PROJECT MANUAL

for

West Branch – Rose City Area Schools

SF 1.5 Surline MS Two-Story HVAC Improvements and Rose City Elementary DDC Controls

PROJECT NO. 263-18M

December 17, 2021

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PROJECT TITLE PAGE

PROJECT NAME: West Branch – Rose City Area Schools
SF 1.5 Surline MS Two-Story HVAC Improvements and
Rose City Elementary DDC Controls
AEA Project No. 263-18M

OWNER: West Branch – Rose City Area Schools
PO Box 308
West Branch, MI 48661
Contact: Phil Mikulski, Superintendent
Telephone: (989) 343-2019

ARCHITECT: Anthony Esson, Architect

Mailing Address:
P.O. Box 479
Gaylord, MI 49734

Shipping Address:
2111 Forester Drive
Frederic, MI 49733

Contact: Anthony P. Esson, Architect, LEED AP
PH: (989) 732-0585
tony@anthonyessonarchitect.com

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1874 Anne Drive
Grayling, MI 49738
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larry@bayshoreengineering.com

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INVITATION TO BID

Project: West Branch – Rose City Schools; SF 1.5 Surline MS Two-Story HVAC Improvements and Rose City Elementary DDC Controls

Owner:

West Branch – Rose City Area Schools
PO Box 308
West Branch, MI 48661

Architect/Engineer:

Anthony P. Esson, Architect, PLLC
PO Box 479
Gaylord, MI 49734

Date: December 17, 2021

West Branch – Rose City Area Schools will receive Bids from Bidders for remodeling work comprising HVAC improvements to portions of the Surline Middle School building located at 147 State Street, West Branch, MI 48661, and the Rose City Elementary School building located at 515 Harrington Street, Rose City, MI 48654.

Sealed Bids should be delivered in person to West Branch – Rose City Area Schools Central Office, c/o Phil Mikulski, Superintendent, 960 S. M33, West Branch, MI 48661. Bids must be received prior to 1:00 PM local time on January 26, 2022. Bids will be opened publically and read aloud immediately following the closure of the bidding period, in the West Branch – Rose City Area Schools Central Office located at 960 S. M33, West Branch, MI 48661. The Owner will not consider or accept a bid received after the date and time specified for bid submission. Post Bid Interviews with the apparent low Bidder(s) will be scheduled following receipt of Bids. All Bids will be evaluated at a later date.

There will be a Pre-Bid Conference conducted by the Owner and Architect/Engineer at 3:30 PM local time, Wednesday, January 12, 2022. The meeting will convene in the Surline Middle School Cafeteria located at, 147 State Street, West Branch, MI 48661. The Pre-Bid Conference will consist of a brief informational meeting followed by an opportunity for Bidders to examine the Project site. Attendance is not mandatory but is strongly encouraged.

Guidelines for social distancing will be observed at both the Pre-bid Conference and the Bid Opening.

Bidding Documents will be available on or about December 31, 2021. Bidding Documents will be available to Bidders in electronic format (.pdf) free of charge. Interested Bidders may view and download bidding documents at www.anthonyessonarchitect.com. Select West Branch – Rose City Area Schools under the Bid Docs button.

As a construction project over $2,000, this Project is subject to the Davis-Bacon Act, 20 USC 1232b, and the Contractor is required to ensure that prevailing wages are paid in accordance with that Act and its implementing regulations.

Each Bidder shall include with its Bid, a sworn and notarized statement disclosing any familial relationships that exist between the owner or any employee of the Bidder and any member of the Board of Education of the Superintendent of the School District.

Compliance with the Iran Economic Sanctions Act (PA 517 of 2012) is required. Each Bidder shall include a sworn and notarized certification that they are not an "Iran Linked Business" as the term is defined in the Act.

A Bid security in the amount of no less than 5 percent of the Bid Sum in the form of a Bid Bond, or certified check payable to the Owner shall accompany each Bid. A personal or company check does not constitute a Bid security.

Refer to other bidding requirements described in Document 00 21 13.

Bids shall be submitted on the Bid Form provided in the Bidding Documents.

The successful Bidder will be required to furnish Performance and Labor/Material Payment Bonds in the amount of 100% of the contract amount.

Bids will be required to be submitted under a condition of irrevocability for a period of 60 days after submission.

The Owner reserves the right to accept or reject any or all Bids, either in whole or in part; to award the Contract to other than the lowest Bidder; to waive any irregularities and/or informalities; and in general to make awards in any manner deemed to be in the best interest of the Owner.

END OF DOCUMENT

DOCUMENT 00 21 13

INSTRUCTIONS TO BIDDERS

1.1 SUMMARY

A. Document Includes:
1. Bid submission.
2. Intent.
3. Work identified in contract documents.
4. Contract Time.
5. Definitions.
6. Contract Documents identification.
7. Availability of documents.
8. Examination of documents.
9. Inquiries and Addenda.
10. Product substitutions.
11. Site Examination.
12. Prebid conference.
13. Bidder qualifications.
14. Davis-Bacon Act, 20 USC 1232b
15. Subcontractors.
16. Submission procedure.
17. Bid ineligibility.
18. Security deposit.
19. Performance Assurance.
20. Bid Form requirements.
21. Fees for changes in the Work.
22. Bid Form signature.
23. Additional Bid Information.
24. Selection and Award of Alternates.
25. Bid opening.
26. Duration of offer.
27. Acceptance of offer.

B. Related Documents:
1. Document 00 11 16 - Invitation to Bid.
2. Document 00 41 13 - Bid Form - Stipulated Sum (Single-Prime Contract).
3. AIA Document A104–2017 Standard Abbreviated Form of Agreement Between Owner and Contractor
    a. Definitions.
    b. Contract Time identification.
    c. Contractors fees for changes.
    d. Contractor’s liability insurance.
    e. Bond types and values.

1.2 BID SUBMISSION

A. Bids signed, executed, and dated will be received by West Branch – Rose City Area Schools, c/o Phil Mikulski, Superintendent, until 1:00 PM local time on January 26, 2022. Bids are to be delivered to the West Branch Rose City Area Schools Central Office located at 960 S. M33, West Branch, MI 48661.

B. Bids submitted after the above time will be returned to Bidder unopened.

C. Amendments to submitted Bids will be permitted when received in writing prior to bid closing and when endorsed by the same party or parties who signed and sealed the Bid.

D. Bidders may withdraw their Bid by written request at any time before bid closing.

1.3 INTENT

A. The intent of this Bid request is to obtain an offer to perform work to complete replacement of designated HVAC equipment and controls in portions of the Surline Middle School building and replacement of controls in the Rose City Elementary Building for a Stipulated Sum contract, in accordance with Contract Documents.

1.4 WORK IDENTIFIED IN CONTRACT DOCUMENTS

A. Work of this proposed Contract comprises remodeling Work.

B. Location:
1. Surline Middle School; 147 State Street, West Branch, MI 48661.
2. Rose City Elementary Schools; 515 Harrington Street, Rose City, MI 48654.

1.5 CONTRACT TIME

A. The Owner requires the work of this contract be substantially complete and approved for occupancy by the authority having jurisdiction not later than August 19, 2022. Liquidated damages as identified in the agreement apply.

B. Contractor shall achieve Final Completion not later than thirty days after Substantial Completion. Liquidated damages as identified in the agreement apply.

1.6 DEFINITIONS

A. Bidding Documents: Contract Documents supplemented with Invitation to Bid, Instructions to Bidders, Bid Form, and bid securities, identified.

B. Contract Documents: Defined in AIA Document A107-2007, including issued Addenda.

C. Bid: Executed Bid Form and required attachments submitted in accordance with these Instructions to Bidders.

D. Bid Sum: Monetary sum identified by the Bidder in the Bid Form.

1.7 CONTRACT DOCUMENTS IDENTIFICATION

A. The Contract Documents are identified as AEA Project Number 263-18M; West Branch – Rose City Area Schools; SF1.5 Surline MS Two-Story HVAC Improvements and Rose City Elementary DDC Controls as prepared by Anthony P. Esson, Architect, PLLC.

1.8 AVAILABILITY OF DOCUMENTS

A. Bidding Documents may be obtained as stated in Invitation to Bid.

B. Bidding Documents are made available only for the purpose of obtaining offers for this Project. Their use does not grant a license for other purposes.

1.9 EXAMINATION OF DOCUMENTS

A. Bidding Documents may be viewed at the Architects website www.anthonyessonarchitect.com. Select West Branch – Rose City Area Schools under the Bid Docs button.

B. Upon receipt of Bidding Documents verify documents are complete. Notify Architect/Engineer if documents are incomplete.

C. Immediately notify Architect/Engineer upon finding discrepancies or omissions in Bidding Documents. When such discrepancies or omissions should be discovered through reasonable examination for the purpose of estimating, and are not brought to the Architect's attention and clarified prior to bidding, Bidder shall include and/or shall be deemed to have included the higher quantity or quality of Product or material, and/or more labor intensive or costly installation in the Bid.

D. Carefully review Drawings and Specifications. Contractor is responsible for the entire Work identified in the Contract Documents without regard to the specific location of the information within the Contract Documents.

1.10 INQUIRIES AND ADDENDA

A. Direct questions in writing to Anthony Esson, at the office of the Architect/Engineer; Email tony@anthonyessonarchitect.com.

B. Verbal answers are not binding on any party.

C. Submit questions not less than 3 business days before date set for receipt of Bids. Replies will be made by Addenda.

D. Addenda may be issued during bidding period. Addenda will be posted on the Architects website. Addenda become part of the Contract Documents. Include resultant costs in the Bid Sum.

1.11 PRODUCT SUBSTITUTIONS

A. Refer to Section 01 60 00 - Product Requirements for substitution procedures.

B. Where Bidding Documents stipulate particular Products with provisions for substitutions, substitution requests will be considered by Architect/Engineer up to 7 days before receipt of Bids.

C. With each substitution request, provide sufficient information for Architect/Engineer to determine acceptability of proposed products.

D. When a request to substitute a Product is made, Architect/Engineer may approve the substitution. Approved substitutions will be identified by Addenda.

E. In submission of substitutions to Products specified, Bidders shall include in their Bid, changes required in the Work and changes to Contract Time and Contract Sum to accommodate such approved substitutions. Later claims by the Bidder for an addition to the Contract Time or

Contract Sum because of changes in Work necessitated by use of substitutions will not be considered.

1.12 SITE EXAMINATION

A. Examine Project site before submitting a Bid.

1.13 PREBID CONFERENCE

A. A Pre-Bid Meeting will be conducted by the Owner and Architect/Engineer at 3:30 PM local time, Wednesday, January 12, 2022.

B. The meeting will convene in the Surline Middle School Cafeteria located at 147 State Street; West Branch, MI 48861.

C. The Pre-Bid Meeting will consist of a brief informational meeting followed by an opportunity for Bidders to examine the Project site.

D. Attendance is not mandatory, but is strongly encouraged.

E. Representatives of the Owner and Architect/Engineer will be in attendance.

F. Information relevant to Bidding Documents will be issued by Addendum.

1.14 BIDDER QUALIFICATIONS

A. To demonstrate qualification for performing the Work of this Contract, Bidders may be requested to submit written evidence of financial position, previous experience, current commitments, and license(s) to perform work.

1.15 DAVIS-BACON ACT 20 USC 123b

A. As a construction project over $2,000, this Project is subject to the Davis-Bacon Act, 20 USC 1232b, and the Contractor is required to ensure that prevailing wages are paid in accordance with that Act and its implementing regulations. Without limiting the breadth of the foregoing:
   1. Contractor shall pay all mechanics and laborers employed directly on the site of the work, unconditionally and at least once a week, and without subsequent deduction or rebate on any account, the full amounts accrued at time of payment, computed at wage rates not less than those stated in the advertised specifications, regardless of any contractual relationship which may be alleged to exist between the Contractor or subcontractor and the laborers and mechanics;
   2. Contractor shall post the scale of wages to be paid in a prominent and easily accessible place at the site of the work; and
   3. There may be withheld from the Contractor so much of accrued payments as the Owner considers necessary to pay to laborers and mechanics employed by the Contractor or subcontractors on the work the difference between the rates of wages required by the Agreement to be paid laborers and mechanics on the work and the rates of wages received by the laborers and mechanics and not refunded to the Contractor or subcontractors or their agents.

1.16 SUBCONTRACTORS

A. The Owner reserves the right to reject a proposed Subcontractor for reasonable cause.

B. Refer to AIA Document A104-2017.

1.17 SUBMISSION PROCEDURE

A. Bidders shall be solely responsible for delivery of Bids in manner and time prescribed.

B. Submit two copies of executed offer on Bid Forms provided, signed and sealed with required security deposit in a closed opaque envelope, clearly identified with Bidder’s name, Project name, and Owner's name on the outside.

C. An abstract summary of submitted Bids will be made available to all Bidders following bid opening.

1.18 BID INELIGIBILITY

A. Bids that are unsigned, improperly signed or sealed, conditional, illegible, obscure, contain arithmetical errors, erasures, alterations, or irregularities of any kind, may be declared unacceptable at Owner’s discretion.

B. Bid Forms, Appendices, and enclosures which are improperly prepared may be declared unacceptable at Owner’s discretion.

C. Failure to provide security deposit, bonds or insurance requirements may invalidate the Bid at the discretion of the Owner.

1.19 SECURITY DEPOSIT

A. Bids shall be accompanied by security deposit as follows:
   1. Bid Bond of a sum no less than 5 percent of the Bid Sum on standard surety company form.
   2. Certified check in the amount of 5% of the Bid Sum.

B. Endorse Bid Bond in name of the Owner as obligee, signed and sealed by the principal (Contractor) and surety.

C. Endorse certified check in name of the Owner.

D. Security deposits will be returned after execution of the agreement.

E. If no contract is awarded, security deposits will be returned.

1.20 PERFORMANCE ASSURANCE

A. Accepted Bidder: Provide a Performance and Payment bond as described in AIA Document A104-2017.

B. Include the cost of performance assurance bonds in the Bid Sum.

1.21 BID FORM REQUIREMENTS

A. Complete requested information in the Bid Form and Bid Form Supplements.

1.22 FEES FOR CHANGES IN THE WORK

A. When the Architect/Engineer establishes that the method of valuation for Changes in the Work will be net cost plus a percentage fee in accordance with General Conditions, the percentage fee allowed for Overhead and Profit shall be Ten Percent (10%) on the net cost of work by the General Contractor, and Ten Percent (10%) on the gross cost of work by a Subcontractor.

1.23 BID FORM SIGNATURE

A. Sign Bid Form, as follows:
   1. Sole Proprietorship: Signature of sole proprietor in the presence of a witness who will also sign. Insert the words "Sole Proprietor" under the signature.
   2. Partnership: Signature of all partners in the presence of a witness who will also sign. Insert the word "Partner" under each signature.
   3. Corporation: Signature of a duly authorized signing officers in their normal signatures. Insert the officer's capacity in which the signing officer acts, under each signature. If the Bid is signed by officials other than the president and secretary of the company, or the president/secretary/treasurer of the company, submit a copy of the by-law resolution of their board of directors authorizing them to do so, with the Bid Form in the bid envelope.
   4. Joint Venture: Signature of each party of the joint venture under their respective seals in a manner appropriate to such party as described above, similar to requirements for Partnerships.

1.24 ADDITIONAL BID INFORMATION

A. Familial Disclosure Statement
   1. Include Familial Disclosure Statement with the Bid.
   2. Complete all requested information in the affidavit.
   3. Signature of the affidavit shall be notarized.
   4. Failure of the Bidder to submit a fully executed affidavit will result in disqualification of the bidder.

B. Iran Economic Sanctions Act Compliance Affidavit
   1. Include Iran Economics Sanctions Act Compliance Affidavit with the Bid.
   2. Complete all requested information in the affidavit.
   3. Signature of the affidavit shall be notarized.
   4. Failure of the Bidder to submit a fully executed affidavit will result in disqualification of the bidder.

1.25 SELECTION AND AWARD OF ALTERNATES

A. Indicate variation of Bid Price for alternates listed in the Bid Form. Indicate "difference" in Bid Price by adding to or deducting from base Bid Price.

B. Bids will be evaluated on total of base Bid Price with full consideration of alternates.

1.26 BID OPENING

A. Bids will be opened immediately following the closure of the bidding period in the West Branch - Rose City Area School Central Office, 960 S. M33, West Branch, MI 48661.

1.27 DURATION OF OFFER

A. Bids shall remain open to acceptance and shall be irrevocable for a period of 60 days after bid closing date.

1.28 ACCEPTANCE OF OFFER

A. The Owner reserves the right to accept or reject any or all offers.

B. After acceptance by the Owner, the Architect/Engineer on behalf of the Owner, will issue to the accepted Bidder, a written letter of Contract Award.

C. Notwithstanding delay in the preparation and execution of the Agreement, accepted Bidder shall be prepared, upon written Notice to Proceed, to commence work within seven days following receipt of official written order of the Owner to proceed, or on date stipulated in such order.

D. The accepted bidder shall assist and cooperate with the Owner to prepare the Agreement, and within 7 days following its presentation shall execute Agreement and return it to the Owner.

END OF DOCUMENT

DOCUMENT 00 41 13

BID FORM – STIPULATED PRICE

To: West Branch – Rose City Area Schools
c/o Phil Mikulski, Superintendent
West Branch – Rose City Area Schools Central Office
960 S. M33
West Branch, Michigan 48661

Project: SF1.5 Surline MS Two-Story HVAC Improvements and
Rose City Elementary DDC Controls
Project No. 263-18M

Date: _____

Submitted by: _____
(full name)

(full address) _____

_____

Estimator: _____

Telephone: _____

1. OFFER

Having examined the Place of The Work and all matters referred to in the Instructions to Bidders and the Contract Documents for the above mentioned project, we, the undersigned, hereby offer to enter into a Contract to perform the Work for the

Stipulated Sum of: $_____(numerical)

$_____dollars in lawful (written) money of the United States of America.

