01 6000.

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).

F. Finish Coats:

1. Acrylic Semi-Gloss Coating: S-W ProClassic Waterborne Interior Acrylic Semi-Gloss (B31W51).
2. Acrylic Latex Semi-Gloss Coating: S-W Pro Industrial Acrylic Semi-Gloss (B66-650).
3. Alkyd Gloss Enamel: S-W Waterbased Industrial Enamel (B53-300).
4. Latex Eggshell Enamel: S-W ProMar 200 Interior Latex Eg-Shel (B20W2200).
5. Transparent Wood Finishes:
   a. Interior Wood Stain: S-W Wood Classics Interior Oil Stain (A49-200).
   b. Wood Sealer: S-W Sher-Wood Natural Filler (D70T1).
   c. Wood Finish (Gloss or Satin): S-W Wood Classics Waterborne Polyurethane Varnish (A68).

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. Interior Wood (Transparent Finish):

a. Repair damaged spots; fill voids and holes with tinted wood putty.

b. For open grain wood species, apply wash coat of thinned wood sealer; sand thoroughly.

3. Steel: Remove mill scale, rust, grease, dirt and dust, by hand scraping, wire brushing, power tool scraping, or sandblasting.

4. 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.

5. Galvanized Surfaces: Acid etch or clean thoroughly with a grease cutting solvent such as mineral spirits.

6. 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.

7. 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.

8. 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.

9. Previously Finished Surfaces (Transparent Finish): Strip and remove existing stain and finish. Sand and dust clean.

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.

1. Apply block filler using airless spray method followed by roller. Ensure complete coverage with pores filled and no pinholes.

B. Do not open containers until required for use. Stir materials thoroughly and keep at uniform consistency during application.

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. Transparent Wood Finishes: Tint fillers to match wood finish. Work fillers into the grain before set. Wipe excess from surface.

8. Back prime concealed wood surfaces with primer prior to installation.

9. Touch-up suction spots between coats.

10. Refinish surfaces affected by refitting work.

11. Apply additional coat wherever there are voids, imperfections or lap marks.

D. Wood Doors: 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 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.

F. Where walls with fire separation requirements are indicated on Drawings, apply the legend "LIFE SAFETY ASSEMBLY – PROTECT ALL OPENINGS" at maximum 15 foot horizontal spacing on both sides of the wall approximately one foot above finish ceiling, using 3 inch high red stenciled letters or preprinted decals. Verify location, spacing, size, wording, color, and method of application with authorities having jurisdiction.

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, 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; mechanical and electrical piping including all exposed gas piping, 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 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: 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 (Transparent Finish):

1. Apply one coat wood stain brushed and wiped out.
2. Apply one coat wood sealer (required for open grained wood only).
3. Apply one coat gloss wood finish (4.0 mils wet, 1.0 mil dry).
4. Apply two finish coats satin wood finish, sand between each coat (4.0 mils wet, 1.0 mil 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 eggshell enamel (4.0 mils wet, 1.6 mils dry per coat).

END OF SECTION

SECTION 10 1100 – VISUAL DISPLAY UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Markerboards.

B. Tackable wall panels.

1.02 RELATED SECTIONS:

A. Section 06 1050 – Miscellaneous Rough Carpentry: Wall blocking for attachment of components.

1.03 REFERENCES:

A. ANSI A208.1 – Wood Particleboard.

B. ASTM A424 – Steel Sheet for Porcelain Enameling.

C. ASTM B221 – Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

1.04 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

B. Shop Drawings: Indicate wall elevations, dimensions, joint locations, accessories and mounting details.

1.05 CLOSEOUT SUBMITTALS:

A. Submit under provisions of Section 01 7700.

B. Maintenance Data: Include recommendations for regular cleaning and stain removal.

1.06 WARRANTY:

A. Section 01 7700 – Closeout Requirements: General warranty requirements.

B. Include 5 year coverage of markerboard surfaces from discoloration, staining, crazing or cracking.

PART 2 PRODUCTS

2.01 MATERIALS:

A. Sheet Steel: ASTM 424, Type I, commercial quality.

B. Particle Board: ANSI A208.1, wood materials set with waterproof resin binder, sanded faces.

C. Aluminum Extrusions: ASTM B221.

D. Temporary Protective Cover: Sheet polyethylene, 8 mil thick.

E. Grounds, Clips, Brackets, Fasteners, and Anchors: As required.

2.02 FIXED DISPLAY BOARDS:

A. Manufacturers:

1. Claridge Products & Equipment, Inc.
2. K-Pro Specialty Products.
3. Marsh Industries, Inc.
4. Platinum Visual Systems.
5. Substitutions: Refer to Section 01 6000.

B. Markerboards: Factory built, ready to install. (Marsh 1631 series; Claridge Series 1; Platinum BTS series)

1. Nominal Thickness: ½ inch.
2. Face: 24 gauge porcelain enamel steel; high gloss finish.
3. Substrate: 3/8 inch particle board with minimum 0.005 inch thick aluminum backing.
4. Color: As selected.
5. Accessories:

a. Map Rail: Extruded aluminum, satin anodized finish; full length of markerboard units, with finished ends; 1 inch high; with cork display insert.

(1) Display Hooks: Metal sliding spring clip type; one pair for each board unit.

(2) Flag Holders: One per room.

b. Chalk Tray: Extruded aluminum, satin anodized finish; box type with end caps, full length of board units; 2¾ inch nominal tray depth.

2.03 TACKABLE WALL PANELS:

A. Manufacturers:

1. Conwed Designscape.
2. ESSI Acoustical Products Co.
3. Golterman & Sabo, Inc.
4. Kinetics Noise Control.
5. Lamvin, Inc.
6. Substitutions: Refer to Section 01 6000.

B. Wall Panels: Factory built, ready to install. (Conwed Respond Tackable Wall Panels)

1. Nominal Thickness: 1 inch.
2. Face: ¼ inch cork or 1/8 inch high density fiberglass, covered with woven polyester fabric.
3. Core: Fiberglass, 6 lb/cu ft density.
4. Edge and Corner Treatment: Half bevel profile with square corners; chemically hardened internal edge protection; backwrap face fabric minimum 1½ inches around panel edge.
5. Mounting Method: Adhesive; chemically harden panel areas intended for adhesive application.
6. Fabric Color: As selected.
7. Splice Joints: Concealed spline.

C. Adhesive: Manufacturer's recommended type for wall surface construction.

PART 3 EXECUTION

3.01 EXAMINATION:

A. Take field measurements prior to preparation of shop drawings and fabrication to assure proper fitting of the work. Allow for trimming and fitting wherever taking of field measurements before fabrication might delay work.

B. Verify that internal wall blocking in stud wall construction is ready to receive work and positioning dimensions are as indicated on shop drawings.

3.02 INSTALLATION:

A. Deliver factory built units completely assembled in one piece without joints, whenever possible.

1. Where overall unit dimensions exceed maximum panel size, provide panels of equal size or symmetrical layout.
2. Where overall unit dimensions require delivery in separate units, pre-fit components at factory, disassemble for delivery, and make final joints at the site.

B. Install units in locations and mounting heights indicated, in accordance with manufacturer's instructions. Keep perimeter lines plumb, straight, and level.

1. Verify mounting heights with Owner.

C. Anchor components firmly to substrate materials and mounting surfaces using mechanical methods. Adhesive installation is not permitted unless specifically approved. Use concealed mounting methods where possible. Where exposed fasteners are required, use tamperproof type.

3.03 CLEANING:

A. Clean surfaces in accordance with manufacturer's instructions. Remove paint, glue, dirt and other foreign substances.

B. Cover surfaces with temporary protective cover, taped to frame; remove cover at Substantial Completion.

END OF SECTION

SECTION 10 1402 – INTERIOR SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Interior signs.

1.02 REFERENCES:

A. ADA (Americans with Disabilities Act) – Standards for Accessible Design.

1.03 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

B. Shop Drawings: Illustrate graphics and copy of each style of signage; indicate mounting provisions, installation details and accessories.

1. Verify final room names and numbers with Owner prior to submitting shop drawings.

C. Samples: Submit full range of colors for selection.

1.04 REGULATORY REQUIREMENTS:

A. Comply with provisions of ADA.

PART 2 PRODUCTS

2.01 INTERIOR SIGNS AND LETTERS:

A. Manufacturers:

1. Best Sign Systems, Inc.
2. Digimatics, Inc; Architectural Arts.
3. Diskey Architectural Signage.
4. EAS Environmental Signage.
5. Ellet Sign Co.
6. Interior Graphic Systems.
7. Roban, Inc.
8. Seton Name Plate Co.
9. Signs Unlimited.
10. Substitutions: Refer to Section 01 6000.

B. Wall Mounted Signs: Two color injection molded plastic, with 1/32” raised graphics and copy; radiused corners; grade 2 Braille.

1. Graphics: International universal style symbols.
2. Copy: Medium sans-serif typestyle, minimum 5/8 inch high.
3. Colors: As selected.
4. Accessories: Coordinating mounting frame.
5. Mounting: Secure frame to wall using the following methods. Secure sign to mounting frame with double faced vinyl foam tape.
   a. Gypsum Board Surfaces: Screws and plastic expansion anchors.
   b. Other Surfaces: Double faced vinyl foam tape.

PART 3 EXECUTION

3.01 INSTALLATION:

A. Install signs after mounting surfaces are finished.

B. Install products in approved locations in accordance with manufacturer’s instructions, level and plumb, and rigidly attached to anchoring surfaces.

C. Mounting Locations and Heights: In accordance with ADA. Adjacent to latch side of door or edge of opening, 9 inches from edge of door to center of sign; 60 inches above finish floor to top of sign. Do not mount signs on doors unless specifically approved.

3.02 SCHEDULE:

A. Refer to schedule on Drawings for locations and copy for the following signs:

1. Room Identification: Wall mounted sign, 12 x 4 inch; room name, or name and number, as indicated.
2. Exits: Wall mounted sign, 8 x 3 inch; “Exit”.
3. Occupant Loads: Wall mounted sign, 12 x 6 inch.

END OF SECTION

SECTION 10 4400 – FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Fire extinguisher cabinets.

B. Fire extinguishers.

1.02 REFERENCES:

A. FM – Factory Mutual.

B. NFPA 10 – Portable Fire Extinguishers.

C. UL – Underwriters Laboratories.

1.03 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

B. Product Data: Indicate dimensions, certifications, and mounting details.

PART 2 PRODUCTS

2.01 MANUFACTURERS:

A. Amerex.

B. J.L. Industries.

C. Larsen's Manufacturing Company.

D. Smith Industries, Inc.; Potter-Roemer.

E. Substitutions: Refer to Section 01 6000.

F. Provide fire extinguishers, cabinets and accessories by a single manufacturer.

2.02 FIRE EXTINGUISHERS AND CABINETS:

A. Fire Extinguishers: NFPA 10, UL rated, FM approved; 10 lb., 4A-60BC type, pressurized multi-purpose dry chemical extinguisher; with pressure gauge and hose.

B. Semi-Recessed Cabinets: Sheet steel interior, minimum 18 gauge; white baked enamel finish; 2½ to 3 inch projection from face of wall, with rolled edge trim. (JL Academy 1027; Larsen's 2409-6R)

1. Door and Frame: Aluminum with satin anodized finish; pull handle with friction catch; full glazed door with clear acrylic window, ¼ inch thick. (JL F10 series)

PART 3 EXECUTION

3.01 INSTALLATION:

A. Install Products in accordance with manufacturer's instructions and requirements of governing authorities.

B. Prepare wall recesses as required by type and size of cabinet and style of trim and to comply with manufacturer's instructions.

C. Securely fasten mounting brackets and cabinets to structure, square and plumb.

D. Fire Extinguisher Cabinet Mounting Height: Maximum 56 inches above finish floor to top of cabinet.

E. Check extinguishers for proper charge operation. Remove and replace damaged, defective or undercharged units prior to substantial completion.

F. Tag all extinguishers; indicate expiration date of charge.

END OF SECTION

SECTION 10 5700 – WARDROBE AND CLOSET SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Coat hooks.

1.02 RELATED SECTIONS:

A. Section 06 1050 – Miscellaneous Rough Carpentry: Wall backing required to secure accessories.

B. Section 08 1400 – Wood Doors.

1.03 REFERENCES:

A. ADA (Americans with Disabilities Act) – Standards for Accessible Design.

1.04 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

B. Product Data: Indicate component layout, installation instructions, and maintenance recommendations.

C. Samples: Color samples for selection.

PART 2 PRODUCTS

2.01 COAT HOOKS:

A. Manufacturers:

1. Alno, Inc.
2. Bobrick Washroom Equipment, Inc.
3. Datum Filing Systems, Inc.
4. Emco Specialty Products, Inc.
5. Vogel Peterson Company.
6. Substitutions: Refer to Section 01 6000.

B. Coat Hooks: Heavy duty stainless steel, single pin; satin finish; square bracket and backplate for concealed mounting, with locking set screw. (Bobrick B-6717)

1. Verify projection with adjacent door and wall clearances.

C. Coat Hook Panel: Solid phenolic panel with plastic laminate; hardware for concealed mounting; 1 inch wide stainless steel bent bar hooks; length and number of hooks as indicated. (Bobrick B-688)

PART 3 EXECUTION

3.01 INSTALLATION:

A. Install accessories in accordance with manufacturer's installation instructions, plumb and level, securely and rigidly attached to substrate.

B. Install accessories 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. Conceal evidence of drilling, cutting, and fitting to room finish.

E. Fit flanges of accessories snugly to mounting surfaces.

END OF SECTION

SECTION 12 3000 – CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Factory fabricated casework.

B. Countertops.

C. Cabinet hardware.

D. Prefinished surfaces.

E. Preparation for installing utilities.

1.02 RELATED SECTIONS:

A. Section 06 1050 – Miscellaneous Rough Carpentry: Wall blocking for attachment of components.

B. Section 07 9200 – Joint Sealants.

C. Section 09 6500 – Resilient Flooring: Base for installation in toe kick space.

D. Section 22 4000 – Plumbing Fixtures.

1.03 REFERENCES:

A. ADA (Americans with Disabilities Act) – Standards for Accessible Design.

B. ALA (American Laminators Association) – Thermoset Decorative Panels.

C. ANSI A156.9 – Cabinet Hardware.

D. ANSI A208.1 – Wood Particleboard.

E. AWI – Architectural Woodwork Standards.

F. NEMA (National Electric Manufacturers Association) LD3 – High Pressure Decorative Laminates.

1.04 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

B. 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.

1.05 QUALITY ASSURANCE:

A. Perform Work in accordance with AWI Premium quality.

B. Regulatory Requirements: Components indicated to be accessible shall comply with ADA.

1.06 ENVIRONMENTAL REQUIREMENTS:

A. Deliver, store, protect, and handle products to site under provisions of Section 01 6000.

B. Protect units from moisture damage.

C. 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. Wood Particleboard Scheduled to Receive Laminate Finish: ANSI A208.1, Grade M-2, medium density (45 lbs per cu ft), Industrial grade; AWI standard, composed of wood chips, made with high waterproof resin binders; sanded faces.

2.02 LAMINATE MATERIALS:

A. Manufacturers:

1. Formica Corporation.
2. International Paper Decorative Products; Nevamar.
3. Pioneer Plastics Corporation, Pionite.
4. Wilsonart International, Inc.
5. Substitutions: Refer to Section 01 6000.

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 CASEWORK:

A. Manufacturers:

1. Case Systems, Inc.
2. P.R. Bean Co., LLC.
3. Stevens Industries, Inc.
4. TMI Systems Design Corp.
5. Substitutions: Refer to Section 01 6000.

B. Cabinet Materials:

1. Cabinet Body:

a. Sides and Exposed Fronts and Backs: Wood particleboard, minimum ¾ inch thick, with plastic laminate.

b. Base Cabinet Tops and Bottoms: Wood particleboard, minimum ¾ inch thick, with plastic laminate.

c. Wall Cabinet Tops and Bottoms: Wood particleboard, minimum ¾ inch thick, with plastic laminate.

d. Tall Cabinet Tops and Bottoms: Wood particleboard, minimum ¾ inch thick, with plastic laminate.

e. Concealed Backs: Wood particleboard, minimum ¼ inch thick, with plastic laminate; fully captured in cabinet body.

f. Mounting Rails: Wood particleboard, minimum ¾ inch thick; with plastic laminate where exposed to view at cabinet interior.

g. Plastic Laminate for Exposed Ends and Exterior Surfaces: Grade VGS.

h. Plastic Laminate for Interior and Concealed Surfaces: Cabinet liner or melamine.

2. Door and Drawer Fronts: Wood particleboard, minimum ¾ inch thick, with grade VGS plastic laminate on front and edges, and cabinet liner or melamine on back; full overlay style.

3. Drawers: Wood particleboard with melamine surface.

a. Drawer Boxes: Minimum ½ inch thick.

b. Drawer Bottoms: Minimum ¼ inch thick; fully captured in drawer frame.

4. Shelving: Wood particleboard with melamine surface; 1 inch thick.

a. Shelving for cabinets less than 30 inches wide may be ¾ inch thick.

C. Cabinet Types: Typical configurations as described; provide special configurations and features as detailed.

1. Base Cabinets: Nominal dimensions as indicated; integral toe kick base front and back, or adjustable leveler legs with removable toe kick cover.

a. Accessible Sinks: Fascia and undersink enclosure, fabricated with dimensions in accordance with ADA; enclosure removable for plumbing access.

b. Pencil Drawers: Width to coordinate with knee space; fascia to match drawer fronts.

2. Wall Cabinets: Nominal dimensions as indicated; wall hung.

a. Microwave Cabinets: Wall cabinet with open front and back; extended bottom shelf, minimum 18 inches deep; with grommet in bottom shelf unless receptacle is installed within cabinet.

3. Tall Cabinets: Nominal dimensions as indicated; integral toe kick base front and back, or adjustable leveler legs with removable toe kick cover.

a. Utility Cabinets: With doors, one fixed shelf and 4 adjustable shelves.

b. Book Shelving Units: Without doors; with one fixed shelf and 4 adjustable shelves; plastic laminate for all surfaces exposed to view.

4. Special Purpose Cabinets and Casework: As detailed.

2.04 COUNTERTOPS:

A. Tops: Wood particleboard, minimum 1-3/16 inch thick, with grade HGS plastic laminate, with backing sheet; front edge radiused and postformed 180 degrees; factory fabricated with openings for sinks, faucets, and other accessories as indicated.

1. Where configuration prevents 180 degree postformed front edge, provide vinyl T-molding or 3mm PVC edge.

2. Backsplashes and End Splashes: Factory fabricated to match countertop; upper edge radiused and postformed 90 degrees.

2.05 HARDWARE:

A. Manufacturers:

1. Casework manufacturer’s standard.

2. Julius Blum, Inc.

3. Ergomart.

4. Häfele America Co.

5. Hettich America LP.

6. Knape & Vogt Manufacturing Company (K & V).

7. Doug Mockett & Co., Inc.
8. Sargent Manufacturing Company.
9. The Stanley Works, Stanley Hardware Division.
10. Substitutions: Refer to Section 01 6000.