- We have included the required security deposit as required by the Instruction to Bidders.
- All applicable federal and/or State of Michigan taxes are included in the Bid Sum.
- We have included the costs of all required construction permits and inspections in the Bid Sum.

- We have included all costs associated with compliance with terms listed in ATTACHMENT A TERMS OF CONTRACT FOR ESSER-FUNDED PROJECTS, including compliance with the Davis-Bacon Act, 20 USC 1232b, in the Bid Sum.

2. BID ALTERNATES

We offer the following Alternate Prices for specific portions of the Work as provided in the Contract Documents:

a. Bid Alternate 1: Add Classroom Air Conditioning equipment. ADD $_____.

3. ACCEPTANCE

This offer shall be open to acceptance and is irrevocable for sixty days from the bid closing date. If this bid is accepted by the Owner within the time period stated above, we will:

a. Execute the Agreement within seven (7) days of receipt of Notice of Award.

b. Commence work within seven (7) days after written Notice to Proceed.

If this bid is accepted within the time stated, and we fail to commence the Work or we fail to provide the required Bond(s), the security deposit shall be forfeited as damages to the Owner by reason of our failure, limited in amount to the lesser of the face value of the security deposit or the difference between this bid and the bid upon which a Contract is signed.

In the event our bid is not accepted within the time stated above, the required security deposit shall be returned to the undersigned, in accordance with the provisions of the Instructions to Bidders; unless a mutually satisfactory arrangement is made for its retention and validity for an extended period of time.

4. ADDENDA

The following Addenda have been received. The modifications to the Bid Documents noted below have been considered and all costs are included in the Bid Sum.

Addendum # _____ Dated _____

Addendum # _____ Dated _____

5. BID FORM SIGNATURE(S)

BIDDER:

_____

By: _____

Its: _____

If the Bid is a joint venture or partnership, add additional forms of execution for each member of the joint venture in the appropriate form or forms as above.

END OF BID FORM - STIPULATED PRICE

DOCUMENT 00 45 01

FAMILIAL DISCLOSURE STATEMENT

The undersigned, the owner or authorized officer of _____ (the "Bidder") pursuant to the familial disclosure requirement provided in the advertisement for construction bids, hereby represent and warrant, except as provided below, that no familial relationships exist between the owner(s) or any employee of the Bidder and any member of the Board of Education or the Superintendent of West Branch – Rose City Area Schools (the School), except as indicated below:

List any Familial Relationships:

BIDDER:

_____

By: _____

Its: _____

State of Michigan)
) SS
County of)

This instrument was acknowledged before me on the _____ day of _____, 20___, by

_____.

_____
, Notary Public

_____, County, Michigan

My Commission Expires: _____

Acting in the County of: _____

END OF FAMILIAL DISCLOSURE STATEMENT

DOCUMENT 00 45 02

IRAN ECONOMIC SANCTIONS ACT COMPLIANCE AFFIDAVIT

Effective April 1, 2013, all Bids and/or Proposals received by public entities in the State of Michigan must comply with the Iran Economic Sanctions Act, Act 517 of 2012. As a condition to compliance with the Act, the following certification must be submitted with the Bid.

The undersigned, the owner or authorized officer of _____ (the "Bidder"), pursuant to the requirements of the Iran Economic Sanctions Act, Act 517 of 2012, hereby certifies under civil penalty for false certification, that the Bidder is not an "Iran Linked Business", as defined in the Act, and is eligible to submit a Bid.

By: _____

Its: _____

State of Michigan)
) SS
County of)

This instrument was acknowledged before me on the _____ day of _____, 20__, by

_____.

_____
, Notary Public

_____, County, Michigan

My Commission Expires: _____

Acting in the County of: _____

END OF IRAN ECONOMIC SANCTIONS ACT COMPLIANCE AFFIDAVIT

DOCUMENT 00 52 14

AGREEMENT FORM - AIA STIPULATED SUM (SINGLE-PRIME CONTRACT)

1.1 SUMMARY

A. Document Includes:
   1. Agreement.

1.2 AGREEMENT

A. AIA Document A104-2017, Standard Abbreviated Form of Agreement Between Owner and Contractor as modified, forms the basis of Agreement Between the Owner and Contractor.

END OF DOCUMENT

AIA® Document A104™ – 2017

Standard Abbreviated Form of Agreement Between Owner and Contractor

AGREEMENT made as of the day of in the year 2022
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

West Branch-Rose City Area Schools
960 South M-33
West Branch, Michigan 48661

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

and the Contractor:
(Name, legal status, address and other information)

for the following Project:
(Name, location and detailed description)

West Branch-Rose City Area Schools
SF1.5 Surline MS Two Story HVAC Improvements and
Rose City Elementary School DDC Controls

The Architect:
(Name, legal status, address and other information)

Anthony P. Esson, Architect
P.O. Box 479
Gaylord, Michigan 49735

The Owner and Contractor agree as follows.

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21 CLAIMS AND DISPUTES

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ARTICLE 1 THE WORK OF THIS CONTRACT

The Contractor shall execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 2 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 2.1 The date of commencement of the Work shall be:
(Check one of the following boxes.)

[X] The date of this Agreement.

[ ] A date set forth in a notice to proceed issued by the Owner.

[ ] ~~Established as follows:~~

~~*(Insert a date or a means to determine the date of commencement of the Work.)*~~

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 2.2 The Contract Time shall be measured from the date of commencement.

§ 2.3 Substantial Completion

§ 2.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:

(Check the appropriate box and complete the necessary information.)

[ ] Not later than ( ) calendar days from the date of commencement of the Work.

[X] By the following date: August 19, 2022

~~**§ 2.3.2** Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:~~

Portion of Work	Substantial Completion Date

§ 2.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section ~~2.3, liquidated damages, if any, shall be assessed as set forth in Section 3.5.~~2.3 due to circumstances within the reasonable control of the Contractor, Owner may at their sole discretion hold Contractor responsible for costs that Owner would not have otherwise incurred. Such costs may be withheld from Progress payments or Final payment as applicable.

ARTICLE 3 CONTRACT SUM

§ 3.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be one of the following:

(Check the appropriate box.)

[X] Stipulated Sum, in accordance with Section 3.2 below

[ ] ~~Cost of the Work plus the Contractor's Fee, in accordance with Section 3.3 below~~

[ ] ~~Cost of the Work plus the Contractor's Fee with a Guaranteed Maximum Price, in accordance with Section 3.4 below~~

(Based on the selection above, complete Section 3.2, 3.3 or 3.4 below.)

§ 3.2 The Stipulated Sum shall be ($), subject to additions and deductions as provided in the Contract Documents.

§ 3.2.1 The Stipulated Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:

(State the numbers or other identification of accepted alternates. If the bidding or proposal documents permit the Owner to accept other alternates subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.)

To be determined

§ 3.2.2 Unit prices, if any:

(Identify the item and state the unit price and the quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit ($0.00)
None		

§ 3.2.3 Allowances, if any, included in the stipulated sum:
(Identify each allowance.)

~~Item~~	~~Price~~

~~**§ 3.3 Cost of the Work Plus Contractor's Fee**~~
~~**§ 3.3.1** The Cost of the Work is as defined in Exhibit A, Determination of the Cost of the Work.~~

~~**§ 3.3.2** The Contractor's Fee:~~
~~*(State a lump sum, percentage of Cost of the Work or other provision for determining the Contractor's Fee and the method of adjustment to the Fee for changes in the Work.)*~~

~~**§ 3.4 Cost of the Work Plus Contractor's Fee With a Guaranteed Maximum Price**~~
~~**§ 3.4.1** The Cost of the Work is as defined in Exhibit A, Determination of the Cost of the Work.~~

~~**§ 3.4.2** The Contractor's Fee:~~
~~*(State a lump sum, percentage of Cost of the Work or other provision for determining the Contractor's Fee and the method of adjustment to the Fee for changes in the Work.)*~~

~~**§ 3.4.3 Guaranteed Maximum Price**~~
~~**§ 3.4.3.1** The sum of the Cost of the Work and the Contractor's Fee is guaranteed by the Contractor not to exceed ($), subject to additions and deductions by changes in the Work as provided in the Contract Documents. This maximum sum is referred to in the Contract Documents as the Guaranteed Maximum Price. Costs which would cause the Guaranteed Maximum Price to be exceeded shall be paid by the Contractor without reimbursement by the Owner.~~
~~*(Insert specific provisions if the Contractor is to participate in any savings.)*~~

~~**§ 3.4.3.2** The Guaranteed Maximum Price is based on the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:~~
~~*(State the numbers or other identification of accepted alternates. If the bidding or proposal documents permit the Owner to accept other alternates subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.)*~~

~~**§ 3.4.3.3** Unit Prices, if any:~~
~~*(Identify the item and state the unit price and the quantity limitations, if any, to which the unit price will be applicable.)*~~

~~Item~~	~~Units and Limitations~~	~~Price per Unit ($0.00)~~

Item	Price
None	

~~§ 3.4.3.4 Allowances, if any, included in the Guaranteed Maximum Price:~~
~~*(Identify each allowance.)*~~

~~Item~~	~~Price~~

~~§ 3.4.3.5 Assumptions, if any, on which the Guaranteed Maximum Price is based:~~

~~§ 3.4.3.6 To the extent that the Contract Documents are anticipated to require further development, the Guaranteed Maximum Price includes the costs attributable to such further development consistent with the Contract Documents and reasonably inferable therefrom. Such further development does not include changes in scope, systems, kinds and quality of materials, finishes or equipment, all of which, if required, shall be incorporated by Change Order.~~

~~§ 3.4.3.7 The Owner shall authorize preparation of revisions to the Contract Documents that incorporate the agreed-upon assumptions contained in Section 3.4.3.5. The Owner shall promptly furnish such revised Contract Documents to the Contractor. The Contractor shall notify the Owner and Architect of any inconsistencies between the agreed-upon assumptions contained in Section 3.4.3.5 and the revised Contract Documents.~~

~~§ 3.5 Liquidated damages, if any:~~
~~(Insert terms and conditions for liquidated damages, if any.)~~

ARTICLE 4 PAYMENT

§ 4.1 Progress Payments

§ 4.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 4.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

§ 4.1.3 Provided that an Application for Payment is received by the Architect not later than the last day of a month, the Owner shall make payment of the ~~certified~~ Architect-certified amount to the Contractor not later than the ~~day of the month. If an~~ last day of the following month, unless and to the extent the Owner reasonably disputes the Application or Certification in good faith. If an Architect-certified Application for Payment is received by the ~~Architect~~ Owner after the date fixed above, ~~payment~~ undisputed payments shall be made by the Owner not later than thirty (30) days after the ~~Architect~~ Owner receives the certified Application for Payment.
(Federal, state or local laws may require payment within a certain period of time.)

§ 4.1.4 For each progress payment made prior to ~~Substantial~~ Final Completion of the Work, the Owner may withhold retainage from the payment ~~otherwise due as follows:~~in an amount not less than ten percent (10%),
(Insert a percentage or amount to be withheld as retainage from each Application for Payment and any terms for reduction of retainage during the course of the Work. The amount of retainage may be limited by governing law.)

§ 4.1.5 Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.
(Insert rate of interest agreed upon, if any.)

5 % Per Annum (See MCL 438.31)

§ 4.2 Final Payment

§ 4.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Section 18.2, and to satisfy other requirements, if any, which extend beyond final payment;

~~**.2** the Contractor has submitted a final accounting for the Cost of the Work, where payment is on the basis of the Cost of the Work with or without a Guaranteed Maximum Price; and~~

.3 a final Certificate for Payment has been issued by the Architect in accordance with Section 15.7.1.

§ 4.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after ~~the issuance of the~~ Owner's agreement to the Architect's final Certificate for Payment, or as follows:

ARTICLE 5 DISPUTE RESOLUTION

§ 5.1 Binding Dispute Resolution

For any claim subject to, but not resolved by, mediation pursuant to Section 21.5, the method of binding dispute resolution shall be as follows:
(Check the appropriate box.)

[ ] ~~Arbitration pursuant to Section 21.6 of this Agreement~~

[X] Litigation in a court of competent jurisdiction

[ ] ~~Other *(Specify)*~~

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, claims will be resolved in a court of competent jurisdiction.

ARTICLE 6 ENUMERATION OF CONTRACT DOCUMENTS

§ 6.1 The Contract Documents are defined in Article 7 and, except for Modifications issued after execution of this Agreement, are enumerated in the sections below.

§ 6.1.1 The Agreement is this executed AIA Document A104™–2017, Standard Abbreviated Form of Agreement Between Owner and Contractor.

§ 6.1.2 ~~AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:~~
~~*(Insert the date of the E203–2013 incorporated into this Agreement.)*~~

Terms and conditions listed in ATTACHMENT A TERMS OF CONTRACT FOR ESSER-FUNDED PROJECTS form part of this agreement

§ 6.1.3 The Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

§ 6.1.4 The Specifications:
(Either list the Specifications here or refer to an exhibit attached to this Agreement.)

Section	Title	Date	Pages
01 10 00	Summary	December 17, 2021	
01 20 00	Price and Payment Procedures	December 17, 2021	
01 30 00	Administrative Requirements	December 17, 2021	
01 33 00	Submittal Procedures	December 17, 2021	
01 40 00	Quality Requirements	December 17, 2021	
01 50 00	Temporary Facilities and Controls	December 17, 2021	
01 60 00	Product Requirements	December 17, 2021	
01 70 00	Execution and Closeout Requirements	December 17, 2021	
02 41 19	Selective Structure Demolition	December 17, 2021	3
04 05 03	Mortar and Masonry Grout	December 17, 2021	3
04 20 00	Unit Masonry Assemblies	December 17, 2021	4
05 31 23	Steel Roof Deck	December 17, 2021	3
05 50 00	Metal Fabrications	December 17, 2021	5
06 10 53	Miscellaneous Rough Carpentry	December 17, 2021	3
06 20 00	Finish Carpentry	December 17, 2021	3
07 72 33	Roof Hatches	December 17, 2021	3
07 84 00	Firestopping	December 17, 2021	4
08 31 13	Access Doors and Frames	December 17, 2021	2
09 24 00	Portland Cement Plaster	December 17, 2021	4
09 51 13	Acoustical Panels Ceilings	December 17, 2021	3
09 90 00	Painting and Coating	December 17, 2021	6
23 00 00	Mechanical General Provisions	December 17, 2021	9
23 00 10	Basic Mechanical Materials and Methods	December 17, 2021	6
23 05 10	Hydronic Piping	December 17, 2021	5
23 05 45	Chemical Water Treatment	December 17, 2021	3
23 05 53	Identification for HVAC Piping and Equipment	December 17, 2021	2
23 05 93	Testing, Adjusting and Balancing for HVAC Equipment	December 17, 2021	10
23 07 00	Thermal Insulation	December 17, 2021	3
23 09 00	Instrumentation and Control for HVAC	December 17, 2021	9
23 82 23	Unit Ventilators	December 17, 2021	5
23 83 00	Boilers	December 17, 2021	3
23 89 00	Duct Work	December 17, 2021	4
26 00 00	Electrical General Provisions	December 17, 2021	9
26 00 10	Basic Electrical Materials and Methods	December 17, 2021	7
26 05 26	Grounding and Bonding for Electrical Systems	December 17, 2021	2

26 05 29	Hangers and Supports for Electrical Systems	December 17, 2021	3
26 05 34	Conduit	December 17, 2021	4
26 24 16	Panelboards	December 17, 2021	2
26 51 00	Lighting Systems	December 17, 2021	3

§ 6.1.5 The Drawings:
(Either list the Drawings here or refer to an exhibit attached to this Agreement.)

SURLINE MIDDLE SCHOOL TWO STORY HVAC IMPROVEMENTS

Number	Title	Date
T	Title Sheet / Project Information	December 17, 2021
D0.1	Composite Floor Plan / Existing Conditions	December 17, 2021
D1.1	Floor Plans – Demolition / Part "C" Lower / Part "C" Upper	December 17, 2021
D2.1	Reflected Ceiling Plans – Demolition / Part "C" Lower / Part "C" Upper	December 17, 2021
A1.1	Floor Plans – New Work / Part "C" Lower / Part "C" Upper	December 17, 2021
A2.1	Reflected Ceiling Plans – New Work / Part "C" Lower / Part "C" Upper	December 17, 2021
A3.1	Room Finish Schedule / Miscellaneous Details	December 17, 2021
M1.1	Floor Plan Part "C" / Mechanical	December 17, 2021
M1.2	MS Boiler Replacement / Floor Plan - Mechanical	December 17, 2021
M5.1	Mechanical / Schedules and Details	December 17, 2021
M5.2	Mechanical / Schedules and Details	December 17, 2021
E1.1	Floor Plan Part "C" / Electrical	December 17, 2021
E2.1	MS Boiler Replacement / Floor Plan – Electrical	December 17, 2021
E5.1	Electrical / Schedules and Details	December 17, 2021

ROSE CITY ELEMENTARY SCHOOL DDC CONTROLS

Number	Title	Date
T	Title Sheet / Project Information	December 17, 2021
M1.1	Floor Plan Part "A" - Mechanical	December 17, 2021
M1.2	Floor Plan Part "B" - Mechanical	December 17, 2021

§ 6.1.6 The Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are enumerated in this Article 6.

§ 6.1.7 Additional documents, if any, forming part of the Contract Documents:

.1 Other Exhibits:
(Check all boxes that apply.)

[ ] ~~Exhibit A, Determination of the Cost of the Work.~~

[ ] ~~AIA Document E204™ 2017, Sustainable Projects Exhibit, dated as indicated below:~~
~~*(Insert the date of the E204-2017 incorporated into this Agreement.)*~~

_____

[ ] ~~The Sustainability Plan:~~

~~Title~~	~~Date~~	~~Pages~~

[ ] ~~Supplementary and other Conditions of the Contract:~~

~~Document~~	~~Title~~	~~Date~~	~~Pages~~

.2 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents.)

.1 Accepted portions of Contractor's Bid Response

The parties acknowledge that, due to the incorporation of several Contract Documents, the possibility exists (and is likely) that conflict or ambiguity may exist between or among the Contract Documents. In the event of any such conflict or ambiguity between or among the Contract Documents, the terms most beneficial to the Owner shall govern, as determined in the Owner's sole discretion.

ARTICLE 7 GENERAL PROVISIONS

§ 7.1 The Contract Documents

The Contract Documents are enumerated in Article 6 and consist of this Agreement (including, if applicable, Supplementary and other Conditions of the Contract), Drawings, Specifications, Addenda issued prior to the execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 7.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind between any persons or entities other than the Owner and the Contractor.

§ 7.3 The Work

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

§ 7.4 Instruments of Service

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

§ 7.5 Ownership and use of Drawings, Specifications and Other Instruments of Service

§ 7.5.1 ~~The~~ Except as otherwise provided herein or in the Agreement between Owner and Architect, the Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and will retain all common law, statutory and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 7.5.2 The Contractor, Subcontractors, Sub-subcontractors and suppliers are authorized to use and reproduce the Instruments of ~~Service provided to them,~~ Service, subject to the protocols established pursuant to Sections 7.6 and 7.7, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect's consultants.

~~**§ 7.6 Digital Data Use and Transmission**~~

~~The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.~~

~~**§ 7.7 Building Information Models Use and Reliance**~~

~~Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.~~

§ 7.5.3 The Drawings, Specifications, and other documents and all data used in compiling any tests, surveys, or inspections at the Project Site and the results therefrom, as well as all photographs, drawings, specifications, schedules, data processing output, computer-aided design/drafting (CADD) system disks/tapes, computations, studies, audits, reports, models and other items of like kind, and all intellectual property, prepared or created for or in connection with the Project and required by the Owner, the Contractor, or a third party, belong to the Owner. The Contractor may retain one record set. All copies of them, except Contractor's record set, shall be returned or suitably accounted for upon completion of the Work. They are for use solely with respect to the Project. The Contractor shall not, without the prior written consent of the Owner, use or permit anyone to use any Drawings, Specifications, or other documents prepared for or in connection with the Project, or any concepts or ideas developed in connection with the Project, for any purpose other than the Project. The Owner shall at all times have access to and control over the disposition of any Drawings, Specifications, and other documents pertaining to the Project.

§ 7.8 Severability

The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 7.9 Notice

§ 7.9.1 Except as otherwise provided in Section 7.9.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to ~~the designated~~ an appropriate representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission ~~in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:~~
~~(If other than in accordance with AIA Document E203–2013, insert requirements for delivering Notice in electronic format such as name, title and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)~~if an acknowledgement of receipt is received from the recipient or proof of receipt is otherwise established. The parties acknowledge that an appropriate representative of the Owner shall have authority only to the extent provided by the Owner's Board of Education.

§ 7.9.2 Notice of Claims shall be provided in writing and shall be deemed to have been duly served only if delivered to ~~the designated~~ an appropriate representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery. The parties acknowledge that the Owner's administrators, employees, representatives, and agents have authority only to the extent expressly provided by the Owner's Board of Education and that, by law, all parties dealing with the Owner must ascertain such authority before relying on the actions or representations purported or implied to be on behalf of the Owner.

~~**§ 7.10 Relationship of the Parties**~~

~~Where the Contract is based on the Cost of the Work plus the Contractor's Fee, with or without a Guaranteed Maximum Price, the Contractor accepts the relationship of trust and confidence established by this Agreement and covenants with the Owner to cooperate with the Architect and exercise the Contractor's skill and judgment in furthering the interests of the Owner; to furnish efficient business administration and supervision; to furnish at all times an adequate supply of workers and materials; and to perform the Work in an expeditious and economical manner consistent with the Owner's interests. The Owner agrees to furnish and approve, in a timely manner, information required by the Contractor and to make payments to the Contractor in accordance with the requirements of the Contract Documents.~~

ARTICLE 8 OWNER

§ 8.1 Information and Services Required of the Owner

§ 8.1.1 ~~Prior to commencement of the Work, at the written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 8.1.1, the Contract Time shall be extended appropriately.~~

§ 8.1.2 The Owner shall furnish all necessary surveys and a legal description of the site.

§ 8.1.3 The Contractor shall be entitled to rely on the accuracy of information furnished by the ~~Owner but~~ Owner, subject to its experience, expertise, and judgement, and shall exercise proper precautions relating to the safe performance of the Work. The Contractor acknowledges and agrees that the Architect is responsible for design, that the Owner has no duty to discover any design errors or omissions in the Drawings, Plans, Specifications and other Construction Documents or to notify Contractor of same, and that the Owner does not warrant the accuracy and adequacy of any Contract Documents.

§ 8.1.4 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, ~~including~~ including, but not limited to, those required under Section 9.6.1, the Owner shall secure and pay for other

necessary approvals, easements, assessments, and charges required for the construction, use, or occupancy of permanent structures or for permanent changes in existing facilities.

§ 8.2 Owner's Right to Stop the Work

If the Contractor fails to correct Work which is not in accordance with the requirements of the Contract Documents, or ~~repeatedly~~ fails to carry out the Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order is eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity. This right shall be in addition to and not in limitation of the Owner's rights under any provision of the Contract Documents.

§ 8.3 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents, and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to any other remedies the Owner may ~~have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the~~ have (including any claim against the Contractor's performance bond), correct such default or neglect. The Architect may, pursuant to Section 15.4.3, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including the Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 21.

ARTICLE 9 CONTRACTOR

§ 9.1 Review of Contract Documents and Field Conditions by Contractor

§ 9.1.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be ~~performed and correlated personal observations~~ performed, including but not limited to the location of utilities, and correlated personal observations and inspections with requirements of the Contract Documents.

§ 9.1.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 8.1.2, shall take field measurements of any existing conditions related to that portion of the Work and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies, or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional unless otherwise specifically provided in the Contract Documents.

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

§ 9.2 Supervision and Construction Procedures

§ 9.2.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters.

§ 9.2.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for or on behalf of the Contractor or any of its Subcontractors.

§ 9.2.3 The Contractor shall immediately notify the Architect of delays of any other Contractors that could impact timely coordination and completion of the Work. The Contractor shall be deemed to have accepted prior work when it commences provision of subsequent Work and shall be responsible for the cost of repair, replacement, or reconstruction if the prior work is found to be improper.

§ 9.3 Labor and Materials

§ 9.3.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 9.3.2 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them.

§ 9.3.3 The Contractor may make a substitution only with the consent of the Owner, after evaluation by the Architect and in accordance with a Modification.

§ 9.3.4 Asbestos-Free Product Installation

§ 9.3.4.1 It is hereby understood and agreed that no product and/or material containing asbestos, including chrysolite, amosite, crocidolite, tremolite asbestos, anthorphyllite asbestos, actinolite asbestos and any combination of these materials that have been chemically treated and/or altered shall be installed or introduced into the Work by the Contractor or its employees, agents, Subcontractors, or other individuals or entities over whom the Contractor has control. The Contractor shall be required to provide a signed certification statement ensuring that all products or materials installed or introduced into the Work will be asbestos-free.

§ 9.3.4.2 The Contractor also shall be required to furnish certified statements from the manufacturers of supplied materials used during construction verifying their products to be asbestos-free in accordance with the requirements of Section 9.3.4.1.

§ 9.3.4.3 The Contractor shall complete and submit to the Owner a certification evidencing asbestos-free product installation prior to issuance of the final Certificate for Payment in a form acceptable to the Owner.

§ 9.3.5 The Contractor agrees that neither it nor its Subcontractors will discriminate against any employee or applicant for employment, to be employed in the performance of this Contract, with respect to hire, tenure conditions or privilege of employment, or any matter directly or indirectly related to employment, because of race, age, sex, color, religion, national origin, ancestry or physical disability. Breach of this covenant may be regarded as a material breach of this Contract.

§ 9.4 Warranty

The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents expressly require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents expressly require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The ~~Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation or normal wear and tear under normal usage.~~ Contractor warrants that the Owner will have good title to the Work and all materials and equipment incorporated into the Work. The Contractor warrants that all Work and materials and equipment incorporated into the Work shall be fit for the purposes for which they were intended. The Contractor warrants that all Work and materials and equipment incorporated into the Work shall be merchantable. All other warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 15.6.3.

Upon notice of the breach of any of the foregoing warranties or guarantees or any other warranties or guarantees under the Contract Documents, the Contractor, in addition to any other requirements in the Contract Documents, will commence to correct such breach within 72 hours after written notice thereof and thereafter will use its best efforts to

correct such breach to the satisfaction of the Owner; provided that if such notice is given after final payment hereunder, such 72 hour period shall be extended to seven (7) days. The foregoing warranties and obligations of the Contractor shall survive the final payment and/or termination of the Contract.

The Contractor shall, at the time of final completion of the Work and as a condition precedent to final payment to the Contractor, assign to the Owner all manufacturers' warranties related to the materials and labor used in the Work. The Contractor further agrees to perform the Work in such manner as to preserve any and all such manufacturers' warranties and deliver to the Architect the warranties, project manuals, operating procedures, and other materials related to each of the building systems and materials included in the Contractor's Work and as required by the Specifications.

§ 9.5 Taxes

The Contractor shall pay sales, consumer, use, and other similar taxes that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect. The Contractor shall pay all local, state and federal taxes levied on its business, income or property and shall make all contributions for social security and other wage or payroll taxes. The Contractor shall be solely responsible for such payments and shall indemnify the Owner and hold it harmless from same.

§ 9.6 Permits, Fees, Notices, and Compliance with Laws

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

§ 9.6.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work. If the Contractor performs Work ~~knowing it to be~~ contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 9.7 Allowances

The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. The Owner shall select materials and equipment under allowances with reasonable promptness. Allowance amounts shall include the costs to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts. Contractor's costs for unloading and handling at the site, labor, installation, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowance.

§ 9.8 Contractor's Construction Schedules

§ 9.8.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

§ 9.8.2 The Contractor shall perform the Work in general accordance with the most recent schedule submitted to the Owner and Architect. The Contractor acknowledges and understands that the work schedule will be modified from time-to-time with the Owner's approval to coordinate with the work of others and that such schedule changes do not give rise to a claim for damages or additional compensation by the Contractor for delay or otherwise. The Contractor shall be required to conform to the most recent Owner-approved schedule and acknowledges that fact was taken into account when it agreed to the Contract Sum and entered into this Contract. The Contractor shall cooperate with the Architect and Owner in scheduling and performing the Contractor's Work to avoid conflict with, and as to cause no delay in, the work or activities of other contractors or the construction or operations of the Owner's own forces.

§ 9.9 Submittals

§ 9.9.1 The Contractor shall review for compliance with the Contract Documents and submit to the Architect Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents in coordination with the Contractor's construction schedule and in such sequence as to allow the Architect reasonable time for review. By

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

§ 9.9.2 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents.

§ 9.9.3 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents or unless the Contractor needs to provide such services in order to carry out the Contractor's own responsibilities. If professional design services or certifications by a design professional are specifically required, the Owner and the Architect will specify the performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional. If no criteria are specified, the design shall comply with applicable codes and ordinances. ~~Each~~ Subject to its professional skill, experience, and expertise (if applicable), and except as otherwise set forth in the Contract Documents, each Party shall be entitled to rely upon the information provided by the other Party. The Architect will review and approve or take other appropriate action on submittals for the limited purpose of checking for conformance with information provided and the design concept expressed in the Contract Documents. The Architect's review of Shop Drawings, Product Data, Samples, and similar submittals shall be for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. In performing such review, the Architect will approve, or take other appropriate action upon, the Contractor's Shop Drawings, Product Data, Samples, and similar submittals.

§ 9.10 Use of Site

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment. The Contractor will also consult with the Owner and Architect concerning necessary operations at the Project site to minimize construction impacts on the Owner, including but not limited to its educational operations.

§ 9.11 Cutting and Patching

The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly.

§ 9.12 Cleaning Up

The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus material from and about the Project.

§ 9.13 Access to Work

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

§ 9.14 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall indemnify and hold harmless the Owner and Architect ~~harmless from~~ from any and all cost, damage, or loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

§ 9.15 Indemnification

§ 9.15.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' ~~fees,~~ fees and the costs of correcting defective work, arising out of or resulting from performance of the Work, ~~provided that such claim, damage, loss, or expense is attributable to~~

~~bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself),~~ , but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, or the Contractor's breach of this Agreement, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Section 9.15.1.

§ 9.15.2 In claims against any person or entity indemnified under this Section 9.15 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 9.15.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

§ 9.15.3 In addition to and not in limitation of the Contractor's other indemnity obligations, the Contractor hereby accepts and assumes exclusive liability for and shall indemnify, protect, and hold harmless the Owner and Architect from and against the payment of the following:

.1 all loss by fines, penalties or corrective measures resulting from acts of the Contractor or omissions by the Contractor, its Subcontractors, agents, employees or assigns, with respect to the violation of safety requirements of this Contract, including reasonable attorney fees

.2 all contributions, taxes, or premiums (including interest and penalties thereof) which may be payable under the unemployment insurance law of any state, the federal Social Security Act, federal, state, county, and/or municipal tax withholding laws, or any other law, measured upon the payroll of or required to be withheld from employees by whomsoever employed, engaged in the Work to be performed and furnished under this Contract;

.3 all sales, use, personal property and other taxes (including interest and penalties thereof) required by any federal, state, county, municipal, or other law to be paid or collected by the Contractor or any of its Subcontractors or vendors or any other person or persons acting for, through or under it or any of them, by reason of the performance of the Work or the acquisition, ownership, furnishing, or use of any materials, equipment, supplies, labor, services, or other items for or in connection with the Work; and

.4 all pension, welfare, vacation, annuity, and other benefit contributions payable under or in connection with respect to all persons by whomsoever employed, engaged in the Work to be performed and furnished under this Contract.

.5 any claim, damage, loss or expense, including, but not limited to, actual attorney fees, incurred by the Owner related to any hazardous material or waste, toxic substance, pollution, or contamination brought into the Project site or caused by the Contractor or used, handled, transported, stored, removed, remediated, disturbed, or dispersed of by Contractor.

§ 9.15.4 In the event that any claim is made or asserted, or lawsuit filed for damages or injury arising out of or resulting from the performance of the Work, whether or not the Owner or Architect is named as a party, the Contractor shall immediately advise the Owner and Architect, in writing, of such claim or lawsuit and shall provide a full and complete copy of any documents or pleadings thereto, as well as a full and accurate report of the facts involved.

ARTICLE 10 ARCHITECT

§ 10.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction, until the date the Architect issues the final Certificate for ~~Payment.~~ Payment and with the Owner's written concurrence during the correction period. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents, unless otherwise modified in writing in accordance with other provisions of the Contract.

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

§ 10.3 The Architect will visit the site at intervals appropriate to the stage of the construction ~~to become generally~~ or more frequently as required by law, to become familiar with the progress and quality of the portion of the Work completed, and to determine ~~in general, if the Work observed is being performed in a manner indicating that~~ the Work, when fully completed, will be in accordance with the Contract Documents. ~~However, the Architect will not be~~

~~required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The~~ Except as otherwise set forth in the Owner/Architect Agreement, the Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences, or procedures, or for safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents. The Architect shall provide all services and duties that may be performed by an "Architect" or "Engineer" in 1937 PA 306 and 1980 PA 299, including but not limited to, construction supervision.

§ 10.4 On the basis of the site visits, the Architect will keep the Owner ~~reasonably~~ informed about the progress and quality of the portion of the Work completed, will guard the Owner against defects and deficiencies in the Work, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. ~~The~~ Except as required by the Owner/Architect Agreement, the Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of ~~and~~ and, except as provided in the Owner/Architect Agreement, will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work. The Architect shall provide all services and duties that may be performed by an "Architect" or "Engineer" in 1937 PA 306 and 1980 PA 299, including but not limited to, construction supervision.

§ 10.5 Based on the Architect's evaluations of the Work and of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 10.6 The Architect has authority to reject Work that does not conform to the Contract Documents and to require inspection or testing of the Work.

§ 10.7 The Architect will review and approve or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 10.8 The Architect will interpret ~~and decide~~ matters concerning performance under, and requirements of, the Contract Documents on written request of ~~either the Owner or Contractor.~~ the Owner. The Architect will make initial ~~decisions~~ interpretations on all claims, disputes, and other matters in question between the Owner and Contractor but will not be liable for results of any ~~interpretations or decisions~~ reasonable interpretations rendered in good faith.

§ 10.9 The Architect's ~~decisions on matters~~ interpretations relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

ARTICLE 11 SUBCONTRACTORS

§ 11.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site.

§ 11.2 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect in writing of the Subcontractors or suppliers proposed for each of the principal portions of the Work. The Contractor shall not contract with any Subcontractor or supplier to whom the Owner or Architect has made reasonable written objection within ten days after receipt of the Contractor's list of Subcontractors and suppliers. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, taking into consideration the Owner's or Architect's reasonable objection in good faith, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 11.3 Contracts between the Contractor and Subcontractors shall (1) require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by the terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by the Contract Documents, assumes toward the Owner and Architect, and (2) allow the Subcontractor the benefit of all rights, remedies and redress against the Contractor that the Contractor, by these Contract Documents, has against the Owner. The Contractor shall ensure that the Owner is made

an express third-party beneficiary of any agreement between the Contractor and Subcontractor (or between a Subcontractor and any sub-subcontractor) related to the Work.

ARTICLE 12 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 12.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to ~~insurance and waiver of subrogation.~~insurance.