B. Door and Drawer Pulls: Extruded aluminum, U shaped wire pulls; chrome finish.

C. Shelf Clips for Adjustable Shelving: Heavy duty plastic; L shaped with locking feature; two pins sized to fit holes in cabinet sides. (K & V 340)

D. Drawer and Shelf Slides: ANSI A156.9; epoxy coated steel with nylon rollers; self closing; minimum 100 lb capacity.

E. File Drawer Slides: ANSI A156.9; epoxy coated steel with nylon rollers; full extension type; self closing; minimum 150 lb capacity. Drawers shall have top mounted side rails to accept standard hanging file folders.

F. 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. (Blum Inserta series)

G. Door Catches: Roller type, magnetic type, or integral with hinge assembly.

H. Door Stops: Chain type or bar type; provide for doors located adjacent to walls, deeper cabinets, or other locations where door swing restriction is necessary.

I. Cabinet Locks: Rim type keyed cylinder, steel with satin finish; keyed alike in each room.

J. Grommets: Plastic liner for cut-outs; removable cap with pivoting cord slot cover; color as selected; 2½ inch nominal diameter unless otherwise indicated.

1. Provide minimum 2 grommets per work station. Where locations are not specifically indicated, field verify locations.

K. Keyboard Trays: Retractable mechanism on ball bearing slides; adjustable for height, tilt and rotation; black baked enamel on steel; nonslip tray with reversible mouse platform. (Häfele 632.68.317; Ergomart IS-SSC SlimForm19)

L. Countertop Support Brackets: Formed steel L shape brackets with brace, 5mm thick; white epoxy coated finish; size as detailed. (K & V 208WH series)

M. Wardrobe Cabinet Rods: Welded steel tube, oval shape; 1.5mm wall thickness; chrome plated; end supports with two pins and screw hole. Provide center support bracket for rod lengths greater than 30 inches. (Häfele 801.09.226 rod, 803.33.210 end support, and 802.04.208 center support)

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.

E. Resilient Base: As specified in Section 09 6500; material and color to match remainder of room.

F. Accessories: Cutouts, fillers, scribes, finished ends, finished backs and tops; as indicated and as required to provide a complete and finished project.

1. Where cabinets do not extend completely into corners, provide tall cabinet top fillers and wall cabinet top and bottom fillers to close spaces between cabinets and walls.

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 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. 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 resilient base as specified in Section 09 6500.

H. Coordinate installation of plumbing connections, and all accessories.

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:

A. Perform final cleaning of casework, shelves, hardware, fittings, and fixtures in accordance with Section 01 7700.

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 SECTION INCLUDES:

A. Materials and installation methods applicable to all Sections of Division 22.

B. Identification.

C. Testing and inspection.

1.02 RELATED SECTIONS:

A. Section 09 9000 – Painting and Coating.

1.03 REFERENCES:

A. ANSI A13.1 – Scheme for the Identification of Piping Systems.

PART 2 PRODUCTS

2.01 IDENTIFICATION MATERIALS:

A. Manufacturers:

1. Allen Systems, Inc.
2. W.H. Brady Company.
3. Seton Name Plate Co.
4. Substitutions: Refer to Section 01 6000.

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 and valves 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. All piping systems shall be tested before piping is concealed, covered, or insulated. Before testing pipe systems, remove or otherwise protect from damage the components which are 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 SECTION INCLUDES:

A. Piping hangers and supports.

1.02 RELATED SECTIONS:

A. Section 22 0500 – Common Work Results for Plumbing.

1.03 REFERENCES:

A. ANSI B31.1 – Code for Pressure Piping.

B. ANSI B31.9 – Building Service Piping.

C. ASTM F708 – Design and Installation of Rigid Pipe Hangers.

D. MSS SP58 – Pipe Hangers and Supports - Materials, Design and Manufacture.

PART 2 PRODUCTS

2.01 MANUFACTURERS:

A. Anvil International, Inc.

B. Eaton; B-Line.

C. Elcen Metal Products Co.

D. Fee and Mason Manufacturing Company.

E. Miro Industries, Inc.

F. Substitutions: Refer to Section 01 6000.

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. Support Attachments to Structural Steel:

a. Pipe Sizes to 2 Inch: Malleable iron C-clamps with lock nuts and cup formed set screws. (Elcen 29A)

b. Pipe Sizes 2½ Inch and Over: Malleable iron or forged steel beam clamp with tie rod and nut, pocket threaded for rod connection. (Elcen 33 or 34)

3. 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)

   e. Insulated Piping 4 Inch and Over: Adjustable steel yoke with pipe roller and pipe covering protection saddle. (Anvil 181 with 160 saddle)

4. 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)

5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.

6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.

7. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

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. Attach hangers to structural members with clamps; at steel joists, support at panel points only. Do not suspend hangers from metal deck.

D. 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 vertical piping at every floor. 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. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
8. Provide support for utility meters in accordance with requirements of utility companies.
9. Provide hangers adjacent to motor driven equipment with vibration isolation.
10. 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.
11. 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 SECTION INCLUDES:

A. Thermal insulation for plumbing piping:

1. Domestic hot and cold water.
2. Accessible sinks and lavatories.

1.02 RELATED SECTIONS:

A. Section 07 8400 – Firestopping.

B. Section 22 0500 – Common Work Results for Plumbing.

C. Section 22 1000 – Plumbing Piping.

D. Section 22 1116 – Domestic Water Piping.

E. Section 22 1316 – Sanitary Waste and Vent Piping.

F. Section 22 4000 – Plumbing Fixtures.

1.03 REFERENCES:

A. ASTM C335 – Steady-State Heat Transfer Properties of Horizontal Pipe Insulation.

B. ASTM C533 – Calcium Silicate Block and Pipe Thermal Insulation.

C. ASTM C534 – Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.

D. ASTM C547 – Mineral Fiber Pipe Insulation.

E. ASTM C1136 – Flexible, Low Permeance Vapor Retarders for Thermal Insulation.

F. ASTM C1822 – Insulating Covers on Accessible Lavatory Piping.

G. ASTM D1784 – Rigid Polyvinyl Chloride (PVC) Compounds and Chlorinated Polyvinyl Chloride (CPVC) Compounds.

H. ASTM E84 – Surface Burning Characteristics of Building Materials.

1.04 DEFINITIONS:

A. Concealed: Below grade or hidden from sight in normally inaccessible areas such as furred-in spaces, attic spaces, areas above suspended ceilings, 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.

1.05 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

B. Product Data: Include general description, fire ratings, and installation instructions.

C. Schedules: Provide list of materials and fastenings to be used for each system.

1.06 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:

A. Armacell LLC.

B. CertainTeed Corporation.

C. Johns Manville.

D. Owens-Corning Fiberglas Corporation.

E. Substitutions: Refer to Section 01 6000.

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. 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 from floor to eight feet above floor; 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. 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)

   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.

2.03 ACCESSORIES:

A. Manufacturers:

   1. Plumberex Specialty Products.

   2. ProFlo.

   3. TrueBro, Inc.

   4. Substitutions: Refer to Section 01 6000.

B. Pipe Covers: ASTM C1822, Type I; molded vinyl, 1/8 inch wall thickness, with internal ribs; locking covers for valves and cleanouts; white color or clear. (TrueBro Lav Guard)

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. Where piping penetrates fire rated assemblies, provide heavy duty pipe insulation to completely fill space between pipe and sleeve, in accordance with Section 07 8400.

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.

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. Domestic Cold Water (up to 6 Inch): 1 inch fiberglass.
2. Domestic Hot Water (up to 2 Inch): 1 inch fiberglass.
3. Hot Water Supply and Drain at Accessible Sinks and Lavatories: ½ inch closed cell, or pipe covers; may be omitted if plastic pipe is used.

C. Concealed Piping:

1. Domestic Cold Water (up to 6 Inch): ½ inch closed cell.
2. Domestic Hot Water (up to 4 Inch): ½ inch closed cell.

END OF SECTION

SECTION 22 1000 – PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Piping materials and installation methods applicable to all plumbing piping work.

1.02 RELATED SECTIONS:

A. Section 07 8400 – Firestopping.

B. Section 07 9200 – Joint Sealants.

C. Section 09 8100 – Acoustic Insulation.

D. Section 22 0500 – Common Work Results for Plumbing.

E. Section 22 0529 – Plumbing Hangers and Supports.

1.03 REFERENCES:

A. ANSI B1.20.1 – Pipe Threads, General Purpose, Inch.

B. ANSI B16.18 – Cast Copper Alloy Pressure Joint Solder Fittings.

C. ANSI B16.21 – Nonmetallic Flat Gaskets for Pipe Flanges.

D. ANSI B18.2.1 – Square and Hex Bolts and Screws, Inch Series.

E. ASME SEC IX – Welding and Brazing Qualifications.

F. ASTM A53 – Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

G. ASTM B32 – Solder Metal.

H. ASTM D1557 – Laboratory Compaction Characteristics of Soil Using Modified Effort.

I. ASTM D2564 – Solvent Cements for PVC Plastic Piping Systems.

J. ASTM D2855 – Making Solvent-Cemented Joints with PVC Pipe and Fittings.

K. ASTM F656 – Primers for Use in Solvent Cement Joints of PVC Plastic Pipe and Fittings.

L. AWS A5.8 – Filler Metals for Brazing and Braze Welding.

M. AWS D1.1 – Structural Welding Code - Steel.

N. AWS D10.12 – Guide for Welding Mild Steel Pipe.

O. CISPI 310 – Joints for Hubless Cast Iron Sanitary Systems.

P. NCPWB – Procedure Specifications for Pipe Welding.

1.04 CLOSEOUT SUBMITTALS:

A. Submit under provisions of Section 01 7700.

B. Valve Charts: Include in Operation and Maintenance binders. For each piping system, indicate identification (correlated with record documents), location and purpose of each valve.

1.05 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, 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.

1.06 DELIVERY, STORAGE AND HANDLING:

A. Deliver, store, protect, and handle products to site under provisions of Section 01 6000.

B. Store piping and specialties elevated above grade, protected from moisture and dirt.

C. Store plastic piping protected from direct sunlight, with supports to prevent sagging and bending.

D. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

E. Provide temporary protective coating on cast iron and steel valves.

F. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

G. 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 Stud Walls, and Floors (Concealed): 22 gauge galvanized steel.
3. Exterior Walls, Interior Masonry 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 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. 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.

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 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, furred wall spaces, pipe chases, and masonry cores 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. Locate valves to facilitate maintenance access. In vertical piping in mechanical rooms and unfinished locations, locate valves within 8 feet of floor.

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. Components located in pipe shafts and suspended ceiling spaces are not considered exposed. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to weld.

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. Install bell and spigot pipe with bell end upstream.

R. Die cut threaded joints with full cut standard taper pipe threads with non-toxic joint compound applied to male threads only.

S. Install valves with stems upright or horizontal, not inverted. Remove protective coatings after installation.

T. Provide valves for shut-off and to isolate service equipment, parts of systems, or vertical risers.

U. Install valves for throttling, bypass, or manual flow control services.

V. Install unions downstream of valves and at equipment or apparatus connections.

W. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.

X. Clean and flush piping systems prior to testing system or connecting equipment.

3.02 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 using neoprene gasket and stainless steel clamp and shield assemblies.

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 K Solder Fittings: 15% silver brazing alloy with silver solder. Thoroughly clean all joint surfaces prior to assembly.

2. 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.

3. 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.

3.03 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 to achieve fire resistance equivalent to fire separation required, in accordance with Section 078400. Seal penetrations through non-rated acoustical assemblies with acoustical sealant in accordance with Section 098100. Where fire and acoustical separation are not required, apply waterproof sealant in accordance with Section 079200.

E. Exterior Wall Sleeves: Install sleeves reamed with welded flanged ends flush with wall.

F. Interior Masonry Wall Sleeves: Install sleeves reamed and finished flush with wall.

G. Stud Wall Sleeves: Terminate ends flush with wall.

END OF SECTION

SECTION 22 1116 – DOMESTIC WATER PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Domestic hot and cold water supply piping and valves.

B. Specialties: Water hammer arrestors, thermostatic tempering valves, recessed valve boxes.

1.02 RELATED SECTIONS:

A. Section 22 0500 – Common Work Results for Plumbing.

B. Section 22 0700 – Plumbing Insulation.

C. Section 22 1000 – Plumbing Piping.

D. Section 22 4000 – Plumbing Fixtures.

1.03 REFERENCES:

A. ANSI A112.26.1 – Water Hammer Arrestors.

B. ANSI B16.18 – Cast Copper Alloy Solder Joint Pressure Fittings.

C. ANSI B16.22 – Wrought Copper and Copper Solder Joint Pressure Fittings.

D. ANSI B31.9 – Building Service Piping.

E. ASSE 1010 – Water Hammer Arresters.

F. ASSE 1016 – Automatic Compensating Valves for Individual Showers and Tub/Shower Combinations.

G. ASSE 1070 – Water Temperature Limiting Devices.

H. ASTM B88 – Seamless Copper Water Tube.

I. ASTM F876 – Crosslinked Polyethylene (PEX) Tubing.

J. ASTM F877 – Crosslinked Polyethylene (PEX) Plastic Hot- and Cold-Water Distribution Systems.

K. ASTM F1960 – Cold Expansion Fittings with PEX Reinforcing Rings for Use with Cross-linked Polyethylene (PEX) Tubing.

L. AWWA C651 – Disinfecting Water Mains.

M. IAPMO (International Association of Plumbing and Mechanical Officials) PS 117 – Copper and Copper Alloy Tubing System Incorporating Press-Type or Nail-Type Connections.

N. MSS SP80 – Bronze Gate, Globe, Angle and Check Valves.

O. MSS SP110 – Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

P. PDI WH-201 – Water Hammer Arrestors.

1.04 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

B. Product Data: Provide for piping materials, valves and specialties. Indicate materials, sizes, dimensions and types.

1.05 CLOSEOUT SUBMITTALS:

A. Submit under provisions of Section 01 7700.

B. Project Record Documents: Record actual locations of components, backflow preventers, water hammer arrestors, and other equipment.

1.06 PROJECT CONDITIONS:

A. Verify and coordinate all required connections to fixtures, equipment, and accessories with manufacturer's instructions.

1.07 WARRANTY:

A. Section 01 7700 – Closeout Requirements: General warranty requirements.

B. PEX Tubing: Provide 30 year manufacturer warranty.

1. Manifolds and Fittings: Provide 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.

3. Provide PEX tubing for all domestic water piping unless specifically indicated or approved.

2.02 VALVES:

A. Manufacturers:

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.
9. Substitutions: Refer to Section 01 6000.

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:

1. Acudor Products, Inc.
2. Guy Gray Manufacturing Co., Inc.
3. Mifab, Inc.
4. Oatey.
5. Substitutions: Refer to Section 01 6000.

B. Refrigerator and Ice Maker: Metal rough-in box; brass ball valve with ¼ turn handle, screw on faceplate frame.

2.04 SPECIALTIES:

A. Manufacturers:

1. Armstrong-Lynwood, Inc.; Rada.
2. Lawler Manufacturing Co.
3. Leonard Valve Co.
4. Mifab, Inc.
5. Powers Process Controls.
6. Precision Plumbing Products.
7. Sioux Chief Mfg. Co.
8. Watts Water Technologies.
9. Zurn Industries, Inc.
10. Substitutions: Refer to Section 01 6000.

B. Water Hammer Arrestors: 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; Watts LF15M2 series)

C. Thermostatic Tempering Valves: Solid brass body, stainless steel internal components, integral temperature adjustment, sized for intended application, with integral check valves.

1. Single Fixtures: ASSE 1016 and ASSE 1070; 4 gpm capacity at 45 psi pressure drop. (Powers Hydroguard e480 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. Install unions and shut-off valves at all plumbing fixtures, equipment, appliances, and branch lines off main lines.

F. Install expansion offsets in lines where required. Anchor piping at each end.

G. Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur.

H. Install water hammer arrestors complete with accessible isolation valve on hot and cold water branch lines serving lavatories and sinks, and on branch lines with quick closing valves and solenoid valves.

I. 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.

J. 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 SECTION INCLUDES:

A. Sanitary sewer drain, waste and vent piping.

B. Cleanouts.

1.02 RELATED SECTIONS:

A. Section 22 0500 – Common Work Results for Plumbing.

B. Section 22 0700 – Plumbing Insulation.

C. Section 22 1000 – Plumbing Piping.

D. Section 22 4000 – Plumbing Fixtures.

1.03 REFERENCES:

A. ANSI B16.3 – Malleable Iron Threaded Fittings.

B. ANSI B16.9 – Factory Made Wrought Steel Buttwelding Fitting.

C. ASME A112.36.2 – Cleanouts.

D. ASTM A53 – Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

E. ASTM A74 – Cast Iron Soil Pipe and Fittings.

F. ASTM A888 – Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.

G. ASTM C564 – Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

H. ASTM D2665 – Polyvinyl Chloride (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.

I. CISPI 301 – Cast Iron Soil Pipe and Fittings for Hubless Cast Iron Sanitary System.

PART 2 PRODUCTS

2.01 SANITARY PIPING:

A. Cast Iron Soil Pipe: ASTM A74; service weight, with hub and spigot.

1. Fittings: Cast iron.

2. Neoprene Compression Gaskets: ASTM C564.

B. Polyvinyl Chloride (PVC): ASTM D2665, Schedule 40 and Schedule 80, with PVC fittings.

C. Galvanized Steel Pipe: ASTM A53, Schedule 40; seamless or welded.

1. Sizes to 2 Inch: Threaded and coupled ends.
2. Sizes 2½ Inch and Larger: Beveled ends for welding.
3. Fittings (Sizes to 2 Inch): ANSI B16.3; Class 150 malleable iron, threaded type.
4. Fittings (Sizes 2½ Inch and Larger): ANSI B16.9, butt welding type.

D. No-Hub Cast Iron Pipe: ASTM A888; CISPI 301.

1. Fittings: Cast iron.
2. Couplings: Shielded type with clamps; 24 gauge type 304 stainless steel with ASTM C564 neoprene compression gaskets.

2.02 CLEANOUTS:

A. Manufacturers:

1. Zurn Industries, Inc.
2. Amtrol, Inc.
3. Josam Co.
4. Mifab, Inc.
5. Jay R. Smith Manufacturing Co.
6. Wade.
7. Watts Drainage.
8. Substitutions: Refer to Section 01 6000.