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

§ 12.3 The Owner shall be reimbursed by the Contractor for costs incurred by the Owner which are payable to a Separate Contractor because of delays, improperly timed activities, or defective construction of the Contractor. ~~The Owner shall be responsible to the Contractor for costs incurred by the Contractor because of delays, improperly timed activities, damage to the Work, or defective construction of a Separate Contractor.~~

ARTICLE 13 CHANGES IN THE WORK

§ 13.1 By appropriate Modification, changes in the Work may be accomplished after execution of the Contract. The Owner, without invalidating the Contract, may order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, with the Contract Sum and Contract Time being adjusted accordingly. Such changes in the Work shall be authorized by written Contract amendment, written Change Order signed by the Owner, Contractor, and Architect, or by written Construction Change Directive signed by the Owner and Architect. Upon issuance of the Change Order or Construction Change Directive, the Contractor shall proceed promptly with such changes in the Work, unless otherwise provided in the Change Order or Construction Change Directive.

§ 13.2 Adjustments in the Contract Sum and Contract Time resulting from a change in the Work shall be determined by mutual agreement of the parties or, in the case of a Construction Change Directive signed only by the Owner and Architect, by the Contractor's cost of labor, material, equipment, and reasonable overhead and profit, unless the parties agree on another method for determining the cost or credit. Pending final determination of the total cost of a Construction Change Directive, the Contractor may request payment for Work completed pursuant to the Construction Change Directive. The ~~Architect~~ Architect, with the Owner's approval, will make an interim determination of the amount of payment due for purposes of certifying the Contractor's monthly Application for Payment. When the Owner and Contractor agree on adjustments to the Contract Sum and Contract Time arising from a Construction Change Directive, the Architect will prepare a Change Order. If the parties cannot agree on a final adjustment to the Contract Sum and/or Contract Time, the Contractor's sole remedy is to timely file a Claim in accordance with this Agreement.

§ 13.3 The Architect will have authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes shall be effected by written order and shall be binding on the Owner and Contractor. The Contractor shall carry out such written orders promptly. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall either: (i) timely file a Claim in accordance with this Agreement, or (ii) notify the Owner and the Architect in writing and shall not proceed to implement the change in the Work.

§ 13.4 If concealed or unknown physical conditions are encountered at the site that differ materially from those indicated in the Contract Documents or from those conditions ordinarily found to exist, the ~~Contract Sum and Contract Time shall be equitably~~ Contractor shall timely provide written notice to the Owner and Architect before conditions are disturbed, including such notice as required by 1998 PA 57, which is incorporated herein by reference. If appropriate, the Contract Sum and Contract Time may be adjusted as mutually agreed between the Owner and ~~Contractor; provided that the Contractor provides notice to the Owner and Architect promptly and before conditions are disturbed.~~Contractor.

ARTICLE 14 TIME

§ 14.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing this Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

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

§ 14.3 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 14.4 The date of Substantial Completion is the date certified by the Architect in accordance with Section 15.6.3.

§ 14.5 ~~If~~ Provided the Contractor timely and properly submits a Claim as required by this Agreement, if the Contractor is delayed at any time in the commencement or progress of the Work by (1) changes ordered in the Work; (2) by ~~labor disputes, fire, unusual delay in deliveries,~~ fire, significant abnormal adverse weather conditions not reasonably anticipatable, unavoidable casualties, or any causes beyond the Contractor's control; or (3) by other causes that the Contractor asserts, and the Owner and Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine, subject to the provisions of Article 21. In the event the Contractor is hindered in the commencement or progress of the Work by someone other than the Owner, and in the event the Contractor claims damages as a direct and proximate consequence thereof (including, but not limited to, extended general conditions, overhead, profit, overtime, interest, supervision or other costs or profits whatsoever), then the Contractor shall not assert such claims against the Owner, and as to the Owner, the Contractor's claims of delay damages are hereby waived. The Contractor's sole and exclusive remedy regarding such claims for such delay damages shall be to pursue such claims directly against the individual or entity which caused the delay.

For any delay claims raised against the Owner, the Contractor's sole and exclusive remedy is an extension of time to perform the Work not to exceed the time frame of any proven delay. Under no circumstances is the Contractor entitled to monetary delay damages from the Owner.

ARTICLE 15 PAYMENTS AND COMPLETION

§ 15.1 Schedule of Values

§ 15.1.1 ~~Where the Contract is based on a Stipulated Sum or the Cost of the Work with a Guaranteed Maximum Price pursuant to Section 3.2 or 3.4, the~~ The Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Stipulated Sum or Guaranteed Maximum Price to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy required by the Architect. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 15.1.2 The allocation of the Stipulated Sum or Guaranteed Maximum Price under this Section 15.1 shall not constitute a separate stipulated sum or guaranteed maximum price for each individual line item in the schedule of values.

~~**§ 15.2 Control Estimate**~~

~~**§ 15.2.1** Where the Contract Sum is the Cost of the Work, plus the Contractor's Fee without a Guaranteed Maximum Price pursuant to Section 3.3, the Contractor shall prepare and submit to the Owner a Control Estimate within 14 days of executing this Agreement. The Control Estimate shall include the estimated Cost of the Work plus the Contractor's Fee.~~

~~**§ 15.2.2** The Control Estimate shall include:~~

- ~~**.1** the documents enumerated in Article 6, including all Modifications thereto;~~
- ~~**.2** a list of the assumptions made by the Contractor in the preparation of the Control Estimate to supplement the information provided by the Owner and contained in the Contract Documents;~~
- ~~**.3** a statement of the estimated Cost of the Work organized by trade categories or systems and the Contractor's Fee;~~
- ~~**.4** a project schedule upon which the Control Estimate is based, indicating proposed Subcontractors, activity sequences and durations, milestone dates for receipt and approval of pertinent information,~~

~~schedule of shop drawings and samples, procurement and delivery of materials or equipment, the Owner's occupancy requirements, and the date of Substantial Completion; and~~

~~.5 a list of any contingency amounts included in the Control Estimate for further development of design and construction.~~

~~**§ 15.2.3** When the Control Estimate is acceptable to the Owner and Architect, the Owner shall acknowledge it in writing. The Owner's acceptance of the Control Estimate does not imply that the Control Estimate constitutes a Guaranteed Maximum Price.~~

~~**§ 15.2.4** The Contractor shall develop and implement a detailed system of cost control that will provide the Owner and Architect with timely information as to the anticipated total Cost of the Work. The cost control system shall compare the Control Estimate with the actual cost for activities in progress and estimates for uncompleted tasks and proposed changes. This information shall be reported to the Owner, in writing, no later than the Contractor's first Application for Payment and shall be revised and submitted with each Application for Payment.~~

~~**§ 15.2.5** The Owner shall authorize preparation of revisions to the Contract Documents that incorporate the agreed-upon assumptions contained in the Control Estimate. The Owner shall promptly furnish such revised Contract Documents to the Contractor. The Contractor shall notify the Owner and Architect of any inconsistencies between the Control Estimate and the revised Contract Documents.~~

§ 15.3 Applications for Payment

§ 15.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of ~~values, if required under Section 15.1,~~ values for completed portions of the Work. The application shall be notarized, if required; be supported by all data substantiating the Contractor's right to payment that the Owner or Architect require; shall reflect retainage if provided for in the Contract ~~Documents; and include any revised cost control information required by Section 15.2.4.~~ Documents. Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 15.3.2 ~~With each Application for Payment where the Contract Sum is based upon the Cost of the Work, or the Cost of the Work with a Guaranteed Maximum Price, the Contractor shall submit payrolls, petty cash accounts, receipted invoices or invoices with check vouchers attached, and any other evidence required by the Owner to demonstrate that cash disbursements already made by the Contractor on account of the Cost of the Work equal or exceed progress payments already received by the Contractor plus payrolls for the period covered by the present Application for Payment, less that portion of the progress payments attributable to the Contractor's Fee.~~

§ 15.3.3 Payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment stored, and protected from damage, off the site at a location agreed upon in writing. Off-site storage by the Contractor is discouraged.

§ 15.3.4 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or other encumbrances adverse to the Owner's interests.

§ 15.3.4.1 Each Contractor Application for Payment shall be accompanied by (1) an Affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which previous Applications for Payment have been submitted and for which the Owner might in any way be responsible have been paid or otherwise satisfied, and (2) a release or waiver of liens from the Contractor and each of its Subcontractors, materialman, suppliers and laborers addressing all previous Applications for Payment submitted for the Project.

§ 15.4 Certificates for Payment

§ 15.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner of the Architect's reasons for withholding certification in whole or in part as provided in Section 15.4.3.

§ 15.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluations of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the ~~Architect. However,~~ Architect, in writing, together with the certification to which it pertains. However, unless otherwise required by the Owner/Architect Agreement, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 15.4.3 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 15.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 15.4.1. If the Contractor and the Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 9.2.2, because of

.1 defective Work not ~~remedied;~~remedied, or the Contractor is in default on the Agreement;
.2 third-party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;
.3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
.5 damage to the Owner or a Separate Contractor;
.6 reasonable evidence that the Work will not be completed within the Contract Time and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; ~~or~~
.7 ~~repeated~~ failure to carry out the Work in accordance with the Contract ~~Documents.~~Documents
.8 the Work not having progressed to the extent set forth in the Application for Payment;
.9 representations of the Contractor are untrue;
.10 failing to conform to Project Schedule;
.11 default in the performance of any obligation to the Owner under another contract; or
.12 failure to provide sufficiently skilled workers.

§ 15.4.4 When ~~either party~~ the Contractor disputes the Architect's decision regarding a Certificate for Payment under Section 15.4.3, in whole or in part, ~~that party~~ the Contractor may submit a Claim in accordance with Article 21.

§ 15.4.5 If the Contractor disputes any determination by the Owner or Architect with regard to any Certificate for Payment, the Contractor shall nevertheless continue to expeditiously perform the Work and such dispute shall provide no basis for any manner of suspension of the Contractor's performance of the Work.

§ 15.4.6 Notwithstanding anything herein to the contrary, the Owner has no obligation to pay the Contractor absent receipt of a Certificate for Payment for the requested amount, and neither the Architect's failure to issue a Certificate for Payment nor the Architect's failure to notify the Contractor and/or Owner of a withheld Certificate for Payment creates an obligation on the Owner to pay the Contractor. The foregoing sentence shall not operate to limit the right of the Owner to dispute amounts requested by the Contractor or to withhold payments from the Contractor as provided in the Contract Documents.

§ 15.5 Progress Payments

§ 15.5.1 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to sub-subcontractors in a similar manner.

§ 15.5.2 Neither the Owner nor Architect shall have an obligation to pay or see to the payment of money to a Subcontractor or supplier except as may otherwise be required by law.

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

§ 15.5.4 ~~Provided the Owner has fulfilled its payment obligations under the Contract Documents, the~~ The Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 15.6 Substantial Completion

§ 15.6.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents and when all required occupancy permits, if any, have been issued, so that the Owner can occupy or utilize the Work for its intended use.

§ 15.6.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final ~~payment.~~ payment (a "punch list"). Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 15.6.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. The Contractor shall respond immediately to correct Work deficiencies and/or punch list items. Should the Contractor fail to make corrections in a timely fashion, but not later than fifteen (15) calendar days from the date of Substantial Completion or notification of the required corrections, whichever is earlier, such Work may be corrected by the Owner at the Contractor's sole expense, and any remaining payments due the Contractor shall be withheld by the Owner. The Contractor shall promptly notify the Architect, in writing, when the Work deficiencies and/or punch list items are completed. Upon the review of the Work by the Architect after such notification by the Contractor, if Work deficiencies and/or punch list items shall continue to exist, the Contractor shall reimburse the Owner its cost plus ten percent (10%) overhead and profit on any cost incurred by the Owner, including the Architect's fees for re-inspection of the Work. Failure to pay such costs within ten (10) days of receipt of a demand regarding the same shall permit the Owner to pay such costs out of retainage held by the Owner on the Contractor's contract. When the Architect determines that the Work or designated portion thereof is substantially complete, the Architect will issue a Certificate of Substantial Completion which shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 15.6.4 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 15.7 Final Completion and Final Payment

§ 15.7.1 Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect

will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions stated in Section 15.7.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 15.7.2 Final payment shall not become due until the Contractor has delivered to the Owner ~~a complete release of all liens arising out of this Contract or receipts in full covering all labor, materials and equipment for which a lien could be filed, or a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including costs and reasonable attorneys' fees.~~(1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, (6) an affidavit that states the Work is fully completed and performed in accordance with the Contract Documents, (7) in the event of Contractor bankruptcy, at the Owner's option, an order entered by the court having jurisdiction of the Contractor's insolvency proceeding authorizing such payment, (8) a general release executed by the Contractor on a form provided by the Architect, (9) all close-out documents, (10) all warranties collected and provided in an acceptable manner, and (11) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner.

§ 15.7.3 The making of final payment shall not constitute a waiver of claims by the ~~Owner except those arising from~~

~~.1 liens, claims, security interests or encumbrances arising out of the Contract and unsettled;~~

~~.2 failure of the Work to comply with the requirements of the Contract Documents;~~

~~.3 terms of special warranties required by the Contract Documents; or~~

~~.4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.~~Owner.

§ 15.7.4 Acceptance of final payment by the Contractor, a Subcontractor or supplier shall constitute a waiver of claims by ~~that payee~~ the Contractor except those previously made in writing and identified by ~~that payee~~ the Contractor as unsettled at the time of the final Application for ~~Payment.~~Payment and specifically referenced as being an exception to the waiver contained in this Section 15.7.4.

ARTICLE 16 PROTECTION OF PERSONS AND PROPERTY

§ 16.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract. The Contractor shall take ~~reasonable precautions~~ every reasonable precaution for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

.1 employees on the Work and other persons who may be affected thereby;

.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and

.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation, or replacement in the course of construction.

The Contractor shall take all reasonable safety precautions with respect to the Work, shall comply with all industry standard safety measures, shall comply with all applicable laws, including but not limited to compliance with, and give notices required by, applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons and property and their protection from damage, injury, or loss. The Contractor shall promptly remedy damage and loss to property caused in whole or in part by the Contractor, a Subcontractor, a sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is ~~responsible~~ responsible, including but not limited to, under Sections 16.1.2 and 16.1.3. The Contractor may make a timely claim as permitted by this Agreement for the cost to

remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of ~~the Owner or Architect or by anyone for whose acts either of them may be liable,~~ others, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 9.15.

§ 16.2 ~~Hazardous Materials and Substances~~If the Contractor or any Subcontractor chooses to use any systems, equipment, facilities, or services which have been incorporated in the Project as a permanent part thereof by any other, the Contractor shall assume full responsibility for damages caused to said systems, equipment, facilities or services, and have damages repaired as required, so that in no case will the performance of the used systems, equipment, facilities or services be diminished from the specified criteria as a result of such use.

§ 16.3 The Contractor acknowledges that the safety of the Owner's students, employees and guests is of the utmost importance. The Contractor will take no action which would jeopardize the safety of the Owner's students, employees and guests and, without the Owner's written approval, shall take no action which would interfere with the Owner's activities. Without limiting the foregoing sentence, the Contractor shall comply with all laws applicable to student and/or school safety.

§ 16.4 Notification of Utility Companies

§ 16.4.1 At least five (5) working days prior to the start of work in areas which may involve existing utility lines, the Contractor shall notify the MISS DIG notification system, as legally required and, if applicable, any Registered Utility Protection Service of the utility company possibly affected by the planned work by certified mail with return receipt requested.

§ 16.4.2 The utility company should, upon receipt of notice, stake, mark or otherwise designate the location (and depth) of their lines, or temporarily move the line(s).

§ 16.4.3 The Contractor shall immediately report to the respective utility company any break or leak in its lines, or any dent, gouge, groove or other damage to the utility line or to its coating or cathodic protection made or discovered in the course of the Work.

§ 16.4.4 The Contractor shall immediately alert the Owner, Architect and occupants of nearby premises of any and all emergencies caused or discovered in the utility line(s) in the course of the Work.

§ 16.5 Security

§ 16.5.1 All construction participants, including the Contractor, Architect, Subcontractors, etc., shall cooperate with the Owner's security personnel and shall comply with all of the Owner's security requirements. Such requirements shall include, without limitation, if requested by the Owner, delivering to the Owner's security personnel, prior to the commencement of the Work on each day, a list of all personnel who will be permitted access to the Work. The foregoing, however, shall not relieve the Contractor of any obligation to provide a safe and secure workplace for all parties entering the Project Site. The Contractor shall be responsible to implement commercially reasonable data security protection measures to protect the Owner's networks and data when performing technology-related Work.

§ 16.6 Fire Protection

§ 16.6.1 The Contractor shall maintain free access to the building areas for firefighting equipment and shall at no time block off main roadways or fire aisles without providing adequate auxiliary roadways and means of entrance for firefighting equipment, including heavy fire department trucks, where applicable.

§ 16.6.2 The Contractor shall at all times cooperate with the Owner and kept the municipal fire department informed of the means of entrance and changes to the roadways or fire aisles as needed to provide fire department access to or around the Project Site.

§ 16.6.3 The Contractor shall, during the entire construction period and until the completion of the Work, provide and maintain all material, equipment, and services necessary for an adequate fire protection system, which shall meet the approval of the Owner and/or the Architect. The system shall, at a minimum, meet the requirements set forth in the Contract Documents and of applicable laws. These requirements shall be augmented and/or the installations relocated, as may be necessary to meet, at all time, the demands of adequate protection in all areas and shall not be reduced prior to the completion of the Work with the written approval of the Owner and/or the Architect.

§ 16.2 Hazardous Materials and Substances

§ 16.2.1 The Contractor is responsible for compliance with the requirements of the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents, and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect in writing of the condition. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately ~~and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of~~ to address shutdown, delay, and start-up.

§ 16.2.2 ~~To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area, if in fact, the material or substance presents the risk of bodily injury or death as described in Section 16.2.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.~~

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

ARTICLE 17 INSURANCE AND BONDS

§ 17.1 Contractor's Insurance

§ 17.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as required by law and as otherwise described in this Section 17.1 or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the insurance required by this Agreement from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 18.4, unless a different duration is stated below:

§ 17.1.2 Commercial General Liability insurance for the Project written on an occurrence form with policy limits of not less than one million dollars ($ 1,000,000.00) each occurrence, two million dollars ($ 2,000,000.00) general aggregate, and two million dollars ($ 2,000,000.00) aggregate for products-completed operations hazard, providing coverage for claims including

- **.1** damages because of bodily injury, sickness or disease, including occupational sickness or disease, and death of any person;
- **.2** personal and advertising injury;
- **.3** damages because of physical damage to or destruction of tangible property, including the loss of use of such property;
- **.4** bodily injury or property damage arising out of completed operations; and
- **.5** the Contractor's indemnity obligations under Section 9.15.

§ 17.1.3 Automobile Liability covering vehicles owned by the Contractor and non-owned vehicles used by the Contractor, with policy limits of not less than one million dollars ($ 1,000,000.00) per accident, for bodily injury, death of any person, and property damage arising out of the ownership, maintenance, and use of those motor vehicles along with any other statutorily required automobile coverage.

§ 17.1.4 The Contractor may achieve the required limits and coverage for Commercial General Liability and Automobile Liability through a combination of primary and excess or umbrella liability insurance, provided such primary and excess or umbrella insurance policies result in the same or greater coverage as those required under Section 17.1.2 and 17.1.3, and in no event shall any excess or umbrella liability insurance provide narrower coverage

than the primary policy. The excess policy shall not require the exhaustion of the underlying limits only through the actual payment by the underlying insurers.

§ 17.1.5 Workers' Compensation at statutory limits.

§ 17.1.6 Employers' Liability with policy limits not less than one million dollars ($ 1,000,000.00) each accident, one million dollars ($ 1,000,000.00) each employee, and one million dollars ($ 1,000,000.00) policy limit.

~~**§ 17.1.7** If the Contractor is required to furnish professional services as part of the Work, the Contractor shall procure Professional Liability insurance covering performance of the professional services, with policy limits of not less than ($) per claim and ($) in the aggregate.~~

~~**§ 17.1.8** If the Work involves the transport, dissemination, use, or release of pollutants, the Contractor shall procure Pollution Liability insurance, with policy limits of not less than ($) per claim and ($) in the aggregate.~~

~~**§ 17.1.9** Coverage under Sections 17.1.7 and 17.1.8 may be procured through a Combined Professional Liability and Pollution Liability insurance policy, with combined policy limits of not less than ($) per claim and ($) in the aggregate.~~

§ 17.1.10 The Contractor shall provide certificates of insurance acceptable to the Owner evidencing compliance with the requirements in this Section 17.1 at the following times: (1) prior to commencement of the Work; (2) upon renewal or replacement of each required policy of insurance; and (3) upon the Owner's written request. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment and thereafter upon renewal or replacement of such coverage until the expiration of the period required by Section 17.1.1. The certificates will show the Owner as an additional insured on the Contractor's Commercial General Liability and excess or umbrella liability ~~policy.~~policy and that the Contractor's insurance shall be primary.

§ 17.1.11 The Contractor shall disclose to the Owner any deductible or self- insured retentions applicable to any insurance required to be provided by the Contractor.

§ 17.1.12 To the fullest extent permitted by law, the Contractor shall cause the commercial liability coverage required by this Section 17.1 to include (1) the Owner, the Architect, and the Architect's Consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions for which loss occurs during completed operations. The additional insured coverage shall be primary and non-contributory to any of the Owner's general liability insurance policies and shall apply to both ongoing and completed operations. ~~To the extent commercially available, the~~ The additional insured coverage shall be no less than that provided by Insurance Services Office, Inc. (ISO) forms CG 20 10 07 04, CG 20 37 07 04, and, with respect to the Architect and the Architect's Consultants, CG 20 32 07 04. The Contractor shall require such insurance company to add to the policy the following clause: "The insurance afforded to the Additional Insured is primary insurance. If the Additional Insureds have other insurance which is applicable to the loss on an excess or contingent basis, the amount of the insurance company's liability under this policy shall not be reduced by the existence of such other insurance."

§ 17.1.13 ~~Within three (3) business days of the date~~ Immediately after the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by this Section 17.1, but in no event less than three days after becoming aware or the coverage actually lapsing, the Contractor shall provide notice to the Owner of such impending or actual cancellation or ~~expiration. Upon~~ expiration, including the Contractor's plan to immediately procure replacement insurance as required by the Contract Documents to avoid any lapse in coverage. Contractor's failure to do so is a material breach of this Agreement, shall entitle the Owner to purchase replacement insurance at Contractor's sole cost, and shall subject the Contractor to any and all damages related to its failure to comply with its required insurance obligations. Further, upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right (but not the obligation) to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 17.1.14 Other Insurance Provided by the Contractor

(List below any other insurance coverage to be provided by the Contractor and any applicable limits.)

Coverage	Limits

§ 17.2 Owner's Insurance

§ 17.2.1 Owner's Liability Insurance

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

§ 17.2.2 Property Insurance

§ 17.2.2.1 The Owner shall purchase and maintain, from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located, property insurance written on a builder's risk "all-risks" completed value or equivalent policy form and sufficient to cover the total value of the entire Project on a replacement cost basis. The Owner's property insurance coverage shall be no less than the amount of the initial Contract Sum, plus the value of subsequent Modifications and labor performed or materials or equipment supplied by others. The property insurance shall be maintained until Substantial ~~Completion and thereafter as provided in Section 17.2.2.2,~~ Completion, unless otherwise provided in the Contract Documents or otherwise agreed in writing by the parties to this Agreement. This insurance shall include the interests of the Owner, Contractor, Subcontractors, and Sub-subcontractors in the Project as insureds. This ~~insurance shall include the interests of mortgagees as loss payees.~~ policy will exclude any tools, equipment, scaffolding, glass breakage, etc., owned or rented by the Contractor or Subcontractors and materials stored on the site, but not incorporated into the Project. The Contractor shall be responsible for protecting all product until the Date of Final Completion is established by the Architect. The Contractor shall replace any Work if damaged before Final Completion. The Contractor may assume the risk itself or obtain insurance in amounts it deems sufficient.

§ 17.2.2.2 ~~Unless the parties agree otherwise, upon Substantial Completion, the Owner shall continue the insurance required by Section 17.2.2.1 or, if necessary, replace the insurance policy required under Section 17.2.2.1 with property insurance written for the total value of the Project that shall remain in effect until expiration of the period for correction of the Work set forth in Section 18.4.~~

§ 17.2.2.3 If the insurance required by this Section 17.2.2 is subject to deductibles or self-insured retentions, the ~~Owner~~ party causing the insurable event shall be responsible for all loss not covered because of such deductibles or retentions.

§ 17.2.2.4 If the Work involves remodeling an existing structure or constructing an addition to an existing structure, the Owner shall purchase and maintain, until the expiration of the period for correction of Work as set forth in Section 18.4, "all-risks" property insurance, on a replacement cost basis, protecting the existing structure against direct physical loss or damage, notwithstanding the undertaking of the Work. ~~The Owner shall be responsible for all co-insurance penalties.~~

§ 17.2.2.5 Prior to commencement of the Work, the Owner shall secure the insurance, and provide evidence of the coverage, required under this Section 17.2.2 and, upon the Contractor's request, provide a copy of the property insurance policy or policies required by this Section 17.2.2. The copy of the policy or policies provided shall contain all applicable conditions, definitions, exclusions, and endorsements.

§ 17.2.2.6 Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any insurance required by this Section 17.2.2, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; and (2) the Contract Time and Contract Sum shall be ~~equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled.~~ negotiated . If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 17.2.2.7 Waiver of Subrogation

§ 17.2.2.7.1 ~~The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by this Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this Section 17.2.2.7 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.~~ Superior to any other provision herein or elsewhere in the Contract Documents, any references to "waiver of subrogation" or such similar provisions are hereby deleted and shall be declared to have no effect.

§ 17.2.2.7.2 ~~If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 17.2.2.7.1 for damages caused by fire or other causes of loss covered by this separate property insurance.~~

§ 17.2.2.8 A loss insured under the Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements, written where legally required for validity, the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 17.2.3 Other Insurance Provided by the Owner

(List below any other insurance coverage to be provided by the Owner and any applicable limits.)

Coverage	Limits
Not Applicable	

§ 17.3 Performance Bond and Payment Bond

§ 17.3.1 The ~~Owner shall have the right to require the Contractor~~ Contractor shall be required to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in the Contract Documents on the date of execution of the Contract. The bonds shall each be in the amount of 100% of the Contract Sum and otherwise comply with the terms of MCL 129.201, et seq.

§ 17.3.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

ARTICLE 18 CORRECTION OF WORK

§ 18.1 The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed, or completed. Costs of correcting such rejected Work, including work of other Contractors or Subcontractors, compensation of consultants, any delay or related damages, attorneys' fees incurred by the Owner, additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's ~~expense, unless compensable under Section A.1.7.3 in Exhibit A, Determination of the Cost of the Work.~~expense. The Owner shall have the right to charge the Contractor for any such costs and expenses and to deduct such amounts from any future payments due the Contractor.

§ 18.2 In addition to the Contractor's obligations under Section 9.4, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 15.6.3, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. ~~During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty.~~

§ 18.3 If the Contractor fails to correct nonconforming Work within a reasonable time, the Owner may correct it in accordance with Section 8.3.

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

§ 18.5 The one-year period for correction of Work shall ~~not~~ be extended by corrective Work performed by the Contractor pursuant to this Article ~~18.~~18 for a period of one-year beyond completion of the corrective Work.

ARTICLE 19 MISCELLANEOUS PROVISIONS

§ 19.1 Assignment of Contract

Neither party to the Contract shall assign the Contract without written consent of the other, except that the Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

§ 19.2 Governing Law

The Contract shall be governed by the law of the ~~place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 21.6.~~State of Michigan in all respects, except that Claims and causes of action brought by the Owner shall not be deemed untimely if filed within six (6) years of Substantial Completion of the entire Project.

§ 19.3 Tests and Inspections

Tests, inspections, and approvals of portions of the Work required by the Contract Documents or by applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities shall be made at an appropriate time. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 19.4 The Owner's representative:
(Name, address, email address and other information)

To be determined
West Branch-Rose City Area Schools
960 South M-33
West Branch, Michigan 48661
mikulskp@wbrc.k12.mi.us

§ 19.5 The Contractor's representative:
(Name, address, email address and other information)

§ 19.6 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

§ 19.7 The Owner, being a governmental unit, is protected by the Michigan Void Construction Contracts Act, MCL 691.991.

§ 19.8 Notwithstanding any provisions within the Contract Documents , nothing shall be deemed a waiver of any immunity granted to Owner by law or statute, including but not necessarily limited to, governmental immunity under MCL 691.1407.

§ 19.9 All Contractor employees assigned to work under this Agreement may, at Owner's discretion, be subject to a background check and clearance by the Owner. Failure to obtain such clearance from the Owner may result in mandatory dismissal from the Owner's property and/or termination of the Agreement.

ARTICLE 20 TERMINATION OF THE CONTRACT

§ 20.1 Termination by the Contractor

If ~~the Architect fails to certify payment as provided in Section 15.4.1 for a period of 30 days through no fault of the Contractor, or~~ if the Owner fails to make an undisputed payment as provided in Section 4.1.3 for a period of 30 ~~days,~~ days beyond the due date, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner payment for Work ~~executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.~~timely and properly executed

§ 20.2 Termination by the Owner for Cause

§ 20.2.1 The Owner may terminate the Contract if the Contractor

- **.1** ~~repeatedly~~ refuses or fails to supply enough properly skilled workers or proper materials;
- **.2** fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;
- **.3** ~~repeatedly~~ disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority;~~or~~
- **.4** otherwise is guilty of substantial breach of a provision of the Contract ~~Documents.~~Documents; or
- **.5** the Contractor fails to prosecute the Work or any part thereof with promptness and diligence or fails to perform any provisions of the Contract, or goes into bankruptcy, liquidation, makes an assignment for the benefit of creditors, enters into a composition with its creditors, or becomes insolvent..

§ 20.2.2 When any of the reasons described in Section 20.2.1 exists, the Owner, upon certification by the Architect that sufficient cause exists to justify such action, may, without prejudice to any other remedy the Owner may have and after giving the Contractor ~~seven days'~~ three (3)days' notice, terminate the Contract and take possession of the site and of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor and may finish the Work by whatever reasonable method the Owner may deem expedient. Upon request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 20.2.2.1 In the event the Contractor's surety bond requires notice of intent to declare a default of the Contractor and if such bond notice is provided by the Owner, such notice shall be adequate to satisfy the three (3) day written notice described above in this Section.

§ 20.2.2.2 The three (3) day notice period identified in this Section does not give rise to an opportunity for the Contractor to cure the cause for termination. Further, the Owner's failure to properly follow the termination procedure shall not be a substantial or material breach of the Contract or the Owner's obligations.

§ 20.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 20.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 20.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Architect, upon application, and this obligation for payment shall survive termination of the Contract.

§ 20.3 Termination by the Owner for Convenience

The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause. The Owner shall pay the Contractor for Work ~~executed;~~ timely and properly executed and costs incurred by reason of such ~~termination, including costs attributable to termination of Subcontracts; and a termination fee, if any, as follows:~~termination.
(Insert the amount of or method for determining the fee payable to the Contractor by the Owner following a termination for the Owner's convenience, if any.)

ARTICLE 21 CLAIMS AND DISPUTES

§ 21.1 Claims, disputes, and other matters in question arising out of or relating to this Contract, including those alleging an error or omission by the ~~Architect but excluding those arising under Section 16.2,~~ Architect, shall be referred initially to the Architect for ~~decision.~~ an interpretation. Such matters, except those waived as provided for in Section 21.11 and Sections 15.7.3 and 15.7.4, shall, after initial ~~decision~~ interpretation by the Architect or 30 days after submission of the matter to the Architect, be subject to mediation as a condition precedent to binding dispute resolution.

§ 21.2 Notice of Claims

§ 21.2.1 Claims by ~~either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 18.2,~~ the Contractor shall be initiated by notice to the Owner and Architect within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the ~~claimant~~ Contractor first recognizes the condition giving rise to the Claim, whichever is later. The Contractor's failure to timely and property initiate a Claim shall be an absolute and irrevocable waiver of such Claim and any cause of action. Claims and causes of action by the Owner shall be governed by the applicable statute of limitations period, except when a provision of the Contract Documents provides a longer period. The parties acknowledge, understand, and agree that the Contractor's required prompt filing of a Claim is critical to the Project, as Contractor Claims often affect the Project schedule and/or Project budget, and that the deadline and waiver applicable to Contractor Claims is a material inducement to the Owner entering into an agreement with the Contractor. The Contractor's timely submission of a Claim shall be a condition precedent to pursuing a Cause of Action, in accordance with Section 21.3.

§ 21.2.2 ~~Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 18.2, shall be initiated by notice to the other party.~~

§ 21.3 Time Limits on Claims and Causes of Action

The Owner ~~and Contractor~~ shall commence all claims and causes of action against ~~the other and~~ the Contractor in accordance with the statutes of limitation applicable under Michigan law, except that no claim or cause of action shall be untimely if filed within six (6) years of substantial completion of the entire Project. The Contractor shall commence all causes of action arising out of or related to the Contract ~~in accordance with the requirements of the final dispute resolution method selected in this Agreement whether in contract, tort, breach of warranty, or otherwise, within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive~~ by first complying with the Claims procedure set forth above in Section 21.2 and, if a Claim is timely and properly filed and resolved, by filing in accordance with the statute of limitations applicable under Michigan law. The Contractor waives all claims and causes of action not commenced in accordance with this Section 21.3.

§ 21.4 ~~If a claim, dispute or other matter in question relates to or is the subject of a mechanic's lien, the party asserting such matter may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.~~

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

§ 21.6 ~~If the parties have selected arbitration as the method for binding dispute resolution in this Agreement, any claim, subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association, in accordance with the Construction Industry Arbitration Rules in effect on the date of this Agreement. Demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.~~

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

§ 21.8 ~~Subject to the rules of the American Arbitration Association or other applicable arbitration rules, any party to an arbitration may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of a Claim not described in the written Consent.~~

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

§ 21.10 Continuing Contract Performance

Pending final resolution of a ~~Claim,~~ Claim or cause of action, except as otherwise agreed in writing, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 21.11 Waiver of Claims for Consequential Damages

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

.1 ~~damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and~~

.2 ~~damages~~ damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This ~~mutual~~ waiver is applicable, without limitation, to all consequential damages due to ~~either party's~~ termination in accordance with Article 20. Nothing contained in this Section 21.11 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

This Agreement entered into as of the day and year first written above.

WEST BRANCH ROSE CITY AREA SCHOOLS

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
(Printed name and title)	*(Printed name and title)*

ATTACHMENT A
TERMS OF CONTRACT FOR ESSER-FUNDED PROJECTS

FEDERAL REQUIREMENTS

1.1 Prevailing Wage. As a construction project over $2,000, this Project is subject to the Davis-Bacon Act, 20 USC 1232b, and the Contractor may be required to ensure that prevailing wages are paid in accordance with that Act and its implementing regulations. Without limiting the breadth of the foregoing:

(1) Contractor shall pay all mechanics and laborers employed directly on the site of the work, unconditionally and at least once a week, and without subsequent deduction or rebate on any account, the full amounts accrued at time of payment, computed at wage rates not less than those stated in the advertised specifications, regardless of any contractual relationship which may be alleged to exist between the Contractor or subcontractor and the laborers and mechanics;

(2) Contractor shall post the scale of wages to be paid in a prominent and easily accessible place at the site of the work; and

(3) There may be withheld from the Contractor so much of accrued payments as the Owner considers necessary to pay to laborers and mechanics employed by the Contractor or subcontractors on the work the difference between the rates of wages required by the Agreement to be paid laborers and mechanics on the work and the rates of wages received by the laborers and mechanics and not refunded to the Contractor or subcontractors or their agents.