B. Wall Cleanouts: ASME A112.36.2; lacquered cast iron body; line size, maximum 4 inch.

1. Gypsum Board Partitions: Threaded plug, with smooth square polished nickel bronze access cover and frame secured with machine screws. (Zurn ZN-1443)
2. Masonry Walls: Threaded plug, with smooth round stainless steel access cover. (Zurn ZN-1441)

PART 3 EXECUTION

3.01 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. Provide cleanouts in drain and waste piping 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.

3.02 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 2123 – NATURAL GAS PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Natural gas piping system for operating pressures up to 160 psig.

B. Accessories.

1.02 RELATED SECTIONS:

A. Section 09 9000 – Painting and Coating: Field painting of exposed piping.

B. Section 22 0500 – Common Work Results for Plumbing.

C. Section 22 0700 – Plumbing Insulation.

D. Section 22 1000 – Plumbing Piping.

1.03 REFERENCES:

A. ANSI B16.3 – Malleable Iron Threaded Fittings.

B. ANSI B31.2 – Fuel Gas Piping.

C. ANSI Z21.15 – Manually Operated Gas Valves.

D. ASTM A53 – Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

E. ASTM A234 – Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.

F. NFPA 54 – National Fuel Gas Code.

1.04 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.

1.05 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 1½ 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. Manual Valves (Sizes to 2 Inch): ANSI Z21.15; full port type; all brass construction with check; lever operator.

2.03 ACCESSORIES:

A. Manufacturers:

1. Cooper B-Line.

2. Dormont.

3. Erico International Corp.

4. Maxitrol Co.

5. Substitutions: Refer to Section 01 6000.

B. 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.

1. Equipment with Automatic Spark Ignition: Maxitrol R400S or 325-3, with automatic safety vent limiting device.

2. Equipment with Standing Pilots: Maxitrol R500S with automatic safety vent limiting device.

C. Pipe Supports: Foam base with metal cover. (Erico Caddy Pyramid 50)

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. Support piping across roofs at maximum 8 ft o.c. Install roof walkway at each support location.

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.

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 SECTION INCLUDES:

A. Sinks.

1.02 RELATED SECTIONS:

A. Section 07 9200 – Joint Sealants: Seal fixtures to adjoining materials.

B. Section 12 3000 – Casework: Preparation of countertops for sinks.

C. Section 22 0500 – Common Work Results for Plumbing.

D. Section 22 1116 – Domestic Water Piping.

E. Section 22 1316 – Sanitary Waste and Vent Piping.

1.03 REFERENCES:

A. ADA (Americans with Disabilities Act) – Standards for Accessible Design.

B. ASME A112.19.3 – Stainless Steel Plumbing Fixtures (Designed for Residential Use).

C. EPACT – Energy Policy Act of 1992, with current amendments.

1.04 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

B. Product Data: Provide component sizes, rough-in requirements, and service sizes. Provide catalog illustrations of fixtures, trim, and finishes.

C. Manufacturer's Instructions: Indicate assembly and support requirements, installation methods and procedures.

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 REGULATORY REQUIREMENTS:

A. Accessible Products: Ensure products and installation are in conformance with applicable requirements of ADA.

B. Provide products complying with the low flow standards mandated by EPACT.

1.07 DELIVERY, STORAGE, AND PROTECTION:

A. Deliver, store, protect, and handle products to site under provisions of Section 01 6000.

B. Accept Products on site in original factory packaging. Inspect for damage.

C. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

D. 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:

A. Fixtures:

1. Elkay Manufacturing Company.
2. American Standard, Inc.
3. Just Manufacturing Co.

B. Faucets:

1. Manufacturer of fixture.
2. Chicago Faucets.
3. Moen Incorporated.
4. Speakman Co.
5. T & S Brass and Bronze Works, Inc.
6. Zurn Industries, Inc.

C. 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.

D. Substitutions: Refer to Section 01 6000.

2.02 SINKS:

A. Accessible Single Compartment Sinks: ASME A112.19.3; 22 x 19½ x 5½ inch outside dimensions; 18 gauge thick, Type 302 or 304 stainless steel, self rimming, undercoated, with stainless steel drain and basket type strainer; factory drilled for trim. (Elkay LRAD2219; Just SL-ADA-1921-A-GR)

B. Pull-Out Spray Faucets: ASME A112.18.1; chrome plated brass with swing spout; pullout hose with spray; maximum flow rate 1.5 gpm; single control metal lever handle. (Elkay LK5000)

C. Supply Fittings: Angle supply with wheel handle stop and escutcheon. (Zurn Z8806LR)

D. 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)

PART 3 EXECUTION

3.01 EXAMINATION:

A. Verify existing conditions before starting work.

B. Confirm that casework is constructed with adequate provision for the installation of counter top sinks.

3.02 PREPARATION:

A. Rough-in fixture piping connections in accordance with manufacturer's recommendations.

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.

G. Seal fixtures to walls, floors, and adjoining surfaces with sealant as specified in Section 07 9200, color to match fixture.

3.04 ADJUSTING:

A. Adjust installed work in accordance with Section 01 7000.

B. 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:

A. Protect finished Work under provisions of Section 01 7000.

B. 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 SECTION INCLUDES:

A. Materials and installation methods applicable to all Sections of Division 23.

B. Mechanical identification.

C. Testing and inspection.

1.02 RELATED SECTIONS:

A. Section 09 9000 – Painting and Coating.

B. Section 23 0593 – Testing, Adjusting, and Balancing.

1.03 CLOSEOUT SUBMITTALS:

A. Submit under provisions of Section 01 7700.

B. Record Drawings: Indicate equipment locations, identified in accordance with identification system.

PART 2 PRODUCTS

2.01 IDENTIFICATION MATERIALS:

A. Manufacturers:

1. Allen Systems, Inc.
2. W.H. Brady Company.
3. Seton Name Plate Co.
4. Substitutions: Refer to Section 01 6000.

B. 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.

3.03 PAINTING:

A. Finish painting of grilles, ductwork, steel, and related components, unless otherwise specified hereinafter, shall be done by the Painting Contractor. If this Contractor should damage any finish painting, the necessary repainting shall be done 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 equipment and controls in accordance with ANSI A13.1. Verify numbering system with Owner; coordinate with existing identification system, where present.

B. Equipment: Install identification labels on HVAC equipment, and ductwork connected at equipment.

C. Controls: Identify controls, relays, thermostats (except individual space thermostats), and associated items 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. 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. 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.

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 23 0593 – TESTING, ADJUSTING, AND BALANCING

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Test, adjust, and balance forced air HVAC systems.

1.02 RELATED SECTIONS:

A. Section 23 0500 – Common Work Results for HVAC.

B. Section 23 0923 – Direct Digital Control Systems.

C. Section 23 3100 – HVAC Ducts.

D. Section 23 7410 – Packaged Rooftop HVAC Units.

1.03 CLOSEOUT SUBMITTALS:

A. Submit under provisions of Section 01 7700.

B. Project Record Documents: Record test data on a copy of the latest revised set of drawings. Submit minimum 4 copies.

C. Balance Report: Include line diagrams of all systems; individual unit diagrams for each supply system with diagrammatic arrangement of 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 on minimum outside air as well as 100 percent outside air. 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.

D. 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.

E. 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.

1.04 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's latest standards.

C. Provide all labor, engineering and test equipment required to adjust and balance all heating, ventilating, air conditioning and exhaust systems.

D. Test all electrical interlocking for proper operation. Require attendance of Contractors responsible for piping, equipment, ductwork, and controls, as applicable.

E. Permanently mark final settings of 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 all 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 Register" enclosed in a clear plastic holder securely attached to the equipment or wall in immediate area, showing all significant operating temperatures, pressures, amperes, voltage, brake horsepower, and other relevant data.

F. Instruct the Owner's personnel along with HVAC Contractor 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 respective installing contractors 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 FORCED AIR 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 and return 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 dampers to obtain required quantities of supply and return 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 SECTION INCLUDES:

A. Thermal insulation for HVAC ductwork.

B. Thermal insulation for HVAC rooftop unit curbs.

1.02 RELATED SECTIONS:

A. Section 07 8400 – Firestopping.

B. Section 23 0500 – Common Work Results for HVAC.

C. Section 23 3100 – HVAC Ducts.

D. Section 23 7410 – Packaged HVAC Rooftop Units.

1.03 REFERENCES:

A. ASTM C335 – Steady-State Heat Transfer Properties of Horizontal Pipe Insulation.

B. ASTM C553 – Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.

C. ASTM C612 – Mineral Fiber Block and Board Thermal Insulation.

D. ASTM C665 – Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

E. ASTM C1136 – Flexible, Low Permeance Vapor Retarders for Thermal Insulation.

F. ASTM E84 – Surface Burning Characteristics of Building Materials.

1.04 DEFINITIONS:

A. Concealed: Below grade or hidden from sight in normally inaccessible areas such as furred-in spaces, attic spaces, areas above suspended ceilings, and similar locations.

B. Exposed: Not concealed. Exception: Pipe chases 24 inches and wider shall be considered exposed.

1.05 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

B. Product Data: Include general description, fire ratings, and installation instructions.

C. Schedules: Provide list of materials and fastenings to be used for each system.

1.06 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:

A. Armacell LLC.

B. CertainTeed Corporation.

C. Johns Manville.

D. Owens-Corning Fiberglas Corporation.

E. Substitutions: Refer to Section 01 6000.

2.02 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)

2. Weather Exposed Exterior Locations: ASTM C612; rigid fiberglass board, 6.0 pcf density; maximum K value 0.22 at 75 degrees F. (Johns Manville Spin-Glas 817)

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. Weather Protective Coating: Bituminous non-vapor barrier type. (Johns Manville Insulkote ET)

   a. Wire Mesh: 1 inch hexagonal.

2.03 ROOFTOP UNIT CURB INSULATION MATERIALS:

A. Fiberglass Batt Insulation: ASTM C665, Type I; unfaced.

   1. 6 inch thickness: R-19.

PART 3 EXECUTION

3.01 PREPARATION:

A. Perform leak testing of ductwork systems, where specified, before installing insulation.

3.02 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 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.

D. Weather Exposed Exterior Ductwork: Apply weather protective coating over wire mesh using two coat trowel application, ½ inch total thickness.

3.03 INSTALLATION OF ROOFTOP UNIT CURB INSULATION:

A. Friction fit insulation to area within curb, to form a complete thermal and acoustical barrier between unit and roof deck. Butt insulation tight, covering the entire area without voids.

3.04 PROTECTION:

A. Protect installed insulation materials from inclement weather using approved waterproof sheeting. Remove and replace water-damaged insulation.

3.05 DUCTWORK INSULATION SCHEDULE:

A. Insulate all ductwork except fibrous glass ducts and factory insulated fabricated ducts, 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 (except in plenums): 1½ inch thickness.
2. Return Ducts (except in plenums): 1½ inch thickness.
3. Exterior Ducts Exposed to Weather: 3½ inch thickness with weather protective coating.

END OF SECTION

SECTION 23 0923 – DIRECT DIGITAL CONTROL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Direct digital temperature controls for packaged rooftop HVAC units.

1.02 RELATED SECTIONS:

A. Section 23 0500 – Common Work Results for HVAC.

B. Section 23 0593 – Testing, Adjusting, and Balancing.

C. Section 23 7410 – Packaged Rooftop HVAC Units.

D. Division 26 – Electrical.

1.03 REFERENCES:

A. ADA (Americans with Disabilities Act) – Standards for Accessible Design.

B. ASHRAE 135 – BACnet Data Communication Protocol for Building Automation and Control Networks.

C. EIA 709.1 – Control Network Protocol Specification.

D. NFPA 70 – National Electrical Code (NEC).

1.04 SEQUENCE OF OPERATION:

A. Interconnect with existing building automation system at Middle/High School and Elementary School to control the following systems.

B. Single Zone Rooftop Units:

1. Building automation system (BAS) shall provide occupied-unoccupied operation of rooftop units.

2. Occupied Mode: Maintain temperature between occupied heat and occupied cool setpoints; operate fan continuously; adjust outdoor air damper to scheduled position.

3. Unoccupied Mode: Maintain temperature between unoccupied heat and unoccupied cool setpoints; operate fan only on call for heating or cooling; close outdoor air damper.

4. Economizer Mode: When in cooling mode and enthalpy of return air is lower than enthalpy of outside air, the outside air damper shall modulate to maintain space condition. If outside air damper is full open and further cooling is needed, mechanical cooling shall be provided. Provide an adjustable minimum on/off timing of the cooling cycle to prevent rapid cycling.

1.05 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

B. Shop Drawings: Include control wiring diagrams and sequence of operation.

1. Schematic diagram showing fans, coils, dampers, and control devices. Label each control device with setting or adjustable range of control.

2. Details of control panel faces, including controls, instruments, and labeling. Label each wiring connection with words to indicate destination of wire.

3. Electrical wiring diagrams. Clearly differentiate between factory-installed and field-installed wiring.

4. Network cable schematic showing control unit locations and network data conductors.

5. Listing of connected data points, including connected control device and input device.

6. System configuration indicating peripheral devices, batteries, power supplies, and interconnection.

7. Building Automation System: Indicate initial software program parameters and configuration.

C. Product Data: Provide for all materials and system components furnished under this Section. Indicate dimensions, capacities, performance characteristics, electrical characteristics, installation instructions, and startup instructions.

D. Submit operating instruction manuals under the provisions of Section 01 7700.

1.06 QUALITY ASSURANCE:

A. Installer Qualifications: Each control system manufacturer's key personnel shall have a minimum 5 year operating history in the design, installation, and commissioning of DDC systems of similar size to this project. Each installer shall be in direct representation of the DDC controls manufacturer and the primary installer of their open, interoperable systems. Installer's field office shall be within 100 miles of the project site.

B. All work shall be installed, wired, circuit tested and calibrated by factory certified technicians qualified for this work and in the regular employment of the DDC system manufacturer or its exclusive factory authorized installing contracting field office (representative).

1.07 DELIVERY, STORAGE AND HANDLING:

A. Deliver, store, protect, and handle products to site under provisions of Section 01 6000.

B. Where control devices are indicated to be factory mounted on equipment, ship devices to unit manufacturer.

1.08 WARRANTY:

A. Section 01 7700 – Closeout Requirements: General warranty requirements.

B. Provide 2 year manufacturer warranty.

1.09 MAINTENANCE SERVICE:

A. Provide service, maintenance, and technical support of complete system for one year from Date of Substantial Completion.

B. Provide and install each software upgrade issued during the maintenance period.

PART 2 PRODUCTS

2.01 MANUFACTURERS:

A. Automated Logic Corporation.

B. Substitutions: Refer to Section 01 6000.

2.02 COMPONENTS:

A. Control system shall be complete with sensors, control devices, wiring, thermometers, pressure gages, thermostats, damper operators, transformers, relays, routers, and miscellaneous control cabinets to provide the specified sequence of operation. All control valves and motorized dampers shall be provided with position indicators.

B. Cabinets:

1. Provide factory-built unitized steel or aluminum temperature control wall mounted cabinets, with hinged access door for grouping of all controls.

2. Only the sensors and control motors will be allowed on the units or ductwork. All controls, relays, and components shall be mounted in these cabinets.

3. Provide terminal strip inside cabinet for ease of wiring. Each control cabinet shall be factory wired to the terminal blocks.

C. Temperature Sensors:

1. Space Sensors: DDC type with LCD display; with buttons for occupied override and temperature setpoint override.

2. Duct Sensors: Single point or averaging as shown. Averaging sensors shall be a minimum of 5 ft in length per 10 sq ft of duct cross-section.

2.03 DDC SYSTEM:

A. Provide the following components and additional items necessary to provide a system capable of integrating multiple building functions including equipment supervision and

control, alarm management, energy management, and historical data collection and archiving.

1. Standalone DDC Panels.
2. Standalone Application Specific Controllers (ASCs).

B. The system shall be modular in nature, and shall permit expansion of both capacity and functionality through the addition of sensors, actuators, standalone DDC panels, and operator devices.

C. Interoperable Communications: Control products provided for this project shall comprise an interoperable network using the following protocols and shall be integrated to ensure interfacing of the factory furnished and wired HVAC equipment control systems.

1. ASHRAE 135; BACnet.
2. EIA 709.1; LonTalk.

D. System architectural design shall eliminate dependence upon any single device for alarm reporting and control execution. Each DDC panel shall operate independently by performing its own specified control, alarm management, operator I/O, and historical data collection. The failure of any single component or network connection shall not interrupt the execution of control strategies at other operational devices.

E. Control units shall have battery backup for minimum 48 hours for complete system including RAM without interruption, with automatic battery charger.

F. Standalone DDC panels shall be able to access any data from, or send control commands and alarm reports directly to, any other DDC panel or combination of panels on the network without dependence upon a central processing device. Standalone DDC panels shall also be able to send alarm reports to multiple operator workstations without dependence upon a central processing device. Panels shall have ports accessible by service and maintenance personnel with laptop computer.

G. Direct digital cabinets placed in unconditioned spaces shall have a four inch muffin fan mounted in them to dissipate heat. Rotation of the fans are to exhaust air from the cabinets.

H. The Network Controller shall perform its assigned control and energy management functions as a stand-alone unit, however it shall be incorporated into the local area network for communication with the building automation system. The controller shall perform its full control and energy management functions regardless of the condition of communications link with the building automation system. In addition, when more than one network controller is required to meet these specifications, the digital control system shall be capable of sharing information between network controllers to develop complex strategies and common point sensing.

I. Control algorithms shall permit Proportional, Integral and Derivative control modes in any combination to meet the needs of the system control and shall allow field

adjustment of all set points and parameters. HVAC modulating control shall be Proportional plus Integral unless specifically designated.

J. Digital control system shall be expandable by adding additional stand-alone controllers to the system bus.

K. When interfacing with equipment providing remote analog inputs or receiving analog outputs to the DDC system, coordinate all requirements such as range, signal condition, grounding, and input impedance with the supplier of the equipment being monitored.

L. Controllers shall have self-test diagnostics, and non-volatile flash memory for remote firmware upgrades.

M. Provide all necessary software to form a complete operating system including complete access via the web. Owner shall be capable of changing setpoints with the software provided from any remote location with web access and web browser software. Provide minimum three levels of access.

2.04 BUILDING AUTOMATION SYSTEM:

A. Supply all required hardware, software, licenses, interface equipment, gateways, and related items to provide connections and integration of HVAC equipment and controls to the BAS and the Owner's network.

B. Set up and configure the following minimum functions:

1. Supply air reset using space load demand.
2. Enthalpy economizer control.
3. Start/stop time optimization.
4. Multiple level demand limiting.
5. Automatic time scheduling with separate occupied and unoccupied setpoints.
6. Trend logging for each system point, with historical data saved to local data storage media.

C. Configure the graphical control software to perform the following functions:

1. Access all building controllers on the same communication trunk throughout the building.
2. Review I/O status and values.