1.2 Equal Employment Opportunity. During the performance of this contract, the Contractor agrees as follows:

(1) The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following:

Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

(2) The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.

(3) The Contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the Contractor's legal duty to furnish information.

(4) The Contractor will send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the Contractor's commitments under this section and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(5) The Contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(6) The Contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(7) In the event of the Contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(8) The Contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance:

Provided, however, that in the event a Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

The applicant further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it participates in federally assisted construction work: Provided, that if the applicant so participating is a State or local government, the above equal opportunity clause is not applicable to any agency, instrumentality or subdivision of such government which does not participate in work on or under the contract.

The applicant agrees that it will assist and cooperate actively with the administering agency and the Secretary of Labor in obtaining the compliance of contractors and subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish the administering agency and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the administering agency in the discharge of the agency's primary responsibility for securing compliance.

The applicant further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated eligibility for, Government contracts and federally assisted construction contracts pursuant to the Executive Order and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the administering agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive Order. In addition, the applicant agrees that if it fails or refuses to comply with these undertakings, the administering agency may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this grant (contract, loan, insurance, guarantee); refrain from extending any further assistance to the applicant under the program with respect to which the failure or refund occurred until satisfactory assurance of future compliance has been received from such applicant; and refer the case to the Department of Justice for appropriate legal proceedings.

1.3 Copeland Anti-Kickback Act.

(1) Contractor. The Contractor shall comply with 18 USC 874, 40 USC 3145, and the requirements of 29 CFR 3 as may be applicable, which are incorporated by reference into this contract.

(2) Subcontracts. The Contractor or subcontractor shall insert in any subcontracts the clause above and such other clauses as FEMA may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all of these contract clauses.

(3) Breach. A breach of the contract clauses above may be grounds for termination of the contract, and for debarment as a contractor and subcontractor as provided in 29 CFR 5.12

1.4 Contract Work Hours and Safety Standards Act.

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (1) of this section the Contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such Contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1) of this section, in the sum of $27 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1) of this section.

(3) Withholding for unpaid wages and liquidated damages. The Owner shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2) of this section.

(4) Subcontracts. The Contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (b)(1) through (4) of this section.

1.5 Clean Air Act.

(1) The Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 USC 7401 et seq.

(2) The Contractor agrees to report each violation to the Owner and understands and agrees that the Owner will, in turn, report each violation as required to assure notification to the Federal Emergency Management Agency, and the appropriate Environmental Protection Agency Regional Office.

(3) The Contractor agrees to include these requirements in each subcontract, if any, exceeding $150,000 financed in whole or in part with Federal assistance.

1.6 Federal Water Pollution Control Act.

(1) The Contractor agrees to comply with all applicable standards, orders, or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 USC 1251 et seq.

(2) The Contractor agrees to report each violation to the Owner and understands and agrees that the Owner, in turn, report each violation as required to assure notification to the Federal Emergency Management Agency, and the appropriate Environmental Protection Agency Regional Office.

(3) The Contractor agrees to include these requirements in each subcontract exceeding $150,000 financed in whole or in part with Federal assistance.

1.7 Suspension and Debarment.

(1) This contract is a covered transaction for purposes of 2 CFR 180 and 2 CFR 3000. As such, the Contractor is required to verify that none of the Contractor's principals (defined at 2 CFR 180.995) or its affiliates (defined at 2 CFR 180.905) are excluded (defined at 2 CFR 180.940) or disqualified (defined at 2 CFR 180.935).

(2) The Contractor must comply with 2 CFR 180, subpart C and 2 CFR 3000, subpart C, and must include a requirement to comply with these regulations in any lower tier covered transaction it enters into.

(3) This certification is a material representation of fact relied upon by Owner. If it is later determined that the Contractor did not comply with 2 CFR 180, subpart C and 2 CFR 3000, subpart C, in addition to remedies available to Owner, the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment.

(4) The bidder or proposer agrees to comply with the requirements of 2 CFR 180, subpart C and 2 CFR 3000, subpart C while this offer is valid and throughout the period of any contract that may arise from this offer. The bidder or proposer further agrees to include a provision requiring such compliance in its lower tier covered transactions.

1.8 Byrd Anti-Lobbying Amendment, 31 USC 1352 (as amended). Contractors who apply or bid for an award of $100,000 or more shall file the required certification. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, officer or employee of Congress, or an employee of a Member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 31 USC 1352. Each tier shall also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the recipient who in turn will forward the certification(s) to the awarding agency.

1.9 In the performance of this contract, the Contractor shall make maximum use of products containing recovered materials that are EPA-designated items unless the product cannot be acquired: (i) Competitively within a timeframe providing for compliance with the contract performance schedule, (ii) Meeting contract performance requirements; or (iii) At a reasonable price. Information about this requirement, along with the list of EPA-designated items, is available at EPA's Comprehensive Procurement Guidelines web site: https://www.epa.gov/smm/comprehensive-procurement-guideline-cpg-program. The Contractor also agrees to comply with all other applicable requirements of Section 6002 of the Solid Waste Disposal Act.

SECTION 01 10 00

SUMMARY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Contract description.

B. Work by Owner.

C. Contractor's use of site and premises.

D. Owner occupancy.

E. Specification Conventions.

1.2 CONTRACT DESCRIPTION

A. Work of the Project comprises improvements to Surline Middle School and Rose City elementary School and generally includes
   1. Surline Middle School:
      a. Removal and/or in-place abandonment of the existing HVAC system;
      b. Installation of classroom unit ventilators with provisions for air conditioning;
      c. Installation of new exhaust fans;
      d. Replacement of hydronic heating boilers and pumps;
      e. Installation of new hydronic heating piping;
      f. Replacement of various terminal heating units;
      g. Installation of new HVAC controls;
      h. Replacement of the domestic water storage tank;
      i. Replacement of suspended acoustical ceilings;
      j. Incidental patching, painting, and other work as depicted.
   2. Rose City Elementary School:
      a. Replacement of existing HVAC controls with new.

B. Perform Work of the Contract under stipulated sum contract with Owner in accordance with Conditions of Contract.

C. Work of each subcontract is described in each respective Bid Category.

1.3 WORK BY OWNER

A. Items noted NIC (Not in Contract), movable cabinets, and furnishings will be furnished and installed by Owner after Substantial Completion.

1.4 CONTRACTOR'S USE OF SITE AND PREMISES

A. Limit use of site and premises to allow:
   1. Owner occupancy.
   2. Work by Others and Work by Owner.
   3. Use of site and premises by the public.

B. Vehicular access to the site is limited to existing paved or gravel drives and parking areas. Vehicular access with not be permitted across lawns or concrete sidewalks or other site improvements except where required to access the work area upon approval of the Construction Manager.

C. Coordinate site and building access routes with Owner.

D. Coordinate disruption of any utility service or system which may affect the Owners use of the premises for normal operations.

1.5 OWNER OCCUPANCY

A. The Owner will occupy areas of the site and premises during the entire period of construction for the conduct of normal operations summer operations. Coordinate with the Owner to allow access by Owner personnel for cleaning, general maintenance, and other work by Owner.

B. Schedule the work with the Owner to accommodate Owner occupancy and to allow the Owner to use spaces prior to, and after completion of work in individual spaces.

C. Cooperate with Owner to minimize conflict, and to facilitate Owner's operations.

1.6 SPECIFICATION CONVENTIONS

A. These specifications are written in imperative mood and streamlined form. This imperative language is directed to the Contractor, unless specifically noted otherwise. The words “shall be” are included by inference where a colon (:) is used within sentences or phrases.

B. Contractor is responsible for the entire Work identified in the Contract Documents without regard to the specific location of the information within the Contract Documents.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 20 00

PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Contingency allowances.

B. Schedule of values.

C. Applications for payment.

D. Change procedures.

E. Defect assessment.

F. Alternates

1.2 CONTINGENCY ALLOWANCES

A. A Contingency Allowance has been established by the Owner.

1.3 SCHEDULE OF VALUES

A. Submit printed schedule on AIA Form G703 - Continuation Sheet for G702. Contractor's standard form or electronic media printout following format of specified AIA form will be considered.

B. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement.

C. Format: Utilize Table of Contents of this Project Manual. Identify each line item with number and title of major specification Section. Identify site mobilization, bonds and insurance, and General Requirements as separate line items.

D. Include within each line item, direct proportional amount of Contractor's overhead and profit.

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

1.4 APPLICATIONS FOR PAYMENT

A. Submit one copy of each application on AIA Form G702 - Application and Certificate for Payment and AIA G703 - Continuation Sheet for G702 or approved Contractor's electronic media driven form.

B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.

C. Payment Period: Submit at intervals stipulated in the Agreement.

D. Substantiating Data: When Architect/Engineer requires substantiating information, submit data justifying dollar amounts in question.

1.5 CHANGE PROCEDURES

A. The Architect/Engineer will advise of minor changes in the Work not involving adjustment to Contract Sum/Price or Contract Time by issuing supplemental instructions in writing to the Contractor.

B. The Architect/Engineer may issue a Proposal Request or Bulletin including a detailed description of proposed change with supplementary or revised Drawings and specifications. Contractor will prepare and submit estimate of cost and any required change in Contract Time within 14 days.

C. Contractor may propose changes by submitting a request for change to Architect/Engineer, describing proposed change and its full effect on the Work. Include a statement describing reason for the change, and effect on Contract Sum/Price and Contract Time with full documentation and a statement describing effect on Work by separate or other Contractors.

D. Stipulated Sum/Price Change Order: Based on Proposal Request (Bulletins) and Contractor's fixed price quotation or Contractor's request for Change Order as approved by Architect/Engineer.

E. Unit Price Change Order: For contract unit prices and quantities, the Change Order will be executed on fixed unit price basis. For unit costs or quantities of units of work which are not pre-determined, execute Work under Construction Change Directive. Changes in Contract Sum/Price or Contract Time will be computed as specified for Time and Material Change Order.

F. Construction Change Directive: Architect/Engineer may issue directive, on AIA Form G713 Construction Change Directive signed by Owner, instructing Contractor to proceed with 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/Price or Contract Time. Promptly execute change.

G. Time and Material Change Order: Submit itemized account and supporting data after completion of change, within time limits indicated in Conditions of the Contract. Architect/Engineer will determine change allowable in Contract Sum/Price and Contract Time as provided in Contract Documents.

H. Maintain detailed records of work done on Time and Material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.

I. Document each quotation for change in cost or time with sufficient data to allow evaluation of quotation.

J. Change Order Forms: AIA G701 Change Order.

K. Execution of Change Orders: Architect/Engineer will issue Change Orders for signatures of parties as provided in Conditions of the Contract.

L. Correlation Of Contractor Submittals:
   1. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as separate line item and adjust Contract Sum/Price.
   2. Promptly revise progress schedules to reflect change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.
   3. Promptly enter changes in Project Record Documents.

1.6 DEFECT ASSESSMENT

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

B. If, in the opinion of the Architect/Engineer, it is not practical to remove and replace the Work, the Architect/Engineer will direct appropriate remedy or adjust payment.
   1. The defective Work may remain, but unit sum/price will be adjusted to new sum/price at discretion of Owner.
   2. Defective Work will be partially repaired to instructions of Architect/Engineer, and unit sum/price will be adjusted to new sum/price at discretion of Owner.

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

D. Authority of Architect/Engineer to assess defects is final.

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

1.7 ALTERNATES

A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in Owner-Contractor Agreement.

B. Coordinate related work and modify surrounding work.

C. Schedule of Alternates:
   1. Bid Alternate 1: State the cost of materials and labor to provide and install air conditioning equipment including condensing units, refrigerant line sets and enclosures, and power supply from designated electrical panels.
      a. Base Bid Item: Provide unit ventilators with cooling coils ready for the addition of air conditioning.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 30 00

ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Coordination and project conditions.

B. Preconstruction meeting.

C. Progress meetings.

D. Periodic construction visits.

E. Pre-installation meetings.

F. Project Record Documents.

G. Acceptance of Preceding Work.

H. Cutting and patching.

I. Special procedures.

1.2 COORDINATION AND PROJECT CONDITIONS

A. Coordinate scheduling, submittals, and Work of various sections of Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

B. 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, operating equipment.

C. Coordinate space requirements, supports, and installation of mechanical and electrical Work indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

D. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within construction. Coordinate locations of fixtures and outlets with finish elements.

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

F. 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.

1.3 PRECONSTRUCTION MEETING

A. Architect/Engineer will schedule meeting after Notice of Award.

B. Attendance Required: Owner, Architect/Engineer, and Contractor.

C. Agenda:
1. Execution of Owner-Contractor Agreement.
2. Submission of executed bonds and insurance certificates.
3. Distribution of Contract Documents.
4. Submission of list of Subcontractors, list of products, schedule of values, and progress schedule.
5. Designation of personnel representing parties in Contract, and Architect/Engineer.
6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
7. Scheduling.
8. Scheduling activities of testing agency.

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

1.4 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the Work at maximum bi-monthly intervals.

B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

C. Attendance Required: Job superintendent, major subcontractors and suppliers, Owner, Architect/Engineer, as appropriate to agenda topics for each meeting.

D. Agenda:
1. Review minutes of previous meetings.
2. Review of Work progress.
3. Field observations, problems, and decisions.
4. Identification of problems impeding planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of off-site fabrication and delivery schedules.
7. Maintenance of progress schedule.
8. Corrective measures to regain projected schedules.
9. Planned progress during succeeding work period.
10. Coordination of projected progress.
11. Maintenance of quality and work standards.
12. Effect of proposed changes on progress schedule and coordination.
13. Other business relating to Work.
14. Coordination of work by Owner’s Contractor with work of the General Contract.
15. Project Record Documents.

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

1.5 PERIODIC CONSTRUCTION VISITS

A. The Architect and Owner will visit the project site periodically. The purpose of the visits will be to monitor the progress and quality of the work.

B. The Contractor's Site Superintendent shall be available for meetings with the Architect and Owner.

C. Agenda:
1. Review of Work in progress.
2. Field observations, problems, and decisions.
3. Identification of problems which impede planned progress.
4. Maintenance of progress schedule.
5. Corrective measures to regain projected schedules.
6. Planned progress during succeeding work period.
7. Maintenance of quality and work standards.
8. Other business relating to Work.

1.6 PRE-INSTALLATION MEETINGS

A. When required in individual specification sections, convene pre-installation meetings at Project site prior to commencing work of specific section.

B. Require attendance of parties directly affecting, or affected by, Work of specific section.

C. Notify Architect/Engineer four days in advance of meeting date.

D. Prepare agenda and preside at meeting:
1. Review conditions of installation, preparation and installation procedures.
2. Review coordination with related work.

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

1.7 PROJECT RECORD DOCUMENTS

A. Contractor shall maintain and update Project Record Drawings (As-Built Drawings) on site during construction. Contractor and each Subcontractor shall be responsible to update the as built drawings on a weekly basis.

B. Project Record Documents shall be available for review by the Architect.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.1 ACCEPTANCE OF PRECEDING WORK

A. Before starting any operation, each Contractor(s) shall examine work performed by others to which their work adjoins or is applied and shall report to the Architect any conditions that will prevent satisfactory accomplishment of their work.

B. Failure to notify the Architect of deficiencies or faults in preceding work will constitute acceptance thereof and waive of any claims to its usability.

3.2 CUTTING AND PATCHING

A. Employ skilled and experienced installer to perform cutting and patching.

B. Submit written request in advance of cutting or altering elements affecting:
   1. Structural integrity of element.
   2. Integrity of weather-exposed or moisture-resistant elements.
   3. Efficiency, maintenance, or safety of element.
   4. Visual qualities of sight exposed elements.
   5. Work of Owner or separate contractor.

C. Execute cutting, fitting, and patching including excavation and fill, to complete Work, and to:
   1. Fit the several parts together, to integrate with other Work.
   2. Uncover Work to install or correct ill-timed Work.
   3. Remove and replace defective and non-conforming Work.
   4. Remove samples of installed Work for testing.
   5. Provide openings in elements of Work for penetrations of mechanical and electrical Work.

D. Execute work by methods to avoid damage to other Work, and to provide proper surfaces to receive patching and finishing.

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

F. Restore Work with new products in accordance with requirements of Contract Documents.

G. Fit Work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

H. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.

I. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for assembly, refinish entire unit.

3.3 SPECIAL PROCEDURES

A. Materials: As specified in product sections; match existing with new products for patching and extending work. Use salvaged products only where indicated in Drawings.

B. Employ skilled and experienced installer to perform alteration work.

C. Cut, move, or remove items as necessary for access to alterations and renovation Work. Replace and restore at completion.

D. Remove unsuitable material not marked for salvage, including rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished Work.

E. Remove debris and abandoned items from area and from concealed spaces.

F. Prepare surface and remove surface finishes to permit installation of new work and finishes.

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

H. Remove, cut, and patch Work in manner to minimize damage and to permit restoring products and finishes to original or specified condition.

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

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

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

L. Where change of plane of 1/4 inch or more occurs, request instructions from Architect/Engineer.

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

N. Finish surfaces as specified in individual product sections.

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Submittal procedures.

B. Construction progress schedules.

C. Proposed products list.

D. Product data.

E. Shop drawings.

F. Samples.

G. Design data.

H. Test reports.

I. Certificates.

J. Manufacturer's instructions.

K. Manufacturer's field reports.

1.2 SUBMITTAL PROCEDURES

A. Electronic Submittals: Prepare and transmit submittals of Product Data, Shop Drawings, Design Data, Test Reports, Certificates, Manufacturers Instructions, and Erection Drawings to Architect in electronic (.pdf) format.

B. Samples: Where specifications require the submittal of samples for verification or selection, submit physical samples and/or physical color charts to the Architect. Electronic reproductions of color charts will not be accepted. Include Contractor’s transmittal form identifying Project, Contractor, subcontractor and supplier; product designated by name indicated in specifications.

C. Transmit electronic submittals with Contractor’s transmittal form:
   1. Sequentially number submittals. Include the specification section in the submittal numbering system. Mark revised submittals with original number and sequential alphabetic suffix.
   2. Identify Project, Contractor, subcontractor and supplier; product designated by name indicated in specifications.

D. Include Contractor's certification (stamp), signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with requirements of the Work and Contract Documents.

E. Schedule submittals to expedite Project. Coordinate submission of related items.

F. For each submittal for review, allow 15 days excluding delivery time to and from Contractor. Submittals for long lead time items shall be expedited by the Contractor in order to allow for the Owner's completion schedule. Notify Architect/Engineer of long lead time items requiring expedited review.

G. Identify variations from Contract Documents and product or system limitations which may be detrimental to successful performance of completed Work.

H. Architect will return files electronically following review. Contractor shall distribute copies of reviewed submittals to appropriate parties.

I. Contractor shall produce and provide a paper copy of approved submittals to the Architect, and to governing authorities upon request.

J. Where specified in specific Submittals Articles, Contractor shall provide a paper copy of approved submittals to the Owner at closeout.

K. When revised for resubmission, identify changes made since previous submission.

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

1.3 CONSTRUCTION PROGRESS SCHEDULES

A. Submit initial schedules within 7 days after Notice to Proceed. After review, resubmit required revised data within ten days.

B. Submit revised Progress Schedules with each Application for Payment.

C. Distribute copies of reviewed schedules to Project site file, subcontractors, suppliers, and other concerned parties.

D. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

E. Utilize Contractor's standard computer generated schedule format.

F. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate early and late start, early and late finish, float dates, and duration.

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

H. Revisions To Schedules:
   1. Indicate progress of each activity to date of submittal, and projected completion date of each activity.
   2. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.
   3. Prepare narrative report to define problem areas, anticipated delays, and impact on Schedule. Report corrective action taken, or proposed, and its effect [including effect of changes on schedules of separate contractors].

1.4 PROPOSED PRODUCTS LIST

A. Within 7 days after 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.

1.5 PRODUCT DATA

A. Product Data: Submit to Architect/Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.

B. Mark submittal to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

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

D. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents described in Section 01 70 00 - Execution and Closeout Requirements.

1.6 SHOP DRAWINGS

A. Shop Drawings: Submit to Architect/Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.

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

C. When required by individual specification sections, provide shop drawings signed and sealed by professional engineer responsible for designing components shown on shop drawings.
   1. Include signed and sealed calculations to support design.
   2. Submit drawings and calculations in form suitable for submission to and approval by authorities having jurisdiction.
   3. Make revisions and provide additional information when required by authorities having jurisdiction.

D. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents described in Section 01 70 00 - Execution and Closeout Requirements.

1.7 SAMPLES

A. Samples: Submit to Architect/Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.

B. Samples For Selection as Specified in Product Sections:
   1. Submit to Architect/Engineer for aesthetic, color, or finish selection.

2. Submit samples of finishes from full range of manufacturers' standard colors, including premium and/or custom colors where specified, textures, and patterns for Architect/Engineer selection.

C. Submit samples to illustrate functional and aesthetic characteristics of Products, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

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

E. Submit number of samples specified in individual specification sections; Architect/Engineer will retain samples.

F. Samples will not be used for testing purposes unless specifically stated in specification section.

G. Architect will issue a schedule indicating colors selected.

1.8 DESIGN DATA

A. Submit for Architect/Engineer's knowledge as contract administrator or for Owner.

B. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

1.9 TEST REPORTS

A. Submit for Architect/Engineer's knowledge as contract administrator or for Owner.

B. Submit test reports for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

1.10 CERTIFICATES

A. When specified in individual specification sections, submit certification by manufacturer, installation/application subcontractor, or Contractor to Architect/Engineer, in quantities specified for Product Data.

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/Engineer.

1.11 MANUFACTURER'S INSTRUCTIONS

A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, [start-up,] adjusting, and finishing, to Architect/Engineer for delivery to Owner in quantities specified for Product Data.

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

1.12 MANUFACTURER'S FIELD REPORTS

A. Submit reports for Architect/Engineer's benefit as contract administrator or for Owner.

B. Submit report [in duplicate] within 5 days of observation to Architect/Engineer for information.

C. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 40 00

QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Quality control and control of installation.

B. Tolerances.

C. References.

D. Labeling.

E. Manufacturers' field services.

F. Examination.

G. Preparation.

1.2 QUALITY CONTROL AND CONTROL OF INSTALLATION

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

B. Comply with manufacturers' instructions, including each step in sequence.

C. When manufacturers' instructions conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.

D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Perform Work by persons qualified to produce required and specified quality.

F. Verify field measurements are as indicated on Shop Drawings or as instructed by manufacturer.

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

1.3 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. When manufacturers' tolerances conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

1.4 REFERENCES

A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of standard, except when more rigid requirements are specified or are required by applicable codes.

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

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

D. When specified reference standards conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.

E. Neither contractual relationships, duties, nor responsibilities of parties in Contract nor those of Architect/Engineer shall be altered from Contract Documents by mention or inference otherwise in reference documents.

1.5 LABELING

A. Attach label from agency approved by authority having jurisdiction for products, assemblies, and systems required to be labeled by applicable code.

B. Label Information: Include manufacturer's or fabricator's identification, approved agency identification, and the following information, as applicable, on each label.
   1. Model number.
   2. Serial number.
   3. Performance characteristics.

1.6 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.

B. Submit qualifications of observer to Architect/Engineer 30 days in advance of required observations.

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

D. Refer to Section 01 33 00 - Submittal Procedures, MANUFACTURERS' FIELD REPORTS article.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.

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

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

D. Verify utility services are available, of correct characteristics, and in correct locations.

3.2 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond.

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Temporary Utilities:
   1. Temporary electricity.
   2. Temporary ventilation.
   3. Telephone service.
   4. Email service
   5. Temporary sanitary facilities.

B. Construction Facilities:
   1. Field offices and sheds.
   2. Parking.
   3. Progress cleaning and waste removal.
   4. Fire prevention facilities.

C. Temporary Controls:
   1. Barriers.

D. Removal of utilities, facilities, and controls.

1.2 TEMPORARY ELECTRICITY

A. Owner will pay cost of energy used. Exercise measures to conserve energy. Utilize Owner's existing power service.

B. Permanent convenience receptacles may be utilized during construction.

1.3 TEMPORARY VENTILATION

A. Ventilate enclosed areas to achieve curing of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

1.4 TELEPHONE SERVICE

A. Provide, maintain, and pay for telephone service to field office at time of project mobilization.

1.5 EMAIL SERVICE

A. Provide, maintain and pay for email service to site Superintendent and Project Manager at time of project mobilization

1.6 TEMPORARY SANITARY FACILITIES

A. Existing designated facilities may be used during construction operations. Maintain daily in clean and sanitary condition.

1.7 FIELD OFFICES AND SHEDS

A. Storage Areas and Sheds: Owner will provide space for storage in adjacent building.

B. Small storage trailers may be placed on-site in paved parking areas where designated by Owner.

1.8 PARKING

A. Use of existing on-site streets and driveways used for construction traffic is permitted. Tracked vehicles not allowed on paved areas.

B. Do not allow heavy vehicles or construction equipment in parking areas without measures to prevent damage to pavement.

1.9 PROGRESS CLEANING AND WASTE REMOVAL

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

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing spaces.

C. Collect and remove waste materials, debris, and rubbish from site weekly and dispose off-site.

1.10 FIRE PREVENTION FACILITIES

A. Smoking on school property is prohibited by law.

B. Establish fire watch for cutting and welding and other hazardous operations capable of starting fires. Maintain fire watch before, during, and after hazardous operations until threat of fire does not exist.

C. Portable Fire Extinguishers: NFPA 10; 10 pound capacity, 4A-60B: C UL rating.
   1. Provide one fire extinguisher on each floor of buildings under construction and demolition.
   2. Provide minimum one fire extinguisher in every construction trailer and storage shed.
   3. Provide minimum one fire extinguisher on roof during roofing operations using heat producing equipment.

1.11 BARRIERS

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

B. Provide barriers to separate construction areas from adjacent occupied areas.

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

1.12 ENCLOSURES AND PROTECTION

A. Interior Enclosures:
   1. Provide temporary enclosures as required to prevent penetration of dust and moisture into adjacent building areas, and to prevent damage to existing materials and equipment.

2. Partition Construction: Framing and suitable plastic sheeting supported to prevent displacement during construction operations.

1.13 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Substantial Completion inspection.

B. Remove underground installations to minimum depth of 2 feet. Grade site as indicated on Drawings.

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

D. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Products.

B. Product delivery requirements.

C. Product storage and handling requirements.

D. Product options.

E. Product substitution procedures.

F. Equipment electrical characteristics and components.

1.2 PRODUCTS

A. Furnish products of qualified manufacturers suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise.

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

C. Furnish interchangeable components from same manufacturer for components being replaced.

1.3 PRODUCT DELIVERY REQUIREMENTS

A. Transport and handle products in accordance with manufacturer's instructions.

B. Promptly inspect shipments to ensure products comply with requirements, quantities are correct, and products are undamaged.

C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.4 PRODUCT STORAGE AND HANDLING REQUIREMENTS

A. Store and protect products in accordance with manufacturers' instructions.

B. Store with seals and labels intact and legible.

C. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

D. For exterior storage of fabricated products, place on sloped supports above ground.

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

F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

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

H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

1.5 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 one of manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with an “Or Equal” provision: Any Product meeting the quality standards or description. Pre-bid requests for approval of Products specified with an “or equal” provision will not be acknowledged. Acceptability of “or equal” Products will be determined by the Architect during the submittal process based upon the quality or suitability of the Product proposed.

D. Products Specified by Naming One or More Manufacturers with Provision for Substitutions: Submit request for substitution for any manufacturer not named in accordance with the following article.

1.6 PRODUCT SUBSTITUTION PROCEDURES

A. Instructions to Bidders specify time restrictions for submitting requests for Substitutions during bidding period to requirements specified in this section.

B. Post-Bid Substitutions will only be considered when a product becomes unavailable through no fault of Contractor.

C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

D. A request constitutes a representation that Bidder:
   1. Has investigated proposed product and determined that it meets or exceeds quality level of specified product.
   2. Will provide same warranty for Substitution as for specified product.
   3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
   4. Waives claims for additional costs or time extension which may subsequently become apparent.

5. Will reimburse Owner and/or Architect/Engineer for review or redesign services associated with re-approval by authorities having jurisdiction.

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 Contract Documents.

PART 2 PRODUCTS

2.1 EQUIPMENT ELECTRICAL CHARACTERISTICS AND COMPONENTS

A. Wiring Terminations: Furnish terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Include lugs for terminal box.

B. Cord and Plug: Furnish minimum 6 foot cord and plug including grounding connector for connection to electric wiring system. Cord of longer length is specified in individual specification sections.

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 70 00

EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Closeout procedures.

B. Final cleaning.

C. Starting of systems.

D. Demonstration and instructions.

E. Testing, adjusting and balancing.

F. Project record documents.

G. Operation and maintenance data.

H. Manual for materials and finishes.

I. Manual for equipment and systems.

J. Product warranties and product bonds.

1.2 CLOSEOUT PROCEDURES

A. Submit certification that the work is Substantially Complete and approved for occupancy by the Authority Having Jurisdiction, and Contractor’s list of items to be completed to the Architect.

B. Architect will inspect the work and will prepare a Punch List of items to be corrected or completed for final acceptance of the work.

C. Upon completion of all work and correction of items included on the Punch List prepared by the Architect, submit written certification that Contract Documents have been reviewed, and that Work is complete in accordance with Contract Documents and ready for Architect/Engineer's final review. Architect will visit the site and will verify that all items have been properly completed and/or corrected.

D. Contractor shall reimburse the Owner for all re-inspection costs incurred as a result of Contractor’s failure to complete and/or correct all items identified by the Architect. Charges to the Contractor shall be made at such times and in such amounts as the Architect invoices the Owner under the rate schedule in effect at the time of service. Such charges to the Contractor will be deducted from the Contractor’s progress payment or final payment as applicable.

E. Provide submittals to Architect/Engineer required by authorities having jurisdiction.

F. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.3 FINAL CLEANING

A. Execute final cleaning prior to final project assessment.

B. Clean equipment and fixtures to sanitary condition with cleaning materials appropriate to surface and material being cleaned.

C. Replace filters of operating equipment.

D. Remove waste and surplus materials, rubbish, and construction facilities from site.

1.4 STARTING OF SYSTEMS

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify Architect/Engineer seven days prior to start-up of each item.

C. Verify each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.

D. Verify tests, meter readings, and specified electrical characteristics agree with those required by equipment or system manufacturer.

E. Verify wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of applicable personnel in accordance with manufacturers' instructions.

G. When specified in individual specification Sections, 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.

H. Submit a written report in accordance with Section 01 33 00 - Submittal Procedures that equipment or system has been properly installed and is functioning correctly.

1.5 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate operation and maintenance of products to Owner's personnel two weeks prior to date of final inspection.

B. Demonstrate Project equipment instructed by qualified manufacturer's representative who is knowledgeable about the Project.

C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

D. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

E. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed time, at equipment location.

F. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

G. Required instruction time for each item of equipment and system is specified in individual sections.

1.6 TESTING, ADJUSTING AND BALANCING

A. Employ and pay for services of independent firm to perform testing, adjusting, and balancing.

B. Independent firm will perform services specified in Section 23 05 93.

C. Reports will be submitted by independent firm to Architect/Engineer indicating observations and results of tests and indicating compliance or non-compliance with requirements of Contract Documents.

1.7 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; 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 instruction 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.

D. Record information concurrent with construction progress, not less than weekly.

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

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
1. Measured depths of foundations in relation to finish first floor datum.
2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
4. Field changes of dimension and detail.
5. Details not on original Contract drawings.

G. Submit documents to Architect/Engineer with claim for final Application for Payment.

1.8 OPERATION AND MAINTENANCE DATA

A. Submit data bound in 8-1/2 x 11 inch (A4) text pages, three D side ring binders with durable plastic covers.

B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, and subject matter of binder when multiple binders are required.

C. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.

D. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

E. Contents: Prepare Table of Contents for each volume, with each product or system description identified, typed on white paper, in three parts as follows:
   1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Subcontractors, and major equipment suppliers.
   2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
      a. Significant design criteria.
      b. List of equipment.
      c. Parts list for each component.
      d. Operating instructions.
      e. Maintenance instructions for equipment and systems.
      f. Maintenance instructions for [special] finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
   3. Part 3: Project documents and certificates, including the following:
      a. Shop drawings and product data.
      b. Air and water balance reports.
      c. Certificates.
      d. Photocopies of warranties and bonds.

1.9 MANUAL FOR MATERIALS AND FINISHES

A. Submit one copy of completed volumes 15 days prior to final inspection. Draft copy will be reviewed and returned, with Architect/Engineer comments. Revise content of document sets as required prior to final submission.

B. Submit two sets of revised final volumes in final form with claim for Final Application for Payment.

C. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations. Include information for re-ordering custom manufactured products.

D. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

E. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Include recommendations for inspections, maintenance, and repair.

F. Additional Requirements: As specified in individual product specification sections.

G. Include listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

1.10 MANUAL FOR EQUIPMENT AND SYSTEMS

A. Submit one copy of completed volumes 15 days prior to final inspection. Draft copy will be reviewed and returned, with Architect/Engineer comments. Revise content of document sets as required prior to final submission.

B. Submit two sets of revised final volumes in final form with claim for Final Application for Payment.

C. Each Item of Equipment and Each System: Include description of unit or system, and component parts. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and model number of replaceable parts.

D. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.

E. Include color coded wiring diagrams as installed.

F. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and special operating instructions.

G. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

H. Include servicing and lubrication schedule, and list of lubricants required.

I. Include manufacturer's printed operation and maintenance instructions.

J. Include sequence of operation by controls manufacturer.

K. Include original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

L. Include control diagrams by controls manufacturer as installed.

M. Include Contractor's coordination drawings, with color coded piping diagrams as installed.

N. Include charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

O. Include list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

P. Include test and balancing reports as specified in Section 01 40 00 - Quality Requirements.

Q. Additional Requirements: As specified in individual product specification sections.

R. Include listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.

1.11 PRODUCT WARRANTIES AND PRODUCT BONDS

A. Obtain warranties and bonds executed in duplicate by responsible subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.

B. Execute and assemble transferable warranty documents and bonds from subcontractors, suppliers, and manufacturers.

C. Verify documents are in proper form, contain full information, and are notarized.

D. Co-execute submittals when required.

E. Include Table of Contents and assemble in three D side ring binder with durable plastic cover.

F. Submit prior to final Application for Payment.

G. Time Of Submittals:
   1. For equipment or component parts of equipment put into service during construction with Owner's permission, provide extended warranty for the full length of the warranty period beyond the Date of Substantial Completion.
   2. Make other submittals within ten days after Date of Substantial Completion, prior to final Application for Payment.
   3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing date of acceptance as beginning of warranty or bond period.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 02 41 19

SELECTIVE STRUCTURE DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Demolishing designated building equipment and fixtures.
2. Demolishing designated construction.
3. Cutting and alterations for completion of the Work.
4. Protecting items designated to remain.
5. Removing demolished materials.

1.2 CLOSEOUT SUBMITTALS

A. Project Record Documents: Accurately record actual locations of capped utilities, concealed utilities discovered during demolition, and subsurface obstructions.

1.3 QUALITY ASSURANCE

A. Conform to applicable code for demolition work, dust control, and products requiring electrical disconnection and re-connection

B. Conform to applicable code for procedures when hazardous or contaminated materials are discovered.

C. Obtain required permits from authorities having jurisdiction.

1.4 SEQUENCING

A. Owner will conduct salvage operations before demolition begins to remove materials Owner chooses to retain.

1.5 SCHEDULING

A. Cooperate with Owner in scheduling noisy operations and waste removal that may impact Owners operation and in adjoining spaces.