3. Display building floor plans matching Architectural drawings, with individual zones color-coded and dynamically updated to indicate zone temperature variance from setpoint, with links to enlarged views and mechanical equipment. Use minimum three colors to indicate zone temperatures below setpoint, within setpoint range, and above setpoint, with additional colors or other approved graphics to indicate extreme temperatures above or below setpoint.
    a. Graphics shall utilize actual equipment numbers, and room names and numbers to match building signage (may vary from construction room numbers indicated on Drawings; verify with Owner).
4. Graphic displays of mechanical equipment shall include all scheduled devices. For each equipment display, include the following:
    a. Dynamic indication of status of major subcomponents.
    b. Links to related mechanical equipment.
    c. Link to sequence of control for the displayed equipment.
    d. Link to service data (manufacturer's web site, etc.) for the displayed equipment.
5. Enable/disable and modify range of individual room sensor overrides.
6. Change, add or delete points.
7. Change, add/delete or modify schedules, variable values, setpoints, etc.
    a. Schedules shall include capability for overrides based on calendar date or recurring schedule, and shall be applied hierarchically to individual zones, groups of zones, entire building, or entire school campus.
    b. Provide a "snow day" button to automate the process of setting the entire building to an unoccupied condition, returning to a normal schedule after the specified time period has passed.
8. Modify all PID loop parameters.
9. Receive and distribute alarms via computer display, log file, telephone, email, or pager.
10. Reboot (download) the digital control system software from the local data storage media.
11. Upload and download the digital controller's program to and from local data storage media.
12. Configure user access levels and passwords.
13. Restart equipment automatically on loss and restoration of power.
14. Provide capability for future integration with systems other than HVAC controls.

PART 3 EXECUTION

3.01 INSTALLATION:

A. Supervise the installation of all equipment furnished to other trades for installation, and be responsible for the proper operation of the system.

B. Mount sensors approximately 48 inches above finished floor level, coordinated to match elevation of light switches, and in accordance with ADA reach ranges for controls adjustable by room occupants.

C. Mount temperature control cabinets in accessible locations. Area around the cabinet shall be well lit and clear of obstructions. Area three foot in front of and one foot to both sides of the enclosure shall be clear for servicing.

   1. Cabinets shall have a laptop connection port for maintenance access; each building shall have at least one connection.

D. Items attached to externally insulated ducts or equipment shall be supported with standoffs equal to the insulation thickness.

E. Wiring:

   1. Provide control and interlock wiring required for the complete installation. Perform work in accordance with Division 27 and NEC.

   2. Provide power wiring for the complete control system, including power wiring dedicated 120 volt, 20 amp circuit(s) for direct digital controls. 120 volt circuits shall be from the nearest receptacle panel with the maximum load on any single circuit being 1400 watts.

   3. Exposed temperature control and interlock wiring, and all power wiring regardless of voltage, shall at a minimum be run in EMT. Refer to Division 27 for additional conduit requirements. Concealed low voltage wiring shall be plenum grade, fastened securely to building structure through bridle rings or similar means, in accordance with Division 27. Do not lay low voltage wiring directly on the ceiling or attach wiring to electrical conduits.

F. Configure controllers and software to enable specified sequence of operation.

G. Coordinate with Owner to obtain I.P. address for the control system.

H. Identification: Provide nameplates in accordance with Section 230500 for all controls, relays, thermostats, damper motors, thermometers and associated items, except for individual space sensors. Securely fasten nameplates with screws.

3.02 ADJUSTING:

A. Provide assistance to the Balancing Agency as indicated in Section 230593.

B. On completion of the project, completely adjust, ready for use, all work provided under this Section.

3.03 TRAINING:

A. Include 8 hours of training sessions for Owner's operating staff in accordance with Section 01 7700. Training may be on-site, or distance learning if approved by Owner. Training shall include the following minimum components:

1. Setpoint and schedule management.
2. Alarm management, and equipment troubleshooting.
3. User access management.
4. Energy demand management.
5. Control programming and troubleshooting.

END OF SECTION

SECTION 23 3100 – HVAC DUCTS

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Ductwork materials, construction, supports, and cleaning.

B. Ductwork accessories.

1.02 RELATED SECTIONS:

A. Section 07 8400 – Firestopping.

B. Section 07 9200 – Joint Sealants.

C. Section 09 9000 – Painting and Coating: Painting of ductwork visible behind outlets and inlets.

D. Section 23 0500 – Common Work Results for HVAC.

E. Section 23 0700 – HVAC Insulation.

F. Section 23 0900 – Testing, Adjusting, and Balancing.

G. Section 23 3700 – Air Outlets and Inlets.

1.03 REFERENCES:

A. ASTM A36 – Carbon Structural Steel.

B. ASTM A90 – Weight of Coating on Iron or Steel Articles with Zinc or Zinc-Alloy Coatings.

C. ASTM A167 – Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

D. ASTM A653 – Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

E. ASTM B209 – Aluminum and Aluminum-Alloy Sheet and Plate.

F. ASTM D1037 – Evaluating Properties of Wood-Base Fiber and Particle Panel Materials.

G. ASTM E84 – Surface Burning Characteristics of Building Materials.

H. NFPA 90A – Installation of Air Conditioning and Ventilating Systems.

I. NFPA 90B – Installation of Warm Air Heating and Air Conditioning Systems.

J. NFPA 92A – Smoke Control Systems.

K. SMACNA – Fibrous Glass Duct Construction Standards.

L. SMACNA – HVAC Duct Construction Standards - Metal and Flexible.

M. UL 33 – Heat Responsive Links for Fire-Protection Service.

N. UL 181 – Factory-Made Air Ducts and Connectors.

O. UL 555 – Fire Dampers and Ceiling Dampers.

P. UL 555S – Leakage Rated Dampers for Use in Smoke Control Systems.

1.04 PERFORMANCE REQUIREMENTS:

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

1.05 CLOSEOUT SUBMITTALS:

A. Submit under provisions of Section 01 7700.

B. 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.

1.06 QUALITY ASSURANCE:

A. Perform Work in accordance with SMACNA Standards.

B. Construct ductwork to NFPA 90A and NFPA 90B standards as applicable.

C. Fire and Smoke Hazard Ratings for Fibrous Glass Ducts: ASTM E84.

1. Flame Spread: Maximum 25.

2. Smoke Developed: Maximum 50.

1.07 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.

1.08 DELIVERY, STORAGE, AND HANDLING:

A. Transport, handle, store, and protect products in accordance with Section 01 6000.

B. Protect dampers from damage to operating linkages and blades.

1.09 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: Water resistant, fire resistive, compatible with mating materials; UL listed.

1. Manufacturers:

a. Carlisle HVAC Products; Iron-Grip 601.

b. McGill AirSeal LLC; Uni-Seal.

c. Substitutions: Refer to Section 01 6000.

2. Flame Spread Rating: Maximum 10.

3. Smoke Developed Rating: 0.

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 T's, 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. Provide spreader supports on return air ducts 18 x 18 inch size and larger, located to minimize interference with air flow.

F. Solder air tight all rooftop ductwork and 10 feet of adjoining horizontal ductwork in building.

G. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

H. 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.

I. Provide standard 45 degree lateral wye takeoffs unless otherwise indicated where 90 degree conical tee connections may be used.

J. Fabricate vertical ducts and risers to be self-supporting.

K. Single thickness partitions between adjacent ducts are not permitted.

2.03 MANUFACTURED DUCTWORK AND FITTINGS:

A. Manufacture in accordance with SMACNA Standards, and as indicated. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

B. Insulated Flexible Ducts: UL 181, Class 1, aluminum laminate and polyester film with latex adhesive supported by helically wound spring steel wire; fiberglass insulation; polyethylene vapor barrier film.

1. Manufacturers:

a. Owens Corning Fiberglas; Valuflex.

b. General Environment Corporation; Genflex SLR-181.

c. Substitutions: Refer to Section 01 6000.

2. Pressure Rating: 10 inches WG positive and 1.0 inches WG negative.

3. Maximum Velocity: 4000 fpm.

4. Temperature Range: -20 degrees F to 210 degrees F.

2.04 DUCTWORK ACCESSORIES:

A. Manufacturers:

1. Greenheck Corp.

2. Vent Products Co., Inc.

3. American Warming & Ventilating.

4. Ruskin Manufacturing.

5. Substitutions: Refer to Section 01 6000.

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. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 x 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware. Where size of damper requires field assembly of multiple panels, provide suitable additional structural support, and linkages as required to transmit blade motion between adjacent panels.

a. For Rectangular Duct Sizes 12 Inches High and Over: Ruskin CD35OB; Vent Products 5100.

3. 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.

4. 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.

2. Up to 18 Inches Square: Provide two hinges and two 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 Outdoor or Weather Exposed Connections: NFPA 90A, UL listed, fire retardant Hypalon coated woven glass fiber fabric, minimum density 30 oz/sq yd.

2. Fabric For Interior Connections: NFPA 90A, UL listed, fire retardant neoprene coated woven glass fiber fabric, minimum density 30 oz/sq yd.

3. Net Fabric Width: Approximately 3 inches wide.

4. 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. Provide galvanized sheet steel ducts with Class B joint seals, except where other duct types are specifically indicated.

C. Install and seal ducts in accordance with SMACNA Standards. Allow assembled components to cure for at least 48 hours before pressure testing for leaks.

D. Insulate ductwork in accordance with Section 23 0700.

E. Duct sizes indicated are inside clear dimensions unless specifically indicated.

F. Support ductwork from structural building framing, plumb and parallel to building lines.

1. Support ducts from structural steel framing and joists using welded studs or C-clamps with retaining clip attached to the steel. At steel joists, support at panel points only. Do not support ductwork from metal deck.

2. Do not exceed maximum hanger spacing per SMACNA.

3. Hangers shall be readily removable.

G. 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 swings, ceiling panel removal, and related conditions. Maintain sufficient space around equipment to allow normal operating and maintenance activities.

H. Provide openings in ductwork in accessible locations where required to accommodate thermometers and controllers. Provide openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.

I. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.

J. Use double nuts and lock washers on threaded rod supports.

K. Connect motorized equipment to ducts with one foot maximum length of flexible connection. Do not use flexible connection to change direction.

L. 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.

M. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

N. Seal terminations and butt joints of ducts and plenums with building components.

O. Seal penetrations of wall and floor assemblies to achieve fire resistance equivalent to fire separation required, in accordance with Section 078400. Seal penetrations through non-rated acoustical assemblies with acoustical sealant in accordance with Section 098100. Where fire and acoustical separation are not required, apply waterproof sealant in accordance with Section 079200.

P. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and SMACNA Standards.

Q. Provide duct access doors for inspection and cleaning before and after filters, and elsewhere as indicated. Provide minimum 8 x 8 inch size for hand access, 18 x 18 inch size for shoulder access, and as indicated. 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 and return 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 3700 – AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Air outlets and inlets.

1.02 RELATED SECTIONS:

A. Section 09 9000 – Painting and Coating.

B. Section 23 0500 – Common Work Results for HVAC.

C. Section 23 0900 – Testing, Adjusting, and Balancing.

D. Section 23 3100 – HVAC Ducts.

1.03 REFERENCES:

A. ADC 1062 – Certification, Rating and Test Manual.

B. ASHRAE 70 – Method of Testing for Rating the Performance of Air Outlets and Inlets.

1.04 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

B. Product Data: Indicate type, size, finish, mounting details, installation instructions, and noise level.

1.05 CLOSEOUT SUBMITTALS:

A. Submit under provisions of Section 01 7700.

B. Project Record Documents: Record actual locations of air outlets and inlets.

1.06 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:

A. Price Industries.

B. Carnes Company, Inc.

C. Dynamics Corporation of America, Anemostat Products Division.

D. Krueger.

E. Titus.

F. Substitutions: Refer to Section 01 6000.

2.02 AIR OUTLETS:

A. Rectangular Ceiling Diffusers: Square, adjustable air pattern, louvered face diffuser to discharge air in four way pattern, or as scheduled; formed aluminum construction with concentric cones; white finish. (Price ASCDA-4C series; Titus TMSA-AA series)

1. Frame: Inverted T-bar.

2. Accessories: Opposed blade damper and multi-louvered equalizing grid with damper adjustable from diffuser face.

2.03 AIR INLETS:

A. Linear Return Grilles: Fixed louvers with 35 to 45 degree deflection and ½ inch blade spacing; front blades parallel to long dimension; surface mounting frame with minimum one inch margin and countersunk screw mounting; aluminum construction with white powder coat finish. (Price 635 series)

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 7410 – PACKAGED ROOFTOP HVAC UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Packaged rooftop single zone HVAC units.

1.02 RELATED SECTIONS:

A. Section 22 2123 – Natural Gas Piping.

B. Section 23 0500 – Common Work Results for HVAC.

C. Section 23 0593 – Testing, Adjusting, and Balancing.

D. Section 23 0923 – Direct Digital Control Systems.

E. Section 23 3100 – HVAC Ducts.

1.03 REFERENCES:

A. ANSI Z223.1 – National Fuel Gas Code.

B. NFPA 70 – National Electrical Code.

1.04 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.

1.05 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

B. Product Data: Provide component sizes, utility and piping connection requirements and locations, and electrical characteristics and connection requirements.

1.06 CLOSEOUT SUBMITTALS:

A. Submit under provisions of Section 01 7700.

B. Maintenance Data: Include installation instructions, spare parts lists, and exploded assembly views.

C. Warranty: Submit manufacturer warranties and ensure forms have been completed in Owner's name and registered with manufacturer.

1.07 QUALITY ASSURANCE:

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

B. Products Requiring Electrical Connection: 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.

1.08 WARRANTY:

A. Section 01 7700 – Closeout Requirements: General warranty requirements.

B. Provide 1 year manufacturer warranty on complete units; 5 years on compressors; 10 years on heat exchangers.

PART 2 PRODUCTS

2.01 SINGLE PACKAGE ROOFTOP HVAC UNITS:

A. Manufacturers:

1. Johnson Controls.

2. Substitutions: Refer to Section 01 6000.

B. General Requirements: Gas heat and electric cooling; UL listed, AHRI and AGA certified; factory piped, wired, charged, and tested. Refer to Section 23 0500 for additional general requirements for equipment.

C. Unit Enclosure: Galvanized steel, minimum 18 gauge, insulated, watertight, with baked enamel finish; corrosion resistant fan grille and coil guard; hinged access panels; weather protected electrical control compartment; reinforced base with provisions for forklift and crane rigging.

D. Compressors: With crankcase heater; high and low pressure switches; overload protection; low ambient temperature controls (to 0 degrees F); filter-drier; service access valves.

E. Condensers: Copper tube coil mechanically expanded into aluminum fins; designed to provide minimum 15 degrees F of liquid sub-cooling at design conditions; motors with permanently lubricated bearings; vertical air discharge; external condensate drain connection.

F. Refrigerant: R-410A.

G. Gas Fired Heating Section: Stainless steel heat exchanger; intermittent spark ignited pilot; power venter; high temperature limit switch with automatic reset; redundant gas valve with pressure regulator, with flame sensor and ignition failure lockout.

H. Blower: Centrifugal type; motor with permanently lubricated bearings.

I. Filters: Disposable pleated media, 2 inch thick; minimum 30 percent efficiency.

J. Electrical: Arranged for single point power supply; auxiliary terminals for controls.

K. Economizer: Automatic single input electronic enthalpy type; solid state logic module; interlocked outdoor and return air dampers positioned by a fully modulating, spring return damper actuator; rain hood matching unit enclosure.

L. Accessories: Roof curb.

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.

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. Adjust outdoor air intakes and economizers to provide minimum outdoor air intake volumes indicated.

F. Provide start-up, inspection and training services in accordance with Section 23 0500.

END OF SECTION

SECTION 23 8240 – ELECTRIC RESISTANCE HEATING UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Radiant metal ceiling panels.

1.02 RELATED SECTIONS:

A. Section 09 5100 – Acoustical Ceilings.

B. Section 26 0500 – Common Work Results for Electrical.

1.03 SUBMITTALS:

A. Submit under provisions of Sections 01 3300.

B. Product Data: Indicate catalog cut sheets, manufacturer's installation instructions, and wiring diagrams.

1.04 QUALITY ASSURANCE:

A. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., or other testing firm acceptable to authority having jurisdiction, as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 MANUFACTURERS:

A. Marley Engineered Products, Berko Division.

B. Chromalox, Inc.

C. Dayton Electric Manufacturing Co.

D. Markel Electric Products, Inc.

E. Marley Engineered Products, Q-Mark Division.

F. Substitutions: Refer to Section 01 6000.

2.02 RADIANT METAL CEILING PANELS:

A. Panel Assembly: Fabricated from 22 gauge formed, galvanized sheet steel; insulated with one inch thick fitted fiberglass batt.

B. Mounting: Suspended in standard 2 x 2 foot modules of T-bar suspended ceiling.

C. Finish: Textured, off-white baked enamel.

D. Heating Assembly: UL approved; silicone-insulated heater wire permanently bonded to panel interior; arranged for uniform heat transmission throughout entire radiating surface.

E. Wiring: Completely prewired for connection to power supply; minimum 3 foot length of flexible metal conduit with lead wires.

F. Thermostat: Wall mounted line voltage thermostat for remote installation; adjustment range between 40 degrees F and 90 degrees F, with manually set "no heat" position.

PART 3 EXECUTION

3.01 INSTALLATION:

A. Install products in accordance with manufacturer's installation instructions.

B. Wire components to circuits indicated, in accordance with manufacturer's wiring diagrams.

3.02 DEMONSTRATION:

A. Fully instruct Owner's personnel as to proper operation of equipment.

END OF SECTION

SECTION 26 0500 – COMMON WORK RESULTS FOR ELECTRICAL

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Materials and installation methods applicable to all Sections of Divisions 26 and 27.

B. Identification.

C. Painting.

D. Testing.

1.02 RELATED SECTIONS:

A. Section 01 5000 – Temporary Facilities and Controls: Temporary lighting and power.

B. Section 07 8400 – Firestopping.

C. Section 09 9000 – Painting and Coating.

D. Section 26 0526 – Grounding and Bonding.

1.03 REFERENCES:

A. NETA (International Electrical Testing Association) ATS – Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

B. NFPA 70 – National Electrical Code (NEC).

1.04 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

B. Test Reports: Indicate procedures and values obtained.

C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency.

1.05 CLOSEOUT SUBMITTALS:

A. Submit under provisions of Section 01 7700.

B. 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.

1.06 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:

a. Tyco Electrical & Metal Products; Unistrut.

b. Cooper B-Line, Inc.; 4Dimension.

c. Thomas & Betts; Superstrut.

d. Substitutions: Refer to Section 01 6000.

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.

C. Verify with the Architect the fire and acoustical rating requirements of walls and floors to be breached by conduit, cable, raceway or other penetrations.

3.02 INSTALLATION:

A. Furnish and install all fixtures and equipment to make a complete and working system as indicated in the Contract Documents. This includes all wiring requirements from the service entrance to and including final outlets, fixtures, and equipment. Furnish all 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 all phases of 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 017000.

G. Rough-in and provide final electrical connections for equipment installed by others, including all equipment indicated on the Drawings. 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 Contractors, shall be connected by the Electrical Contractor.

   2. Provide a 6 foot long cord with plug for each item of equipment served by a special purpose receptacle. 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 013100.

H. Provide through-penetration firestops in accordance with Section 078400. Seal openings around conduits or in sleeves for conduits penetrating fire-rated assemblies at both sides of the penetration. Seal penetrations through non-rated acoustical assemblies with acoustical sealant in accordance with Section 098100. Where fire

and acoustical separation are not required, apply waterproof sealant in accordance with Section 07 9200.

I. Furnish and install appropriate sleeves and hangers required for the electrical work.

1. Do not attach conduits, cables, boxes, devices, or other components, to wires that support ceiling suspension system.

2. Recessed lighting fixtures, speakers, smoke detectors, clocks, and other components attached to or suspended from grid ceilings shall be supported from the main T-bars, not the intermediate T's.

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, starters, 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 switch or 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 switchboards, panelboards, industrial control panels, meter sockets, enclosures, disconnects, motor control centers, 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 by the Painting Contractor. Exposed conduit installed after finish painting is complete shall be painted to match room finish by the Painting Contractor at the expense of the Electrical Contractor.

D. If this Contractor should damage any finish painting, the necessary repainting shall be done at this Contractor's expense.

E. Coordinate with Painting Contractor 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 NETA 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 SECTION INCLUDES:

A. Building wire and cable, 600 Volts or less.

1.02 RELATED SECTIONS:

A. Section 26 0500 – Common Work Results for Electrical.

B. Section 26 0533 – Raceway and Boxes.

1.03 REFERENCES:

A. ASTM B1 – Hard-Drawn Copper Wire.

B. ASTM B2 – Medium-Hard-Drawn Copper Wire.

C. ASTM B3 – Soft or Annealed Copper Wire.

D. ASTM B8 – Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.

E. ASTM D4247 – General-Purpose, Black Heavy-Duty, and Black Extra-Heavy-Duty Crosslinked Polychloroprene Jackets for Wire and Cable.

F. FS (Federal Specification) A-A-59544 – Cable and Wire, Electrical (Power, Fixed Installation).

G. IEEE 82 – Impulse Voltage Tests on Insulated Conductors.

H. IEEE 241 – Electric Power Systems in Commercial Buildings.

I. NECA (National Electrical Contractors Association) – Standard of Installation.

J. NEMA WC 70 / ICEA (Insulated Cable Engineers Association) S-95-658 – Non-Shielded Power Cable 2000V or Less.

K. NFPA 70 – National Electrical Code.

L. UL 83 – Thermoplastic-Insulated Wires and Cables.

M. UL 486A – Standard For Wire Connectors and Soldering Lugs for Use With Copper Conductors.

1.04 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

B. Product Data: Provide for all materials furnished under this Section.

1.05 QUALITY ASSURANCE:

A. Regulatory Requirements and Reference Standards:

1. Comply with applicable requirements of ASTM B1, B2, B3, B8, and D4247.
2. Comply with applicable requirements of FS A-A-59544.
3. Comply with applicable requirements of IEEE 82 and IEEE 241.
4. Comply with applicable requirements of NEMA WC 70.
5. Comply with applicable requirements of UL 83 and UL 486A.
6. Provide products which are ETL listed and labeled.

PART 2 PRODUCTS

2.01 BUILDING WIRE AND CABLE:

A. Manufacturers:

1. Aetna Insulated Wire, LLC.
2. Encore Wire.
3. Prysmian Group.
4. Southwire Co.
5. Substitutions: Refer to Section 01 6000.

B. Conductors: Copper, 600 Volt rated; minimum size 12 AWG for power and lighting circuits, and 14 AWG for control circuits.

1. Sizes 10 AWG to 14 AWG: Type THHN/THWN, solid or stranded, with color impregnated insulation.
2. Sizes 8 AWG and Larger: Type XHHW, stranded.
   a. Provide color impregnated insulation, or tape conductor ends with solid color electrical tape for minimum 3 inches at terminations and boxes.

C. Provide wire and cable in full factory lengths of minimum 500 feet, on original reels or in boxes, new and unused.

2.02 ACCESSORIES:

A. Manufacturers:

1. 3M Electrical Products.
2. Buchanan Construction Products, Inc.
3. Ideal Industries, Inc.
4. Thomas & Betts Corp.

5. Substitutions: Refer to Section 01 6000.

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: 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. Low voltage wiring for HVAC control systems in accordance with Division 23.
   b. Low voltage wiring for communications systems in accordance with Division 27.
   c. Low voltage wiring for fire alarm systems.
2. Wiring systems otherwise approved for open wiring shall be installed in conduit or raceway 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 or ceiling suspension system at maximum 5 feet o.c. Do not rest cable on ceiling panels, light fixtures, ductwork, piping or equipment.
5. Protect exposed cable from damage.
   a. Provide metal conduit sleeves for concrete and masonry penetrations. Provide bushings or grommets for metal stud 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, red, and blue.
2. Neutral: White.
3. Ground: Green.
4. The identified neutral shall be insulated throughout and grounded only at the service entrance equipment (not individual panels).
5. Arrange phase conductors at equipment connections in sequence from front to rear, top to bottom, or left to right when facing established front of equipment.

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 SECTION INCLUDES:

A. Grounding for electrical systems.

1.02 RELATED SECTIONS:

A. Section 03 3000 – Cast-in-Place Concrete.

B. Section 26 0500 – Common Work Results for Electrical.

C. Section 26 0519 – Conductors.

D. Section 27 0526 – Grounding and Bonding for Communications Systems.

1.03 REFERENCES:

A. IEEE (Institute of Electrical and Electronics Engineers) 142 – Grounding of Industrial and Commercial Power Systems.

B. IEEE 241 – Electrical Power Systems in Commercial Buildings.

C. NFPA 70 – National Electrical Code (NEC).

D. UL 467 – Standard for Grounding and Bonding Equipment.

E. UL 869 – Reference Standard for Service Equipment.

1.04 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:

1. Comply with requirements of NFPA 70 as applicable.

2. Comply with applicable requirements of UL 467 and UL 869. Provide products which are UL listed and labeled.

3. Comply with applicable requirements of IEEE 142 and IEEE 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 Conductors: Insulated copper, size to meet NFPA 70 requirements.

C. 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, transformers, 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.

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 SECTION INCLUDES:

A. Conduit and fittings.

B. Surface mounted raceway.

C. Boxes and enclosures.

1.02 RELATED SECTIONS:

A. Section 07 8400 – Firestopping.

B. Section 07 9200 – Joint Sealants.

C. Section 09 8100 – Acoustic Insulation.

D. Section 09 9000 – Painting and Coating.

E. Section 26 0500 – Common Work Results for Electrical.

F. Section 27 0528 – Pathways for Communications Systems.

G. Section 31 2000 – Earth Moving: Excavation and backfilling.

1.03 REFERENCES:

A. ADA (Americans with Disabilities Act) – Standards for Accessible Design.

B. ANSI C80.3 – Electrical Metallic Tubing – Zinc Coated.

C. ANSI C80.5 – Aluminum Rigid Conduit.

D. ASTM D1557 – Laboratory Compaction Characteristics of Soil Using Modified Effort.

E. NEMA 250 – Enclosures for Electrical Equipment (1000 Volts Maximum).

F. NEMA TC 2 – Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.

G. NEMA TC 9 – Fittings for PVC Plastic Utilities Duct for Underground Installation.

H. NFPA 70 – National Electrical Code.

I. TIA 569 – Telecommunications Pathways and Spaces.

J. UL 1 – Flexible Metal Conduit.

K. UL 5 – Surface Metal Raceways and Fittings.

L. UL 6 – Electrical Rigid Metal Conduit – Steel.

M. UL 360 – Liquid-Tight Flexible Steel Conduit.

N. UL 797 – Electrical Metallic Tubing – Steel.

O. UL 1242 – Electrical Intermediate Metal Conduit – Steel.

1.04 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

B. Product Data: Provide for all materials furnished under this Section.

1.05 QUALITY ASSURANCE:

A. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., or other testing firm acceptable to authority having jurisdiction, as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE AND HANDLING:

A. Deliver, store, protect, and handle products to site under provisions of Section 01 6000.

B. Provide temporary end caps and closures on conduit and fittings. Maintain in place until installation.

C. 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.

F. Rigid Nonmetallic Conduit: NEMA TC 2; Schedule 40 PVC.

1. Fittings, Couplings and Bushings: NEMA TC 9; solvent-cemented watertight joints.

2.02 SURFACE MOUNTED RACEWAY:

A. Manufacturers:

1. Legrand; Wiremold.
2. Panduit Corp.
3. Square D.
4. Substitutions: Refer to Section 01 6000.

B. Surface Mounted Metal Raceway: UL 5; galvanized steel with baked enamel finish, color as selected; minimum 5 foot lengths.

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. Manufacturers:

1. Appleton Electric Co.
2. Crouse-Hinds Conduit and Cable Fittings.
3. Killark Electric Manufacturing Co.
4. Raco, Inc.
5. Universal Electric Corp.
6. Substitutions: Refer to Section 01 6000.

B. Concealed Boxes: Galvanized steel, with cover as required; with knockouts.

1. Size:

a. Conduit Size to ¾ Inch: 4 inch square. (Universal 52C50 or Raco 785)
b. Conduit Size 1 Inch and Larger: 4-11/16 inch square. (Raco 839)

2. Depth:

   a. Power, Lighting, and General Use: As required by code for number of conductors.

   b. Communications: Minimum 3½ inch depth.

3. Provide extension rings for flush boxes in stud wall construction.

C. Exposed Boxes: Type FS, with matching galvanized steel plates.

1. Exterior Locations: Type FD.

D. 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 FLOOR BOXES AND FITTINGS:

A. Manufacturers:

1. FSR, Inc.

2. Hubbell Wiring Device - Kellems.

3. Legrand; Wiremold.

4. Substitutions: Refer to Section 01 6000.

B. Rectangular Boxes for Concrete Floors: Welded steel, fully adjustable, with leveling feet; separate compartments for power and low voltage wiring; temporary cover for construction use; pour pan for slab on grade installation. (Wiremold RFB2 series)

1. Cover: Flanged type recessed for carpet, with hinged cable exit doors; brass finish. (Wiremold FPCTC series)

2.05 ENCLOSURES:

A. Outdoor Locations: NEMA 250, Type 3R.

B. Indoor Locations: NEMA 250, Type 1.

2.06 ACCESSORIES:

A. Anchors and Fasteners:

1. Cast-in-place inserts or expansion anchors in concrete.

2. Beam clamps or welded fasteners on steel structural elements.

3. Toggle bolts in hollow masonry and gypsum board partitions.

4. Expansion anchors in solid masonry walls.

5. Sheet metal screws in sheet metal and wood screws in wood elements.

B. Sleeves: Schedule 40 galvanized steel pipe.

C. Conduit Straps for Surface Mounted Conduit: One-hole malleable type with clamp backs.

D. Underground Warning Tape: Six inch wide polyethylene tape permanently colored yellow for electric and green for telephone, with wording indicating type of service and "CAUTION".

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 conduit 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 conduit. Trim floor of excavation true, with uniform grade.

C. Bed conduit and structures on 6 inch thick layer of compacted granular material. Should unsatisfactory soil conditions be discovered, the Architect will inspect the excavation and determine the necessary additional support required.

D. Maintain a minimum depth of 36 inches between top of largest conduit or duct and finish grade outside the building, unless noted otherwise.

E. Encase rigid nonmetallic conduit in minimum 3 inch concrete envelope at locations with less than 36 inch cover from top of conduit to grade or floor slab surface.

F. Apply two coats of bituminous paint to uncoated metallic conduit installed below grade. Touch up voids and pinholes prior to backfilling.

G. Provide underground warning tape 12 inches below grade, directly above, and continuous with, all underground cable or conduit.

H. Perform testing and obtain required approvals after conduit embedment and before backfilling.

I. Backfill by hand and manually compact initial backfill, using approved fill material free of particles larger than 1 inch, in 6 inch layers until 8 inches of cover is provided over top of conduit, cable or duct.

J. 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.

K. Exercise caution during backfilling and compaction to prevent damage or displacement of buried components.

L. Replace existing surface improvements removed or damaged in the course of the work unless such improvements are to be reconstructed as part of this project. Make

all necessary arrangements to perform such repairs and pay all costs in connection therewith.

3.02 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. Conduit Below Grade: 1 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 open web joists, trusses, or girders, supported against the underside of the top chord.
4. Conceal vertical conduit in stud wall cavities, furred wall spaces, pipe chases, and masonry cores 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 masonry surfaces with self-drilling anchors or toggle bolts. Fasten pipe straps to wood or sheet metal 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 structural steel with steel C-clamps, and 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. All threaded rod hangers shall include 3 nuts jam-locked to rigidly support the conduit. DO NOT suspend any conduit, light fixtures, or devices from metal deck.
4. Support wall mounted electrical equipment on ¾ inch thick B-D exterior fir plywood painted with 2 coats of ASA-A9 gray enamel.

H. Sleeves:

1. Provide sleeves and escutcheons when penetrating foundations, floors, walls and partitions. Cut escutcheons as necessary to fit in close quarters.
2. Size sleeves to provide minimum ¾ inch clearance around all sides of conduits.
3. 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.
4. Seal conduit and sleeve penetrations to achieve fire resistance equivalent to fire separation required, in accordance with Section 078400. Seal penetrations through non-rated acoustical assemblies with acoustical sealant in accordance with Section 098100. Where fire and acoustical separation are not required, apply waterproof sealant in accordance with Section 079200.
5. Exterior Wall Sleeves: Install sleeves reamed with welded flanged ends flush with wall.

I. Boxes and Enclosures:

1. Mount outlet boxes in exposed masonry walls with top and one side of box on mortar joints. Wall outlets shall be plumb and accurately aligned in rows. Mount ceiling boxes symmetrical with walls, beams or tiles. Coordinate outlet box locations with trim, equipment and other exposed or existing features.
2. Locate switch boxes maximum 6 inches from door jamb.
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. Feed communications outlets from minimum 1¼ inch conduit and recessed telephone outlet box with 1¼ inch raised single gang plaster ring.
3. 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.
4. Securely anchor raceway to studs, blocking, concrete, or masonry, using approved fasteners spaced at maximum 16 inches o.c., minimum 2 anchors per section, located within 6 inches of end of section. For non-metallic raceway, utilize double-sided self-adhesive tape backing for temporary positioning only; fasten with screws for permanent attachment.

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 pipe shafts and suspended ceiling spaces are not considered exposed. Where support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to weld.

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 all 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.

3.03 CONDUIT LOCATION SCHEDULE:

A. Below Grade or Below Floor Slab: Rigid nonmetallic conduit with insulated grounding conductor sized in accordance with NFPA 70, or rigid steel conduit.

1. Elbows and stub-ups shall be rigid steel conduit.

2. Conduit sleeved through footings and foundation walls shall be rigid steel conduit for minimum 10 feet on both sides of penetration.

B. Distribution Feeders Above Grade: Rigid steel conduit or IMC. EMT conduit is permitted for concealed locations above finished ceilings.

C. Branch Circuits Above Grade:

1. Exposed Locations:

a. Exterior: Rigid steel conduit.

b. 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.

c. Above Bottom Chord of Joists: EMT.

d. Finished Areas in Existing Construction: Surface mounted metal raceway; obtain Architect's approval of raceway location and routing prior to installation.

2. Concealed Locations:

a. Stud Walls and Interior Masonry Walls: EMT.

b. Above Ceilings: EMT.

3. Rigid steel conduit or IMC may be used at locations scheduled for EMT.

D. 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.

3.04 OUTLET BOX MOUNTING HEIGHT SCHEDULE:

A. Unless otherwise indicated, mount outlet boxes at the following distance above finish floor. In exposed masonry walls, adjust height to top or bottom location in block in the next higher course (minimum 16 inches to bottom of box and maximum 48 inches to top

of box in accessible locations) and adjust horizontal location to the nearest corner of block. Verify locations with ADA requirements.

B. Switches, Safety Switches, and Disconnects: 48 inches to top of box.

C. Receptacles and Communications Outlets: 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.

2. Wall Cabinet Mounted Microwave Ovens: 64 inches to top of box.

END OF SECTION

SECTION 26 2400 – SWITCHBOARDS AND PANELBOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Panelboards.

1.02 RELATED SECTIONS:

A. Section 26 0500 – Common Work Results for Electrical.

B. Section 26 0533 – Raceway and Boxes.

1.03 REFERENCES:

A. NECA – Standard of Installation.

B. NEMA AB1 – Molded Case Circuit Breakers and Molded Case Switches.

C. NEMA PB1 – Panelboards.

D. NFPA 70 – National Electrical Code.

E. UL 67 – Panelboards.

F. UL 489 – Molded Case Circuit Breakers.

1.04 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

B. Product Data: Indicate voltages and phases, frequencies, and short-circuit and continuous current ratings. Provide application data for main and branch circuit breakers, sections, main buses, and basic insulation levels.

PART 2 PRODUCTS

2.01 MANUFACTURERS:

A. Square D.

B. Cutler-Hammer.

C. GE Electrical Distribution & Control.

D. Siemens Energy & Automation.

E. Substitutions: Refer to Section 01 6000.

2.02 PANELBOARDS:

A. Lighting, Appliance and Distribution Panelboards: UL 67, NEMA PB1; galvanized sheet steel cabinet construction, full height bus bars, steel trim with baked enamel finish, distributing bussing, hinged steel doors, latches, and adjustable trim clamps.

Provide panelboards with proper lugs and connections and space for cable sizes indicated. Provide panel boxes with separate wiring gutters where required by wiring scheme indicated. (Square D, NQ)

1. Enclosures: Type as scheduled in Section 26 0533 for installed location; flush mounted.
2. Keying: Provide each panelboard with locking door; key all panels alike and provide 2 sets of spare keys.

B. 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. Short Circuit Current Rating: 10,000 amps RMS symmetrical at rated voltage.
2. Provide circuit breaker handle locking devices for minimum 5 percent of each type of breaker.

PART 3 EXECUTION

3.01 PANELBOARD INSTALLATION:

A. Mount panelboards to interior wall construction. Mount independent of conduit and raceways entering boxes.

1. Mounting Height: Maximum 78 inches above finished floor.

B. Bonding and Grounding:

1. The main panel shall be the only panel where the panel neutral bar is bonded to the panel enclosure. All other neutral bars shall be isolated from the panel enclosures.
2. Install grounding bars in all panels, securely bonded to the panel enclosure. Identify bar with green marking. Do not bond any green wire to any white wire at any point except at the main panel, in accordance with NFPA 70.

C. Identify each circuit with circuit number secured to breaker.

D. Install typed circuit directory on interior of each panel door.

E. At each flush mounted panel, provide 4 empty ¾ inch conduits stubbed above finish ceiling or to an accessible location. Cap conduits with insulating type bushing and mark for “spare use.” When fewer than four spares or spaces are available in the panel, provide one empty conduit for each spare or space.

F. When connecting single phase circuits and equipment to a 3 phase system, distribute the loads on the phases to achieve an approximately balanced loading.

G. Identification: Provide nameplates in accordance with Section 26 0500 for all distribution devices and panelboards; label as indicated.

3.02 FIELD QUALITY CONTROL:

A. Prior to energization, check phase-to-phase and phase-to-ground insulation resistance levels with ground resistance tester to ensure requirements are fulfilled.

B. Prior to energization, check for electrical continuity of circuits, and for short circuits.

C. Subsequent to wire and cable hook-ups, energize equipment and demonstrate functioning in accordance with requirements.

END OF SECTION

SECTION 26 2726 – WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Switches and receptacles.

B. Low voltage lighting controls.

C. Cover plates.

1.02 RELATED SECTIONS:

A. Section 26 0500 – Common Work Results for Electrical.

B. Section 26 0533 – Raceway and Boxes.

C. Section 26 5000 – Lighting.

1.03 REFERENCES:

A. NEMA WD 1 – General Requirements for Wiring Devices.

B. NEMA WD 6 – Wiring Devices - Dimensional Requirements.

1.04 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

B. Product Data: Provide for all materials furnished under this Section.

C. Wiring Diagrams: Indicate layout and sequence of operation of each type of occupancy sensor and room control circuit.

PART 2 PRODUCTS

2.01 MANUFACTURERS:

A. General Electric; GE Wiring Devices & Specialty Products.

B. Eaton; Cooper Controls; Greengate.

C. Hubbell Wiring Device - Kellems.

D. Leviton Manufacturing Co.

E. Pass & Seymour.

F. Sensor Switch.

G. The Watt Stopper, Inc.

H. Substitutions: Refer to Section 01 6000.

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; single pole, or as indicated. (Hubbell HBL1220 series)

2. Automatic Wall Switches With Occupancy Sensors: Passive infrared occupancy sensor; 800 watt, 120-277 volt; vandal resistant; manual ON operation; adjustable time delay to switch lighting off when no occupancy is detected; adjustable light level sensor to hold lighting off when ambient light is adequate. (SensorSwitch WSX series; Leviton ODS series; Greengate ONW series)

a. Where dual level switching is indicated, provide units with dual switches and relays for independent control of loads; one switch automatic ON and one switch manual ON.

B. Low Voltage Switches and Lighting Controls:

1. Wall Switches: ON-OFF pushbuttons, manual on; 0-10V dimming type where indicated. (Greengate RC series; SensorSwitch SPODM series)

2. Occupancy Sensors: Ultrasonic and passive infrared motion detector; 24 volt DC with remote transformer; adjustable time delay to switch lighting off when no occupancy is detected; adjustable light level sensor to hold lighting off when ambient light is adequate.

a. Ceiling Type: 360 degree; sized for coverage area and mounting height. (SensorSwitch CM-PDT series; Leviton USC series; Greengate OAC series)

b. Corridor Type: Linear pattern; sized for coverage area and mounting height; wall mounted. (SensorSwitch HW series; Greengate OAWC series)

3. Room Controllers: Factory configured for application; line voltage input and relays; switch and sensor inputs; 0-10V DC dimming outputs; emergency relay where indicated; plenum type for installation above ceiling. (Greengate RC3 series)

4. Cables: Manufacturer’s standard type; factory terminated.

5. Accessories: Power packs, relays, and other components required for control sequence.

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, or ground fault circuit interrupt (GFCI) type as indicated. (Hubbell HBL5300 series; Leviton 5362 series)

a. Locations Within 6 Feet of a Sink: All receptacles shall be GFCI type.

b. Quadplex Receptacles: Two duplex receptacles mounted in double gang box.

2. Special Purpose Receptacles: As indicated.

D. Color:

1. Finished Wall Areas: As selected.

2. Finished Ceiling Areas: White.

2.03 COVER PLATES:

A. Finished Areas: Smooth molded nylon, high abuse grade; color to match device.

B. Provide single piece ganged plates for gang mounted devices.

C. Floor Box Cover Plates: As specified in Section 26 0533.

D. Identification: Provide pre-marked nylon 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. Lighting Controls: Provide power and control wiring and electrical connections, in accordance with Section 26 0500 and manufacturer's recommendations.

1. Provide identification for all system components in accordance with Section 26 0500.

2. Program system to Owner's requirements.

E. 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 and control sequence with circuit energized and verify proper operation.

END OF SECTION

SECTION 26 5000 – LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Light fixtures.

1.02 RELATED SECTIONS:

A. Section 26 0500 – Common Work Results for Electrical.

B. Section 26 2726 – Wiring Devices.

1.03 REFERENCES:

A. EPACT – Energy Policy Act of 1992, with current amendments.

B. FCC – Federal Communications Commission Rules and Regulations, Part 18.

C. IES LM-79 – Electrical and Photometric Measurements of Solid-State Lighting Products.

D. IES LM-80 – Measuring Lumen Maintenance of LED Light Sources.

E. NEMA – National Electrical Manufacturers Association.

F. UL – Underwriters Laboratories, Inc.

1.04 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

B. Product Data: Submit for each specified product, including each fixture, lamp, and ballast type; indicate required accessories.

C. Photometric Data: For fixtures other than the Basis of Design, provide IES files.

1.05 QUALITY ASSURANCE:

A. Products Requiring Electrical Connection: Listed and classified by UL as suitable for the purpose specified and indicated.

B. Regulatory Requirements: Provide products complying with EPACT and applicable energy code.

1.06 WARRANTY:

A. Section 01 7700 – Closeout Requirements: General warranty requirements.

B. LED Fixtures: 3 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. LED Fixtures: IES LM-79; IES LM-80; minimum 70 percent initial lumens maintained at 50,000 hours; voltage, wattage, color temperature, and lumens as scheduled.

   1. Recessed Open Downlights: Recessed mounting frame; wide distribution; semi-specular cone with flange and 6 inch nominal aperture. (Gotham EV0-6AR-WD-LD series; Portfolio LD6-6LW-H series)

   2. Volumetric Troffers: Steel housing, 4½ inch maximum height; white painted reflector with acrylic linear prismatic diffuser; trim for installation in T-bar ceiling grid; size as scheduled. (Lithonia 2VTL series; Metalux CZ-LD4 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. Do not support conduit or fixtures from metal deck.

E. Where recessed fixtures are installed in suspended ceilings, secure fixture to ceiling grid.

   1. Provide felt or fiberglass gaskets on recessed lighting fixtures where necessary to prevent light leakage at the ceiling line.

F. Where recessed fixtures are installed in suspended ceilings, provide outlet boxes adjacent to each fixture outlet to permit each fixture to be adjusted to fit ceiling pattern and to permit "feed through" wiring.

   1. Wire troffers to outlet boxes with Type THHN wire in flexible metallic conduit; maximum 6 foot length.

3.02 FIELD QUALITY CONTROL:

A. Test light fixtures and lamps for normal operation and illumination.

3.03 CLEANING:

A. Remove all labels visible after installation of fixture, except UL labels.

B. Clean photometric control surfaces as recommended by manufacturer.

C. Final Cleaning: Immediately prior to Substantial Completion, clean all light fixtures; remove dirt, bugs, debris, stains, rust and foreign materials. Replace components operating at less than the mean rated lumen output.

END OF SECTION

SECTION 27 0500 – COMMON WORK RESULTS FOR COMMUNICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Materials and installation methods applicable to all Sections of Division 27.

B. Identification.

C. Testing.

1.02 RELATED SECTIONS:

A. Section 26 0500 – Common Work Results for Electrical.

1.03 REFERENCES:

A. BICSI (Building Industry Consulting Service International) TDMM – Telecommunications Distribution Methods Manual.

B. IEEE – Institute of Electrical and Electronics Engineers.

C. ISO – International Organization for Standardization.

D. NEMA 250 – Enclosures for Electrical Equipment (1000 Volts Maximum).

E. NFPA 70 – National Electrical Code (NEC).

F. NJATC – National Joint Apprenticeship and Training Committee for the Electrical Industry.

G. TIA 568-C.0 – Generic Telecommunications Cabling for Customer Premises.

H. TIA 568-C.1 – Commercial Building Telecommunications Cabling Standard.

I. TIA 568-C.2 – Balanced Twisted-Pair Cabling and Components Standard.

J. TIA 569 – Telecommunications Pathways and Spaces.

K. TIA 570 – Residential Telecommunications Infrastructure Standard.

L. TIA 606 – Administration Standard for Telecommunications Infrastructure.

M. TIA 607 – Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.

N. UL 969 – Marking and Labeling Systems.

O. UL 1863 – Communications-Circuit Accessories.

1.04 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

B. Product Data: Describe all materials, equipment, and components.

1. Submit labeling and identification scheme for approval, including proposed text at each location, and samples of each product.

C. Test Reports: Submit documentation of ETL or UL verification for cables, patch panels, and modular jacks.

1.05 CLOSEOUT SUBMITTALS:

A. Submit under provisions of Section 01 7700.

B. Project Record Documents: Record actual routing of cable runs, outlet locations, outlet/cable identifications, conduit sizes and routes, and related items.

1.06 QUALITY ASSURANCE:

A. Contractor Qualifications: This Contractor and all Subcontractors engaged in this installation shall be fully capable and experienced in the systems specified and shall have experience in communications systems installations of minimum 5 years.

1. Submit on request at least 5 reference projects at which work similar in both scope and design has been successfully completed by the Contractor and Subcontractors within the last 5 years. Reference information shall include the following items:

a. Client company name and address.

b. Contact name, title and telephone number.

c. Installation start-up, completion and acceptance dates.

d. Brief description of project.

2. Submit list of Subcontractors who will be utilized in the project, including:

a. Subcontractor responsibilities and scope of work.

b. Supporting documentation verifying Subcontractor qualifications.

3. Prior to award of contract, the Owner and Architect may, with full cooperation of the Contractor, visit client installations to observe equipment operations and consult with references. Visits shall be arranged by the Contractor. However, the Contractor may not be present during discussions with references.

B. Project Manager Qualifications: The Project Manager will be responsible for all aspects of project quality of installation and compliance with Contract Documents and industry standards. The Project Manager shall be on-site whenever work is being performed and installation crews are present.

1. The Project Manager shall be a BICSI registered cabling installation technician, a NJATC certified installer/technician journeyman, a BICSI RCDD, or approved equal.

2. The Project Manager shall be a management employee not involved in personally performing installation work. The Project Manager shall coordinate all activities and interaction with other trades and Contractors on-site, and shall direct and supervise employees and Subcontractors.

3. Project Manager Responsibilities:

   a. Maintain and update all job-related documentation including record drawings, specifications, addendums, and contract modifications, and keep a master copy of project schedules and as-builts in the field office at all times. These documents shall be readily and conveniently available to the workers and technicians for reference.

   b. Make weekly written project progress reports to the Architect, including work completed, problems encountered, corrective solutions proposed, resolution actions approved or taken, all changes, bulletin items, alternative proposals or solutions for consideration, approval or implementation, scheduling or delivery problems, conflicts and coordination problems with other trades, Contractors or design elements, and other items as necessary. This report shall include the name, company and telephone numbers of all pertinent individuals involved in report items (suppliers, vendor reps, other trades, Owner representatives, and others as applicable).

   c. Notify the Architect of existing or developing conditions which may adversely affect the quality, completion date or performance of the installation. Notification shall be made in a timely manner, to minimize or eliminate changes and rework.

C. Employee Qualifications: All workers and technicians shall be enrolled in or have completed the NJATC Installer/Technician Apprenticeship Program, or be a BISCI Registered installation cabling apprentice/installer/technician, or approved equal. All apprentices or tradesmen with 2 years or less experience after completion of an approved training program shall work under the direct supervision of a Registered Installation Cabling Installer or a technician with minimum 5 years experience after completion of an approved training program.

D. Regulatory Requirements and Reference Standards:

1. Comply with requirements of NFPA 70 and other NFPA standards as applicable, including NEC Article 770 and Article 800.

2. Comply with applicable requirements of NEMA 250.

3. Comply with applicable requirements of IEEE, ANSI, and ISO.

4. Comply with applicable requirements of UL 1863. Provide products which are UL listed and labeled.

1.07 ENVIRONMENTAL REQUIREMENTS:

A. Store cables in heated areas at minimum 40 degrees F.

B. Maintain ambient temperature of installation area and cable of minimum 50 degrees F for 48 hours prior to installation.

1.08 SEQUENCING AND SCHEDULING:

A. Total cooperation, coordination and communication between the Contractors, the Owner and the Architect is required for the timely scheduling and completion of all elements and components of the installation. It shall be recognized and acknowledged by all participants, that all phases and elements cannot finish the same day, and certain elements and items must be completed prior to the start of other elements. Provide a construction schedule in accordance with the General Conditions and Section 01 3200, coordinated with the other elements of the project, indicating significant construction and project milestones and completion dates. This schedule will be adjusted and modified as required to meet the overall project schedule requirements.

B. Computer, telephone and other systems associated with this work shall not be taken off-line or removed from service during normal working hours. These systems are critical to the Owner's operations and shall not be interrupted by the Contractor's activities. Make arrangements to coordinate such activities, accommodate the above conditions, and work with the Owner's staff to minimize disruptions to normal Owner activities.

C. Provide timely written notice to the Owner of the need to disconnect existing voice, computer or other system. Schedule such outages as required and directed, and only with the authorized consent of the Owner and Architect. Do not perform testing, outages, modifications, or other functions on active operating systems without prior approval of the Owner and Architect. The Contractor will be responsible for damages, expenses incurred, or losses suffered by the Owner or others caused by unauthorized actions.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS FOR CABLE MATERIALS:

A. All cable shall be new, purchased specifically for the project; salvaged, leftover, or reused cable is not acceptable. Factory seconds and factory shorts are not acceptable.

B. All cable of a given type shall be the same manufacturer and part number, or part number series for color coded cables.

C. Verify that all equipment and materials meet the specified requirements. Notify the Architect in writing, in sufficient time to evaluate changes and implement corrective measures, in the event the manufacturer alters the product specification, description, or part number.

2.02 HANGERS AND SUPPORTS:

A. Manufacturers:

1. ERICO Fastening Products; Caddy CableCat.

2. Hubbell Premise Wiring.

3. Southwest Data Products.

4. Substitutions: Refer to Section 01 6000.

B. Cable Ties: Hook and loop type, or 3/16 inch wide plastic.

C. Cable Support Grips: Non-magnetic tin coated bronze mesh, sized for cable diameter. (Hubbell Kellems 02201 series)

2.03 IDENTIFICATION MATERIALS:

A. 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.

B. Cable Identification Markers: TIA 606; UL 969; permanently applied, pre-printed wraparound wire markers.

1. Manufacturers:

a. Brady Worldwide, Inc.; Bradywrap LAT-18 or LAT-19.

b. Chatsworth Products, Inc.

c. Hubbell Premise Wiring.

d. Substitutions: Refer to Section 01 6000.

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS FOR CABLE INSTALLATION:

A. Ground and bond communications system and components in accordance with Section 27 0526.

B. Routing for cable and raceway shall follow the logical structure of the building whenever possible; follow hallways, aisles and corridors, parallel or perpendicular to the building structure. No diagonal runs are permitted unless specifically indicated or approved. Keep corridor crossovers to a minimum. Cables shall enter and exit areas at right angles to the structure.

C. When walls must be breached, install cables through pre-established metal conduit sleeved openings in accordance with Section 27 0528, with insulated bushings and grounded bushings as required.

D. Above-ceiling spaces shall be considered return air plenum spaces, unless noted otherwise. Exposed cables above ceilings shall be plenum-rated. Non-plenum rated cables must be routed in conduits or enclosed raceways.

E. Perform all ceiling removal, reinstallation, and restoration required for the execution of this work.

F. Cable pulls longer than 100 feet in length are not recommended or authorized, and are made solely at the Contractor's risk. Cable shall be neatly coiled in a figure 8 pattern at the completion of a pull in preparation for the next pull.

G. Take care to assure that during the installation and upon completion, all cables have been installed free from kinks, twists, knots, sharp bends, gouges or cuts to the cable jacket or conductor insulation, or any other physical damage. During installation, do not allow the cables to lay on the floor or be exposed to foot, vehicle or equipment traffic, or to be exposed to any other forms of abuse which may pinch, crush, bind, overtension, or in any way cause physical damage to the cables. Such physical damage will cause electrical characteristic alterations to the cables, which may or may not be detected by standard testing procedures. Replace cables exhibiting physical damage or, in the Architect's judgment, an attempt to correct, cover-up, hide or otherwise conceal such damage.

H. Where field cutting and drilling of metal components is necessary, including supplemental support framing in accordance with Section 26 0500, cut components clean and square with the appropriate metal cutting saw; file and chamfer free from burrs and sharp edges. De-burr and chamfer drilled holes, free from sharp edges. Provide chaffing gear approved by Architect on all holes, edges, and corners subject to possible cable exposure.

I. Open Ceiling Distribution: Cables above lay-in suspended ceilings, and not routed in conduit, shall be supported by an approved open ceiling distribution system as follows:

1. Verify that adequate space is available for open ceiling distribution systems, minimum 3 inches clear space all around, not including space required for removal of ceiling tile or light fixtures, or for service and access to other systems.

2. Support cables on hangers spaced at maximum 48 inches o.c. and supported from steel joists or trusses; neatly bunched, bundled and routed; accessible from an 8 foot step ladder. Support maximum 24 cables in a single hanger.

3. For spans longer than 48 inches, provide conduit, wireway, messenger wire or other approved cable support.

4. Open unsupported spans shall not exceed 12 inches horizontally or 24 inches vertically. Provide "drop-out" supports for changes in elevation as required.

5. Do not support cables from suspended ceiling and lighting fixture support wires or rods, or from ductwork, plumbing lines, or mechanical systems. Do not lay cables on ductwork, piping, plumbing systems, or on top of lay-in ceiling tile or lighting fixtures.

J. Bundling and Supports: Where cables are routed in an open ceiling distribution system, bundle cables in groups of maximum 12 cables. Maintain a neat and orderly installation.

1. Cable routing from the outlet location conduit stub, through the open ceiling distribution system J-hooks, to zone conduits, into the communications cabinets, and onto the distribution rack patch panels, shall be neatly organized and supported by cable support brackets, cable clips, cable ties, cable loops, and related devices as required to minimize tension and stress on the cables, conductors, terminations, connectors, and connector blocks.

2. Utilize hook and loop type cable ties for organizational purposes and on horizontal cable runs only. Do not use hook and loop type cable ties for vertical cable support.

3. Utilize plastic cable ties for vertical support, installed in a figure 8 pattern around the support and over the cable bundle, pulled up to minimum tension to provide cable bundle support without pinching or deforming the cables.

4. Bundle cable types serving different systems separately at maximum 6 feet o.c. Bundles of separate cable types may be supported in the same or separate hangers.

5. Cables within bundles shall be free of twists, tangles, kinks, or knots. Cable supports shall not pinch, bind, crimp, or in any way cause physical damage to the cables.

6. Cables shall be free from tension at both ends and for the entire length of the cable. In vertical risers and other cases where a cable must bear some stress, use cable support grips to distribute the strain over a longer length of cable.

K. RFI/EMI Interference: Maintain maximum possible distance from cable runs to sources of radio frequency interference and electromagnetic interference; route cables through the center of the building where possible to reduce the effects of external RFI/EMI interference.

1. Maintain minimum 6 inch clearance between open wiring or non-metallic raceway and lighting fixtures.

2. Maintain separation distance between communications pathways and power wiring of 480 Volts or less in accordance with the following table.

CONDITION	MINIMUM SEPARATION DISTANCE		
	< 2 kVA	2-5 kVA	> 5 kVA
Unshielded power lines or electrical equipment in proximity to open or nonmetal communications pathways	6 in	12 in	24 in
Power lines enclosed in grounded metal conduit (or equivalent shielding) in proximity to open or non-metallic communications pathways	3 in	6 in	12 in
Unshielded power lines or electrical equipment in proximity to grounded metal conduit communications pathway	3 in	6 in	12 in
Power lines enclosed in grounded metal conduit (or equivalent shielding) in proximity to grounded metal conduit communications pathway	½ the trade size of the larger conduit	3 in	6 in

L. Identification: Label horizontal cables at each end. At the faceplate end of the cable, the label shall be installed within 3 to 6 inches of the module termination, and shall not be visible from the outside of the faceplate or surface mounted enclosure. Provide additional cable labeling at intermediate locations, such as in pull boxes, or where cables exit a zone conduit to feed an open area.

M. Remove unusable, unacceptable, or otherwise unapproved cables from the installation; no cable shall be abandoned in place without approval.

3.02 GENERAL REQUIREMENTS FOR SYSTEM TESTING AND VERIFICATION:

A. Testing procedures described herein are the minimum acceptable. Additional independent system verification testing may be required at the Contractor's expense, in the event of non-performance of specified testing procedures and submittals or contested materials or installation procedures. Independent testing will be determined by and arranged by the Architect at the Contractor's expense.

B. Perform systems testing and verification in order to:

1. Verify and document that the completed installation meets or exceeds minimum systems performance and quality standards.

2. Establish a base standard criteria against which the completed installation can be tested and compared in the future, to facilitate troubleshooting and maintenance.

C. The Contractor shall recognize that the available test equipment is limited in its ability to completely test all pertinent parameters of an acceptable cabling installation. Accordingly, a “pass” test result will not be the sole criteria for determining acceptability of an installation which does not otherwise meet the standards and intent of the Contract Documents.

D. It is strongly recommended that the Contractor perform minimum verification testing of all cables on the reels before pulling and installation. The Contractor shall be responsible for all cable installed, and all cable must be fully acceptable and verified upon completion.

E. Complete cable installation prior to performing required testing. All connectors shall be installed, conductors terminated, faceplates installed and mounted, cable routed, bundled, and supported.

F. It is recommended that the Contractor coordinate with the Architect for a visual inspection and preliminary approval of the physical installation prior to performing certification testing, as any rework, changes, or alterations will necessitate retesting.

G. Provide minimum two working days notice to the Architect prior to commencing cable testing. The Architect reserves the right to observe cable testing. Cable testing procedures must be acceptable to the Architect.

H. Test Equipment:

1. Testing equipment is subject to approval. Testing personnel shall demonstrate to the satisfaction of the Architect a thorough knowledge and understanding of the test equipment, and proficiency in its operation.

2. Provide a written detailed test equipment set-up procedure, indicating what and how all test parameters are entered into the test equipment; factory default settings are not acceptable. Approved set-up procedures shall be provided to the Owner as a component of the final submittals, providing the Owner with all information required to duplicate the original test conditions and parameters.

3. Submit cut sheets, shop drawings, technical specifications, and operator manuals as provided by the manufacturer of the testing equipment.

I. Upon completion of the cable installation, perform the following required tests:

1. Perform continuity check of all cable, including all pairs of multipair cable, checking for opens and shorts.

2. Determine and record all cable lengths.

3. Check all cables, all pairs for proper termination and correct pair polarity.

4. Verify correct cable labeling at both ends of the cable, the outlet faceplate and jack, and the patch panel.

J. Submit complete cable documentation and verification testing reports, for approval. Include the following:

1. Date testing was performed and the name and signature of the Technician/Operator performing the tests and inspections.
2. Test equipment model and serial number.
3. Submit only test reports which indicate full compliance with minimum acceptable standards and specifications indicated. Marginally acceptable test results, indicated by some test equipment manufacturers as within a 15% Fault Anomaly Threshold or similar notation, are not acceptable.
4. For computer-based testing, submit test reports on digital media in addition to hard copy. Include a copy of the appropriate software for managing the reports in CSV file formats.
5. After approval, submit test reports with the system operation and maintenance manuals in accordance with Section 01 7700.

K. Each communications outlet and each cable shall pass a complete active operational test as performed by, and acceptable to, the Owner.

L. Outlets, cables, or components not satisfactorily passing all of the static visual inspections, electronic micro-computer based automatic scanner testing, Owner performed passive testing, and active operational tests; or failing to meet quality installation standards, shall be repaired or replaced at the Contractor's expense, as directed.

END OF SECTION

SECTION 27 0526 – GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Grounding and bonding for communications cable systems.

1.02 RELATED SECTIONS:

A. Section 26 0500 – Common Work Results for Electrical.

B. Section 26 0526 – Grounding and Bonding.

C. Section 27 0500 – Common Work Results for Communications.

1.03 REFERENCES:

A. BICSI (Building Industry Consulting Service International) TDMM – Telecommunications Distribution Methods Manual.

B. IEEE (Institute of Electrical and Electronics Engineers) 1100 – Powering and Grounding Electronic Equipment.

C. NFPA 70 – National Electrical Code (NEC).

D. TIA 607 – Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.

E. UL 467 – Standard for Grounding and Bonding Equipment.

F. UL 869 – Reference Standard for Service Equipment.

1.04 SYSTEM DESCRIPTION:

A. Furnish and install a communications grounding system, providing a low AC impedance path to ground and a stable 0 volt to ground signal reference point for the communications systems equipment and infrastructure.

B. Bonding and grounding conductors shall originate from the ground distribution bus bars, to all communications equipment, raceways, local power distribution panels, building structural steel, etc.

1.05 QUALITY ASSURANCE:

A. Manufacturer Qualifications: Firms 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 not less than three years.

B. Regulatory Requirements and Reference Standards:

1. Comply with requirements of NFPA 70 as applicable, including Article 250 and Article 800. Bond individual electronic components and equipment to the grounding system per the manufacturer's recommendations and instructions.

2. Comply with applicable requirements of UL 467 and UL 869. Provide grounding and bonding conductors and connectors, and other products, which are UL listed and labeled.

3. Comply with applicable requirements of IEEE 1100, TIA 607, and BICSI TDMM.

PART 2 PRODUCTS

2.01 MATERIALS:

A. Provide cables, wires, connectors, terminals, compression lugs, grounding rods/electrodes and plate electrodes, bonding jumper braid, surge arresters, and additional accessories needed for a complete installation.

B. Provide materials and components in accordance with Section 26 0526. Where materials or components are not indicated, provide products complying with NEC, UL, IEEE, and established industry standards for applications indicated.

C. Grounding and Bonding Conductors: Insulated stranded copper, minimum conductor size #6 AWG, colored green or clearly marked with green tape. Bare copper conductor may only be utilized when exposed in plenum rated areas or buried below grade.

D. Connection Hardware: Connect joined segments of the grounding system using irreversible compression-type connectors, exothermic welding, bronze bolt, star washers and nut connections or equivalent.

1. Provide oxide inhibiting joint compound on all compression, nut and bolt, and mechanical type terminations.

2. Utilize bronze machine screws, nuts, bolts, and star washers for all grounding hardware and fasteners. Common zinc-clad or nickel-plated steel hardware fasteners are not acceptable. Split ring washers are not acceptable. Setscrew type, split bolt type, and box lug type terminations are not acceptable.

PART 3 EXECUTION

3.01 EXAMINATION:

A. Inspect, service and verify existing grounding systems and grounding work of related trades. Failures of related grounding systems to meet the requirements of Section 26 0526 and this Section shall be brought to the attention of the Architect in writing.

1. Electrical service entrance grounding.

2. Telephone service entrance grounding.
3. Electrical systems grounding.
4. Structural building steel grounding.
5. Conduit and raceway systems grounding.
6. Ground connection to the source side of water meter and the water meter bonding jumper.
7. Natural gas line grounding.

B. Grounding connections shall be checked, cleaned, re-tightened or re-made with a suitable anti-oxidant applied, as required to bring them up to code and standards. Discrepancies in related systems shall be brought to the attention of the Architect, for corrective action as required.

C. Submit a written report detailing the inspection, service, and verification procedures of the related grounding systems performed by the Contractor and indicating the findings and actions taken.

3.02 INSTALLATION:

A. General Requirements:

1. Install grounding system cables and bonding conductors without splices wherever possible. Where splices are necessary, they shall be minimal, accessible, and located in communications spaces only.
2. Adequately support and protect all connections, joints, and conductors.
3. Neatly burnish mechanical connection points on both sides to remove the finishes and expose bare metal for a positive electrical connection.
4. Provide grounding bushings on each unbonded conduit to bond the conduit to ground; discard the setscrew type ground clamp provided and bolt the compression type ground lug directly to the bushing using a bronze machine screw and star washer and 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.
   a. Where a grounding bushing has not been installed on a conduit and cannot be installed due to the installed cable base, install a UL listed bonding and grounding wedge on the end of the conduit adjacent to the existing bushing fitting. Attach the compression type ground lug to the bonding and grounding wedge using a bronze machine screw and star washer.
5. Mechanical ground connections shall be made using dedicated grounding hardware to the main structure. Multi-purpose use of equipment structure hardware or attachment to equipment accessories or substructures (i.e. gussets, brackets, hangers, mounting brackets, etc.) is not acceptable.

6. Wherever possible, bolt two-hole compression lugs using two bolts. When the two-hole compression lug can only utilize one hole, utilize the hole nearest the compression fitting; cut off excessive tang length as required.

B. Grounding and Bonding Conductor Installation:

1. Provide grounding and bonding conductors to all individual pieces of equipment. Minimize daisy chaining of conductors between different pieces or types of equipment and infrastructure elements.

2. Provide bonding conductors between equipment elements in lieu of the unreliable physical electrical continuity through mounting means. Utilizing conduit fittings, mounting hardware, support hardware and their attachment hardware for grounding and bonding conductor attachment or in lieu of a grounding and bonding conductor is not acceptable.

3. Extend the communications grounding system to and through communications raceways by extending a #6 AWG minimum bonding conductor through the length of the raceway system and lugging to each section of raceway, lugging at 10 foot maximum intervals along the length of the raceway, and lugging to each section of raceway greater than three feet in length in lieu of the installation of individual bonding jumpers between each raceway section.

   a. Extend bonding jumpers to all pull boxes and transition fittings along the raceway system. Extend the bonding conductor through conduits connecting sections of metallic raceway systems.

   b. Unless otherwise noted, bond individual continuous “zone” conduits to ground at the “home” end, with a bonding jumper installed to and through all pull boxes. Bond at the “zone” end to building steel as available.

4. Do not place bonding and grounding conductors in ferrous metal conduit.

5. Maintain grounding and bonding conductors as short and straight as possible, with the maximum radius bends practical (20x conductor diameter). In no case shall the minimum bend radius be less than 10x the conductor diameter.

6. Route grounding and bonding conductors free from loops and coils (either partial or full). No bends shall be greater than 90 degrees.

7. Protect grounding and bonding conductors from physical damage. Do not run conductors exposed across the floor or strung from item to item without intermediate support. Route grounding and bonding conductors to provide physical protection and support or route in conduit as required.

8. Provide a rubber grommet or chase nipple and bushing at exposed grounding and bonding conductors entering cabinets and enclosures. Install grommets or bushings as required.

3.03 FIELD QUALITY CONTROL:

A. Upon completion of installation, perform approved standard ground resistance tests with an approved ground resistance test unit (i.e. stakeless clamp-on ground resistance tester, two-point and three-point fall of potential tester), using approved procedures.

B. **CAUTION:** Never assume a ground wire is electrically dead without first testing to be sure. Always test for, and record, the ground current in the ground conductor at the test point prior to measuring ground resistance. Erroneous ground resistance measurements will result if the ground current exceeds 2 Amps AC. Identify sources of high ground current (greater than 2 Amps AC) before proceeding with ground testing.

C. **NOTE:** By measuring at several points and comparing the readings (both ground current and resistance), it is possible to identify neutral/ground loops, utility grounds, and central office grounds. The test is effective and accurate because the ground window is connected to the utility ground at only one point, according to standard practices and code. A reading of less than 0.1 Ohms generally indicates that the cable is continuous with itself, forming a ground path, which can be usually confirmed by comparatively high ground current readings, also obtained when readings are taken at multiple locations around the loop. A good low resistance ground may have very high AC ground current flow, depending upon the type of equipment being grounded.

D. Demonstrate by testing that the communications grounding system to earth resistance value is 10 Ohms or less, utilizing a “clamp-on” or 3 point fall of potential tester.

E. Demonstrate by testing that the communications 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 Ohm. Where test results indicate a resistance to ground of 0.1 Ohm or greater, take appropriate action to reduce the ground resistance to less than 0.1 Ohm. Re-test to demonstrate compliance.

F. Record the test results, and provide a description of the testing procedures for submission to the Architect. Include copies of the test report in the cabling system instruction manuals.

END OF SECTION

SECTION 27 0528 – PATHWAYS FOR COMMUNICATIONS SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Structured raceway system for communications cabling; conduits, backboxes, and surface mounted raceways.

1.02 RELATED SECTIONS:

A. Section 07 8400 – Firestopping.

B. Section 26 0500 – Common Work Results for Electrical.

C. Section 26 0533 – Raceway and Boxes.

D. Section 27 0500 – Common Work Results for Communications.

E. Section 27 0526 – Grounding and Bonding for Communications Systems.

1.03 REFERENCES:

A. ADA (Americans with Disabilities Act) – Standards for Accessible Design.

B. BICSI (Building Industry Consulting Service International) TDMM – Telecommunications Distribution Methods Manual.

C. NEMA 250 – Enclosures for Electrical Equipment (1000 Volts Maximum).

D. NFPA 70 – National Electrical Code (NEC).

E. TIA 569 – Telecommunications Pathways and Spaces.

1.04 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

B. Shop Drawings: Indicate raceway routing, size, and cable fill.

C. Product Data: Describe all materials and components.

1.05 QUALITY ASSURANCE:

A. Regulatory Requirements and Reference Standards:

1. Comply with requirements of NFPA 70 as applicable.
2. Comply with applicable requirements of NEMA 250.
3. Comply with applicable requirements of TIA 569.

PART 2 PRODUCTS

2.01 OUTLETS:

A. Communications Outlets: Double gang deep box, 4-11/16 inch square, 3½ inch deep; with 1¼ inch raised single gang or double gang plaster ring, as required.

2.02 CONDUIT:

A. Conduit: In accordance with Section 26 0533; size as scheduled, minimum 1 inch.

1. Do not use flexible steel conduit without specific written approval for the application.

B. Pull Boxes and Splice Boxes: Code gauge steel, etched; rust resistant gray primed finish.

1. Enclosures: NEMA 250, Type 1 with screw attachment, unless noted otherwise.

2. Size:

a. Pull Boxes: For conduits 1¼ inch and larger terminating in a pull box, the minimum length of pull box shall be 8 times the diameter of the largest conduit terminating in the pull box.

b. Splice Boxes: In accordance with TIA 569.

2.03 SURFACE MOUNTED RACEWAY:

A. Metallic Surface Mounted Raceways: UL listed as a grounded raceway system; color as selected; size as indicated.

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. Where communications outlets are indicated in metallic raceway, provide 106 duplex mounting frame, faceplates, and device brackets as required.

3. 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.

PART 3 EXECUTION

3.01 INSTALLATION:

A. General Installation Requirements:

1. Provide through penetration firestops in accordance with Section 07 8400, BICSI TDMM, and TIA 569. Consult individual manufacturer’s instructions for specific application details.

2. Bond raceway systems to the communications grounding system in accordance with Section 27 0526.

3. Coordinate installation of cable systems and equipment with cable system installer, local utility companies, and Owner's vendors.

B. Outlets: Install boxes at locations indicated on Drawings, at mounting heights in accordance with ADA and Section 26 0533.

1. Stub out 1¼ inch conduit from box to space above suspended ceiling. Terminate conduit with ell turned toward main cable routing path; install insulating bushing. For conduits home runned or otherwise extended beyond the turn out, install a grounding bushing and bond to the communications grounding system in accordance with Section 27 0526.

C. Conduit: Install in accordance with Section 26 0533; reamed; furnished with insulating bushings or grounding bushings as required.

1. Provide pull boxes where sections of conduit runs are longer than 100 feet, have a total of more than 180 degrees of bends, or have a reverse bend greater than 90 degrees.

   a. Place pull boxes and splice boxes in straight sections of conduit runs; do not use in place of a bend unless specifically approved.

   b. Install pull boxes and splice boxes in readily accessible locations. Where boxes are installed above suspended ceilings, they shall be located immediately above the ceiling.

2. Bends shall have a minimum inside radius as follows:

   a. Conduit Sizes to 2 Inch: 6 times internal diameter.

   b. Conduit Sizes 2½ Inch and Larger: Long sweep bends, 10 times internal diameter.

3. Do not use condulete type fittings or LB fittings in lieu of pull boxes or bends.

4. Conduit, sleeves and stubs through fire rated construction shall be rigid galvanized steel conduit with insulated and grounding bushings. Conduit sleeves shall be minimum 12 inches long. Install firestop upon completion of the work.

5. Seal penetrations through non-rated acoustical assemblies with acoustical sealant in accordance with Section 09 8100.

6. All conduits shall be left clean, dry, and free of debris or other obstructions, with insulated grounding bushings installed.

7. Provide a pull rope in all conduits, 1/8 inch nylon or polypropylene.

D. Surface Mounted Raceway: Install in accordance with Section 26 0533.

3.02 TRAY FILL SCHEDULE:

A. Maximum number of cables in each conduit shall be in accordance with the following table, and shall not exceed the BICSI TDMM recommended maximum number of cables, or the NEC maximum fill.

B. Schedule is based on BICSI TDMM and TIA 569 with 30 percent conduit fill for a horizontal conduit run of maximum 100 feet with maximum two 90 degree bends. Adjust conduit sizes as required for other conditions.

	Cable Max. O.D. (in.)														
Raceway Size	0.13	0.18	0.22	0.24	0.29	0.31	0.37	0.53	0.62	0.70	0.89	0.97	1.07	1.30	1.50
1" Conduit	8	8	7	6	3	3	2	1	-	-	-	-	-	-	-
1¼" Conduit	16	14	12	10	6	4	3	1	1	1	-	-	-	-	-
1½" Conduit	20	18	16	15	7	6	4	2	1	1	-	-	-	-	-
2" Conduit	30	26	22	20	14	12	7	4	3	2	1	1	1	-	-
2½" Conduit	45	40	36	30	17	14	12	6	3	3	2	2	1	1	-
3" Conduit	70	60	50	40	20	20	17	7	6	6	3	3	1	1	1
3½" Conduit	94	81	73	61	35	36	22	12	7	6	4	4	3	2	1
4" Conduit	120	104	94	79	64	47	30	14	12	7	5	5	4	2	1

END OF SECTION

SECTION 27 1413 – COPPER COMMUNICATIONS CABLING

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Connectivity hardware.

B. Horizontal cabling.

C. System testing and verification.

1.02 RELATED SECTIONS:

A. Section 27 0500 – Common Work Results for Communications.

B. Section 27 0526 – Grounding and Bonding for Communications Systems.

C. Section 27 0528 – Pathways for Communications Systems.

D. Section 27 1543 – Communications Faceplates and Connectors.

1.03 REFERENCES:

A. TIA 568-C.0 – Generic Telecommunications Cabling for Customer Premises.

B. TIA 568-C.1 – Commercial Building Telecommunications Cabling Standard.

C. TIA 568-C.2 – Balanced Twisted-Pair Cabling and Components Standard.

D. TIA 569 – Telecommunications Pathways and Spaces.

E. TIA 606 – Administration Standard for Telecommunications Infrastructure.

F. TIA 607 – Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.

1.04 SYSTEM DESCRIPTION:

A. The Contractor, the cable manufacturer, the connectivity manufacturer and the distributor shall collaborate and work in partnership with one another to provide a cabling installation that is guaranteed to perform at levels above and beyond the standards of TIA 568, in accordance with the minimum acceptable Permanent Link Performance specification contained herein.

B. Provide UL or ETL independent testing and verification of the completed installation and full written registration and certification of the installation.

1.05 SUBMITTALS:

A. Product Data: Submit under provisions of Section 01 3300. Describe all materials, equipment, and components.

B. Test Reports: For each shipment of Category 6 cable, cable manufacturer shall submit copies of the manufacturing master reel test reports indicating the worst case minimum electrical performance for each pair of each cable reel.

1.06 QUALITY ASSURANCE:

A. Manufacturer Qualifications: Firms regularly engaged in the manufacture of communications cabling system components of the types specified and whose products have been satisfactorily used in similar applications for not less than 5 years.

1. The cable manufacturer and the connectivity manufacturer shall match their respective component products to provide maximum performance.

B. Comply with applicable requirements of TIA 568, 569, 606, and 607.

1.07 WARRANTY:

A. Section 01 7700 – Closeout Requirements: General warranty requirements.

B. Replace equipment and materials or any component thereof, found defective within 3 years from date of Substantial Completion.

C. Provide a manufacturer-certified installation with a warranty of minimum 20 years including horizontal cables, patch panels, terminations, and labor. Contractor shall support manufacturer's warranties for all components furnished and installed under this Section for the life of the manufacturers' warranties.

PART 2 PRODUCTS

2.01 CONNECTIVITY HARDWARE:

A. Manufacturers:

1. Hubbell Premise Wiring.
2. Leviton Voice & Data Division.
3. Ortronics, Inc.
4. Panduit Corp.
5. Siemon Company.
6. Substitutions: Refer to Section 01 6000.

B. Patch Panels: Rack mounted; wired and terminated according to T568B wiring sequence; with stuffer caps, cable support bars and designation label kits.

1. Category 6 Patch Panels: TIA 568-C.2; 24-port or 48-port, 8-conductor RJ45 modular jacks, prewired to 110 type terminations on rear. (Hubbell HP6 series; Leviton 69586 series; Ortronics OR-SP6U series; Panduit DP-688TGY series; Siemon Z6-PNL series)
2. Labels: Self-adhesive clear strips with preprinted labels. (Hubbell LPH174)

3. Category 6 Patch Cords: TIA 568-C.2; 8P8C RJ45 connector each end; blue jacket. (Leviton 62460 series)
    a. Provide one patch cord per patch panel port, plus 10% spare; minimum 6 foot length, or as required by project conditions.

2.02 HORIZONTAL CABLES:

A. Manufacturers:
    1. Belden, Inc.
    2. Berk-Tek.
    3. Cable Design Technologies; Mohawk/CDT.
    4. CommScope.
    5. General Cable Technologies Corporation.
    6. Superior Essex.
    7. Substitutions: Refer to Section 01 6000.

B. General Requirements: Purchase the cable on minimum 1000-foot reels only; boxed or coiled cable is not acceptable.
    1. Jacket: CM, CMR, FHC, or CMP rated depending on application.
        a. CM rated cables shall be acceptable only when routed end-to-end, through conduits, or used as tie cables within the communications closet.
        b. CMR rated cables shall be acceptable when routed exposed in non-return air spaces and risers, in sleeves through fire rated floors between stacked wiring closets or CM rated applications.
        c. FHC rated cables shall be required where the use of other cable types would require conduit or plenum fire suppression.
        d. All other cables shall be CMP plenum-rated, unless noted otherwise.
    2. Color Coding: 4 pairs of conductors shall be insulated with a common FEP material to assure stable performance characteristics, a common nominal value of propagation for all 4 pairs, and a resulting minimum skew.
        a. Pair 1: White/blue and blue.
        b. Pair 2: White/orange and orange.
        c. Pair 3: White/green and green.
        d. Pair 4: White/brown and brown.
    3. Performance: 350 Mhz at standard data rate of 1000 Mbps; cable skew maximum 45 nsec.

4. Minimum Cable Length: 50 feet (15 meters). Manage excess cable length by means of cable routing path, do not utilize slack cable coils.
5. Maximum Cable Length: 295 feet (90 meters) from the outlet faceplate to the patch panel.

C. Category 6 Horizontal Cables: TIA 568-C.2; 100 Ohm solid copper, 23 AWG.

1. Voice/Data Cables: Four unshielded twisted pairs; blue jacket. (Berk-Tek Lanmark 1000 Enhanced series; Mohawk AdvanceNet series; General Cable Genspeed 6000 Enhanced series; Superior Essex DataGain 6+ series)
2. Audio/Video Cables: Four shielded twisted pairs; purple jacket. (Berk-Tek Lanmark-6 series; General Cable Genspeed 10,000 Enhanced series; Superior Essex 6+ series)

2.03 OTHER CABLES:

A. USB Cables: USB 2.0, active type; with adapters, gender changers, or patch cords as required for connection to faceplate couplers.

1. Manufacturers:
   a. Covid P-USB series, plenum rated.
   b. C2G 39000 series, plenum rated.
   c. Tripp-Lite U026 series, installed in conduit.
   d. Substitutions: Refer to Section 01 6000.

B. Audio Cables: Two individually shielded twisted pairs; 22 AWG copper; 100% aluminum polyester tape shield, 0.195 inch nominal outside diameter; CMP plenum-rated jacket.

1. Manufacturers:
   a. West Penn Wire; 25510B.
   b. Belden, Inc.
   c. CommScope.
   d. Substitutions: Refer to Section 01 6000.

PART 3 EXECUTION

3.01 CONNECTIVITY HARDWARE INSTALLATION:

A. Mount patch panels, cable organizers, and other components in the racks and cabinets as indicated.

B. Terminate cables on patch panels in sequential alphanumeric order according to the faceplate number scheme.

C. Label patch panels with user outlet location identification and jack identification number. Label each patch panel to indicate the facility floor or area served from the panel.

D. Wire Management: Cables shall be neatly organized and supported by cable support brackets, distribution rings, cable clips, cable loops, or by other approved method to minimize tension or stress on the connector terminations.

3.02 CABLE INSTALLATION:

A. Install cables in accordance with Section 27 0500; provide terminations and connections in accordance with manufacturer's recommendations.

B. Install horizontal cables as single continuous runs from outlet faceplate to patch panel, and between other terminations. No in-line connectors or splices will be permitted. Cabling shall be free of bridges, splices, taps, splitters, baluns, and other connections.

C. Cables that require service loops or additional length shall be coiled at 200% of their recommended minimum bend radius, or in a 16 inch diameter coil, whichever is larger. The coil shall then be cable tied and attached to a nearby support, individually bundled and tagged with the cable number.

D. Spare cable sets for future use shall be of sufficient length to reach any point within the intended service area, and shall be individually coiled at 200% of their recommended minimum radius, or 16 inch diameter coil, whichever is larger. The coil shall then be cable tied and supported on J-hooks, individually tagged with the cable identification number.

E. Observe minimum bend radius and tension limitations specified by the cable manufacturer and TIA standards when installing the cables. When conflict exists between specifications, manufacturer recommendations and standards, the more stringent criteria shall apply.

1. Minimum Bend Radius: 1½ inch.

2. Maximum Pulling Tension: 25 ft-lbs.

F. Exercise extreme care when installing cables; sharp bends, cable kinks, crushing, or other abuse will cause deformity of the cable, discontinuity of twisted pairs and their relationship to one another, which will adversely affect the high speed electrical performance of the cable.

G. Terminate cables in accordance with TIA 568 and current industry practices. Preserve wiring pair twist as close as possible to the point of termination. The amount of untwisting of a pair as the result of termination to the connector hardware, shall be no greater than 3/8 inch. To maintain the interrelationship of pairs, limit the amount of unjacketing of the cable to maximum ½ inch at the point of termination.

3.03 SYSTEM TESTING AND VERIFICATION:

A. Horizontal Cables: Test and verify cable installation in accordance with TIA 568.

B. Shielded Cables: Test all cables and all pairs for opens, shorts, continuity, pair-reversals (flips).

C. After tests have been performed, install the permanent faceplate labels, modular jack dust covers and permanent pre-printed patch panel labels.

END OF SECTION

SECTION 27 1543 – COMMUNICATIONS FACEPLATES AND CONNECTORS

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Communications jacks and faceplates.

B. Faceplate media converters and transceivers.

1.02 RELATED SECTIONS:

A. Section 26 0533 – Raceway and Boxes.

B. Section 26 2726 – Wiring Devices.

C. Section 27 0500 – Common Work Results for Communications.

D. Section 27 1413 – Copper Communications Cabling.

1.03 REFERENCES:

A. FCC (Federal Communications Commission) Part 68 – Connection of Terminal Equipment to the Telephone Network.

B. TIA 568-C.0 – Generic Telecommunications Cabling for Customer Premises.

C. TIA 568-C.1 – Commercial Building Telecommunications Cabling Standard.

D. TIA 568-C.2 – Balanced Twisted-Pair Cabling and Components Standard.

E. UL 94 – Flammability of Plastic Materials for Parts in Devices and Appliances.

1.04 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

B. Product Data: Describe all materials, equipment, and components.

1. Submit labeling and identification scheme for approval, including proposed text at each location.

1.05 QUALITY ASSURANCE:

A. Plastic Materials: UL 94 V-0 rated; flame retardant polymer.

PART 2 PRODUCTS

2.01 COMMUNICATIONS JACKS AND FACEPLATES:

A. Manufacturers:

1. Hubbell Premise Wiring.

2. Leviton Voice & Data Division.

3. Semtron, Inc.

4. Substitutions: Refer to Section 01 6000.

B. Plastic Faceplates: Flush mounted, single gang or double gang as indicated; one rectangular GFCI-style opening per gang; label fields with paper labels and clear covers; captive mounting screws. (Hubbell IMF series)

1. Outlet Frames: Sized to fit faceplate openings; designed for flush mounting of rear-loaded jacks; number of ports as indicated. (Hubbell IFP series)

2. Color: Match wiring device faceplates; refer to Section 26 2726.

C. Communications Jacks: Modular snap-in type to match faceplate frames.

1. Category 6 Jacks: TIA 568-C.2; FCC Part 68.5; modular 8-position, 8-conductor RJ45 type, non-keyed; terminated according to T568B sequence. (Hubbell HXJ6 series)

a. Unshielded Jacks: Black color.

b. Shielded Jacks: Gray color.

c. Terminations: Insulation displacement contact (IDC) type, tin-lead plated for #22 to #26 AWG solid conductors.

d. Modular Jack Contacts: Beryllium copper with minimum 50 micro inches of gold plating.

2. USB Connectors: USB 2.0 pass-through coupler; blue color. (Hubbell SFUSB series)

3. Audio Connectors: 3.5mm stereo jack with feed-through connection; nickel finish; housing color to match faceplate. (Hubbell 35FF series)

4. Blank Inserts: Modular snap-in type; color to match faceplate.

2.02 FACEPLATE MEDIA CONVERTERS AND TRANSCEIVERS:

A. Manufacturers:

1. Extron Electronics.

2. Hall Research, Inc.

3. Kramer Electronics, Ltd.

4. Substitutions: Refer to Section 01 6000.

B. HDMI Extender Pair: Transmitter and receiver to extend 1080p video and stereo audio up to 90 ft over shielded Category 6 cable; HDCP compliant; sized to fit GFCI-style faceplate openings; HDMI face connectors and RJ45 rear jacks; power and signal LED; power supply for transmitter; color to match faceplates. (Kramer WP-571 and WP-572)

PART 3 EXECUTION

3.01 EXAMINATION:

A. Verify that field conditions are as indicated.

B. Verify that wall openings are neatly cut and will be completely covered by wall plates.

3.02 INSTALLATION:

A. Install modules in accordance with the manufacturer's instructions, using a single-punch 110 style impact tool, or as specified for cable termination by the connectivity manufacturer.

B. Install faceplates on standard flush mounted communications outlets with the appropriate single gang or double gang plaster ring, in accordance with Section 27 0528.

C. Install faceplates on surface mounted raceway boxes as indicated. Secure box to wall with minimum 2 panhead screws or mushroom headed nail anchors, located in diagonally opposite corners. Coordinate with surface mounted raceway as required. Utilize faceplates and snap-in fittings to match the raceway in color.

D. Connect in-wall cabling to transceivers. Hardwire power supply to circuit serving adjacent receptacle. Adjust controls for optimum signal.

E. Label faceplates to correspond with approved identification scheme.

END OF SECTION

SECTION 31 2000 – EARTH MOVING

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Excavation and fill.

1. Excavating and backfilling for footings and foundations.
2. Excavating and backfilling for utilities.

B. Compaction.

C. Rough grading and finish grading.

1.02 RELATED SECTIONS:

A. Section 01 4520 – Testing and Inspecting Services.

B. Section 01 7000 – Execution Requirements: Field engineering.

C. Section 03 3000 – Cast-In-Place Concrete: Concrete fill for overexcavated areas.

D. Division 26 – Electrical: Earthwork for underground electrical work within building.

1.03 REFERENCES:

A. ASTM D698 – Laboratory Compaction Characteristics of Soil Using Standard Effort.

B. ASTM D2487 – Classification of Soils for Engineering Purposes (United Soil Classification System).

C. ASTM D5268 – Topsoil Used for Landscaping Purposes.

D. ODOT 203 – Roadway Excavation and Embankment.

E. ODOT 204 – Subgrade Compaction and Proof Rolling.

F. ODOT 208 – Rock Blasting.

G. ODOT 304 – Aggregate Base.

H. ODOT 411 – Stabilized Crushed Aggregate.

I. ODOT 623 – Construction Layout Stakes.

J. ODOT 653 – Topsoil Furnished and Placed.

K. ODOT 703 – Aggregate.

L. ODOT SS 832 – Temporary Sediment and Erosion Control.

1.04 SUBMITTALS:

A. Submit under provisions of Section 01 3300.

B. All fill material shall be approved by the Architect and testing firm's Soils Engineer prior to delivery.

1.05 QUALITY ASSURANCE:

A. Excavator Qualifications: Trained in underground utility protection.

1.06 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 and vegetation indicated to remain 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. Maintain carefully all benchmarks and other reference points; if disturbed or destroyed, replace as directed.

1.07 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.

D. Granular Material for Pipe Bedding: Natural gravel or stone; ODOT 703.01; No. 57, No. 67, or No. 8 as detailed.

E. Granular Material for Aggregate Walks: ODOT 411.

F. Soil Materials: ASTM D2487, soil classification groups CL, GW, GP, GM, SW, SP, and SM.

1. All 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. All 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. 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.

D. 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. Should water be 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. All 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.

E. 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. 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 with approved compacted fill material.

4. 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.

5. Fill planting areas to the top of adjacent curb or pavement with minimum 18 inches clean topsoil.

B. Backfilling for Foundations: Backfill around foundations immediately after concrete has thoroughly set. Backfill with stone to within two feet of finish grade; fill remainder of excavation with top soil.

C. 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.

D. 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: ASTM D698; 100%.

   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. Tolerance: 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. Compact exposed subgrade to 95% ASTM D698, Method D maximum dry density near optimum moisture content.
3. 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.
4. 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. Testing firm will perform testing of excavating and backfilling in accordance with Section 01 4520.

B. Subsurface soil investigation reports were not conducted for this project. If deemed necessary, such an investigation shall take place with all costs borne by the Owner.

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 design soil bearing pressure.

END OF SECTION

SECTION 32 9200 – LAWNS AND GRASS

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Preparation, fertilizing, and seeding indicated areas including the following:

1. Material storage areas.
2. Site areas disturbed as a result of construction.

1.02 RELATED SECTIONS:

A. Section 31 2000 – Earth Moving: Rough and final grading; removal of stones during grading operations.

1.03 REFERENCES:

A. ODOT 659 – Seeding and Mulching.

PART 2 PRODUCTS

2.01 MATERIALS:

A. Fertilizer: ODOT 659.04; dry or liquid type; 10-20-10 analysis.

B. Lime: ODOT 659.03; agricultural ground limestone.

C. Seed for Lawn Areas: ODOT 659.09, Class 1.

1. Kentucky Bluegrass: 30% by weight.
2. Perennial Ryegrass: 30% by weight.
3. Creeping Red Fescue: 20% by weight.
4. Annual 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.

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 to lawn areas 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.

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. Weeding: Uproot and remove weeds and other undesirable vegetation.

C. Refertilization: Where areas are designated for refertilization, apply fertilizer between August 15 and October 15 during a period when the grass is dry.

D. 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