B. Coordinate utility and building service interruptions with Owner.
1. Do not disable or disrupt building fire or life safety systems without three days prior written notice to Owner.
2. Schedule tie-ins to existing systems to minimize disruption.
3. Coordinate Work to ensure fire sprinklers, fire alarms, smoke detectors, emergency lighting, exit signs and other life safety systems remain in full operation in occupied areas.

1.6 PROJECT CONDITIONS

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

B. Cease operations immediately if structure appears to be in danger and notify Architect/Engineer. Do not resume operations until directed.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 PREPARATION

A. Notify affected utility companies before starting work and comply with their requirements.

B. Mark location and termination of utilities.

C. Erect, and maintain temporary barriers and security devices, including warning signs and lights, and similar measures, for protection of the public, Owner, and existing improvements indicated to remain.

D. Erect and maintain weatherproof closures for exterior openings.

E. Erect and maintain temporary partitions to prevent spread of dust, odors, and noise to permit continued Owner occupancy.

F. Prevent movement of structure; provide temporary bracing and shoring required to ensure safety of existing structure.

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

H. Do not close or obstruct building egress path during building occupancy.

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

3.2 DEMOLITION

A. Conduct demolition to minimize interference with adjacent occupied building areas.

B. Maintain protected egress from, and access to, adjacent existing buildings at all times.

C. Do not close or obstruct public roadways or sidewalks without permits.

D. Cease operations immediately when structure appears to be in danger and notify Architect/Engineer.

E. Disconnect and remove designated utilities within demolition areas.

F. Cap and identify abandoned utilities at termination points when utility is not completely removed. Annotate Record Drawings indicating location and type of service for capped utilities remaining after demolition.

G. Demolish in orderly and careful manner. Protect existing improvements, supporting structural members.

H. Carefully remove building components indicated to be reused.
   1. Disassemble components as required to permit removal.
   2. Package small and loose parts to avoid loss.
   3. Mark components and packaged parts to permit reinstallation.
   4. Store components, protected from construction operations, until reinstalled.

I. Remove demolished materials from site except where specifically noted otherwise. Do not burn or bury materials on site.

J. Remove materials as Work progresses. Upon completion of Work, leave areas in clean condition.

K. Remove temporary Work.

END OF SECTION

SECTION 04 05 03

MASONRY MORTARING AND GROUTING

PART 1 GENERAL

1.1 SUMMARY

A. Section includes mortar and grout for masonry.

B. Related Sections:
1. Section 04 20 00 - Unit Masonry: Installation of mortar and grout.

1.2 REFERENCES

A. American Concrete Institute:
1. ACI 530 - Building Code Requirements for Masonry Structures.
2. ACI 530.1 - Specifications for Masonry Structures.

B. ASTM International:
1. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
2. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic Cement Concrete.
3. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar.
4. ASTM C150 - Standard Specification for Portland Cement.
5. ASTM C199 - Standard Test Method for Pier Test for Refractory Mortars.
6. ASTM C206 - Standard Specification for Finishing Hydrated Lime.
7. ASTM C270 - Standard Specification for Mortar for Unit Masonry.
8. ASTM C387/C387M - Standard Specification for Packaged, Dry, Combined Materials for Mortar and Concrete.
9. ASTM C404 - Standard Specification for Aggregates for Masonry Grout.
10. ASTM C476 - Standard Specification for Grout for Masonry.
11. ASTM C595 - Standard Specification for Blended Hydraulic Cements.
12. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
13. ASTM C1019 - Standard Test Method for Sampling and Testing Grout.
14. ASTM C1329 - Standard Specification for Mortar Cement.
15. ASTM C1357 - Standard Test Method for Evaluating Masonry Bond Strength.

1.3 SUBMITTALS

A. Design Data: Submit design mix when Property specification of ASTM C270 is to be used, required environmental conditions, and admixture limitations.
1. Indicate conformance of component mortar materials to requirements of ASTM C270. Submit test and evaluation reports to ASTM C780 for aggregate ratio and water content, air content, consistency and compressive strength.
2. Submit reports on grout indicating conformance of component grout materials to requirements of ASTM C476. Submit test and evaluation reports to ASTM C1019.

B. Product Data: Submit Product Data when pre-packaged mortar and grout mixes are to be used.
1. Indicate conformance of mortar to property requirements of ASTM C270.

2. Submit reports on grout indicating conformance of grout to property requirements of ASTM C476.

C. Manufacturer's Installation Instructions: Submit premix mortar manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 530 and ACI 530.1.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Cold Weather Requirements: In accordance with ACI 530.1 when ambient temperature or temperature of masonry units is less than 40 degrees F.

B. Hot Weather Requirements: In accordance with ACI 530.1 when ambient temperature is greater than 100 degrees F or ambient temperature is greater than 90 degrees F with wind velocity greater than 8 mph.

PART 2 PRODUCTS

2.1 MORTAR AND MASONRY GROUT COMPONENTS

A. Portland Cement: ASTM C150, Type I, gray color.

B. Mortar Aggregate: ASTM C144, standard masonry type.

C. Hydrated Lime: ASTM C206, Type S.

D. Grout Aggregate: ASTM C404, fine and coarse.

E. Water: Clean and potable.

F. Bonding Agent: Latex Type; Tammsweld by Euclid Chemical Company.

G. Calcium chloride is not permitted.

2.2 MIXES

A. Pre-packaged Mortar and Grout Mixes: ASTM C387/387M; At Contractor’s option use pre-packaged Mortar and Grout Mixes meeting specified requirements as manufactured by Spec Mix or equal. Mix and install pre-packaged mortar and grout mixes in accordance with manufactures instructions.

B. Mortar Mixes:
1. Mortar For Structural Masonry and Masonry in contact with earth: ASTM C270, Type M using Property specification.
2. Mortar For Non-Structural Masonry: ASTM C270, Type S using Property specification.
3. Pointing Mortar: ASTM C270, Type N using Property specification.

C. Site Mixed Mortar Mixing:

1. Thoroughly mix mortar ingredients in accordance with ASTM C270 in quantities needed for immediate use.
2. Achieve uniformly damp sand immediately before mixing process.
3. Re-temper only within two hours of mixing.

D. Grout Mixes:
1. Grout for Non-Structural Masonry: 2,000 psi strength at 28 days; 8-11 inches slump; mixed in accordance with ASTM C476 for Fine and Coarse grout.
2. Grout for Structural and Non-Structural Masonry: 2,000 psi strength at 28 days; 8-11 inches slump; mixed in accordance with ASTM C476 for Fine and Coarse grout.
3. Application:
   a. Coarse Grout: For grouting spaces with minimum 4 inches dimension in every direction.
   b. Fine Grout: For grouting other spaces.

E. Grout Mixing:
1. Plant Mixed Grout: Transit mix grout in accordance with ASTM C94/C94M, modified to use ingredients complying with ASTM C476.
2. Site Mixed Grout: Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C476.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Request inspection of spaces to be grouted.

3.2 INSTALLATION

A. Install mortar and grout in accordance with ACI 530.1 Specifications for Masonry Structures.

END OF SECTION

SECTION 04 20 00

UNIT MASONRY

PART 1 GENERAL

1.1 SUMMARY

A. Section includes concrete masonry units; reinforcement, anchorage, and accessories.

B. Related Sections:
1. Section 04 05 03 - Masonry Mortaring and Grouting: Mortar and grout.

1.2 REFERENCES

A. American Concrete Institute:
1. ACI 530 - Building Code Requirements for Masonry Structures.
2. ACI 530.1 - Specifications for Masonry Structures.

B. ASTM International:
1. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
2. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement.
3. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units.
4. ASTM C140 - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
5. ASTM D226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
6. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

1.3 PERFORMANCE REQUIREMENTS

A. Concrete Masonry Compressive Strength (f'm): 1,500 psi; determined by unit strength method.
1. Concrete Masonry Units: 1,900 psi minimum net area compressive strength.

1.4 SUBMITTALS

A. Submit unit masonry test data showing breaking strength and average net area compressive strength of units.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 530 Building Code Requirements for Masonry Structures and ACI 530.1 Specification for Masonry Structures.

1.6 QUALIFICATIONS

A. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

PART 2 PRODUCTS

2.1 COMPONENTS

A. Facing Brick: ASTM C216, Type FBS, Grade SW; color, texture and finish to match exiting.

B. Hollow Concrete Masonry Units (CMU):
   1. Above Grade Applications: ASTM C90; light weight.
   2. Concrete Masonry Unit Size and Shape: Nominal modular face size of 8 x 16 inches. Furnish special units for 90 degree corners, jambs, bond beams, and lintels.

2.2 ACCESSORIES

A. Mortar and Grout: As specified in Section 04 05 03.

B. Reinforcing Steel: ASTM A615/A615M, 60 ksi yield grade, deformed billet bars, uncoated finish.

C. Copper/Kraft Paper Flashings: 3 oz/sq ft rolled sheet copper bonded to asphalt impregnated glass fabric both sides, crimped full sheet width.

PART 3 EXECUTION

3.1 EXAMINATION

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

B. Verify items provided by other sections of work are properly sized and located.

C. Verify built-in items are in proper location, and ready for roughing into masonry work.

3.2 PREPARATION

A. Direct and coordinate placement of metal anchors supplied to other sections.

B. Furnish temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent support.

3.3 INSTALLATION

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form bed and head joints of uniform thickness.

C. Coursing of Concrete Masonry Units:
   1. Bond: Running (match existing).
   2. Coursing: One unit and one mortar joint to equal 8 inches (match existing).
   3. Mortar Joints: Concave.

D. Coursing of Brick Units:
   1. Bond: Running and Soldier as indicated.
   2. Coursing: three units and three mortar joints to equal 8 inches.
   3. Mortar Joints: Concave.

E. Placing And Bonding:
1. Lay hollow masonry units with face shell bedding on head and bed joints.
2. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.
3. Remove excess mortar as work progresses.
4. Interlock intersections and external corners.
5. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment is required, remove mortar and replace.
6. Perform job site cutting of masonry units with proper tools to assure straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
7. Do not place chipped, cracked, or damaged units.
8. Isolate masonry from vertical structural framing members with movement joint as indicated on Drawings.
9. Isolate top of masonry from horizontal structural framing members and slabs or decks with compressible joint filler.

F. Grouted Components:
1. Place and consolidate grout fill without displacing reinforcing.

G. Openings:
1. Install loose steel and/or reinforced unit masonry lintels over openings where indicated.
2. Size lintels as indicated in Plans. Where not shown, provide reinforced unit masonry lintels or steel angle lintels as indicated in 3.6.
3. Extend masonry lintel reinforcing 24 inches beyond opening. Reinforce full perimeter of opening as indicated in Drawings.
   a. Do not splice reinforcing bars.
   b. Support and secure reinforcing bars from displacement.
   c. Place and consolidate grout fill without displacing reinforcing.
   d. Allow masonry lintels to attain specified strength before removing temporary supports.
   e. Maintain minimum 8 inch bearing on each side of opening.
4. Extend steel lintels 6 inches beyond opening width and bear on solid masonry or masonry cores that have been grouted full.

H. Masonry Flashings:
1. Extend flashings horizontally through outer wythe above ledge or shelf angles and lintels.
2. Turn flashing up minimum 8 inches and terminate with termination bar and mastic.
3. Lap end joints minimum 6 inches and seal watertight.
4. Turn flashing, fold, and seal at corners, bends, and interruptions.

I. Cutting And Fitting:
1. Cut and fit for chases, pipes, conduit, sleeves, and grounds. Coordinate with other sections of work to provide correct size, shape, and location.
2. Obtain Architect/Engineer’s approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.4 CLEANING

A. Remove excess mortar and mortar smears as work progresses.

B. Use non-metallic tools in cleaning operations.

3.5 PROTECTION OF FINISHED WORK

A. Protect new and existing construction from mud and mortar splatter.

3.6 SCHEDULE

A. Reinforced Masonry Lintels:
   1. Openings Up To 42 inches Wide: Place two, No. 4 reinforcing brs 1 inch from bottom web.
   2. Openings From 42 inches Up To 78 inches Wide: Place two No. 5 reinforcing bars 1 inch from bottom web.
   3. Openings Over 78 inches: Consult Architect/Engineer for lintel size and reinforcing requirements

B. Steel Lintels:
   1. Openings up to 44 inches in width: Provide one 3 inch x 3 inch x 3/8 inch steel angle for each 4 inches of masonry thickness.

END OF SECTION

SECTION 05 31 23

STEEL ROOF DECKING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Steel roof deck and accessories.
   2. Framing for openings up to and including 18 inches.
   3. Bearing plates and angles.

B. Related Sections:
   1. Section 05 50 00 – Metal Fabrications: Miscellaneous plates and angles.

1.2 REFERENCES

A. ASTM International:
   1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

B. Steel Deck Institute:
   1. SDI 29 - Design Manual for Composite Decks, Form Decks and Roof Decks.

C. SSPC: The Society for Protective Coatings:
   1. SSPC – Structural Steel Painting Manual.

1.3 PERFORMANCE REQUIREMENTS

A. Steel roof decking is a component of the Metal Building System, and shall be designed and detailed by Metal Building Manufacturer.

B. Design metal deck in accordance with SDI 29 Design Manual.

C. Calculate to structural working stress design and maximum vertical deck deflection of L/240.

1.4 SUBMITTALS

A. Shop Drawings: Indicate deck plan, support locations, Projections, openings and reinforcement, pertinent details, and accessories.

B. Product Data: Submit deck profile characteristics and dimensions, structural properties, finishes.

C. Manufacturer’s Installation Instructions: Submit manufacturer's installation instructions.

D. Manufacturer’s Certificates: Certify Products meet or exceed specified requirements.

1.5 QUALIFICATIONS

A. Installer: Company specializing in performing Work of this section with minimum three years documented experience and approved by manufacturer.

B. Design deck layout, spans, and fastening under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Michigan.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Cut plastic wrap to encourage ventilation.

B. Separate sheets and store deck on dry wood sleepers; slope for positive drainage.

PART 2 PRODUCTS

2.1 MATERIALS

A. Manufacturers:
1. United Steel Deck.
2. Vulcraft Steel Deck.
3. Substitutions: Section 01 60 00 - Product Requirements

B. Sheet Steel: ASTM A653, Grade 33 Structural Quality; with G60 galvanized coating.

C. Bearing Plates and Angles: As specified in Section 05 50 00.

D. Touch-Up Primer for Galvanized Surfaces: SSPC Paint 20 Type I Inorganic.

2.2 FABRICATION

A. Metal Deck: Sheet steel, configured as follows:
1. Span Design: multiple.
2. Minimum Metal Thickness Excluding Finish: 20 gage.
3. Nominal Height: 1-1/2 inch, fluted profile WR.
4. Side Joints: lapped.
5. Flute Sides: plain vertical face.

B. Fasteners: Mechanical, pneumatically driven for attachment to joists, and self-tapping threaded fasteners for side lap connections.

PART 3 EXECUTION

3.1 INSTALLATION

A. Erect metal deck in accordance with SDI Manual.

B. Bear deck on steel supports with 1-1/2 inch minimum bearing. Align and level.

C. Fasten deck to steel support members at ends and intermediate supports with mechanical fasteners spaced as indicated on Shop Drawings.

D. Reinforce steel deck openings from 6 to 18 inches in size with 1-1/2 x 1-1/2 x 1/4inch steel angles. Place framing angles perpendicular to flutes; extend minimum two flutes beyond each side of opening and mechanically attach to deck at each flute.

END OF SECTION

SECTION 05 50 00

METAL FABRICATIONS

GENERAL

1.1 SUMMARY

A. Section includes shop fabricated metal items.
   1. Ledge and shelf angles.
   2. Metal ladders and landings.
   3. Decorative metal cover plates.
   4. Structural supports for miscellaneous attachments.

B. Related Sections:
   1. Section 04 20 00 - Unit Masonry: Execution requirements for embedded anchors and attachments for metal fabrications specified by this section in masonry.
   2. Section 09 90 00 - Painting and Coating: Field applied paint finish.

1.2 REFERENCES

A. ASTM International:
   1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
   2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
   3. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
   4. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
   5. ASTM B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
   6. ASTM F436 - Standard Specification for Hardened Steel Washers.
   7. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.

B. American Welding Society:
   1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.
   2. AWS D1.1 - Structural Welding Code - Steel.

C. National Ornamental & Miscellaneous Metals Association:
   1. NOMMA Guideline 1 - Joint Finishes.

D. SSPC: The Society for Protective Coatings:
   1. SSPC - Steel Structures Painting Manual.
   2. SSPC SP 2 – Hand Tool Cleaning.
   3. SSPC Paint 15 - Steel Joist Shop Paint.
   4. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).

1.3 SUBMITTALS

A. Section 01 33 00 - Submittals: Submittal requirements.

B. Product data: Manufactures product data for prefabricated products.

C. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

D. Samples: Submit samples illustrating factory finishes for selection where applicable.

1.4 QUALITY ASSURANCE

A. Finish joints in accordance with NOMMA Guideline 1.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 – Material and Equipment: Product storage and handling requirements.

B. Accept metal fabrications on site in labeled shipments. Inspect for damage.

C. Protect metal fabrications from damage by exposure to weather.

1.6 FIELD MEASUREMENTS

A. Verify field measurements are as indicated on shop drawings.

PART 2 PRODUCTS

2.1 MATERIALS - STEEL

A. Channels and Angles: ASTM A36/A36M.

B. Steel Plate and Bars: ASTM A36/A36M.

C. Steel Grating: ASTM A36/A36M.

D. Bolts: Heavy hex, structural type.
1. High Strength: ASTM A325; Type 1, plain or hot dipped galvanized where exposed to weather.

E. Nuts: ASTM A563 Grade; heavy hex type.
1. Finish: Plain or hot dipped galvanized where exposed to weather.

F. Washers: ASTM F436; Type 1, circular. Furnish clipped washers where space limitations require.
1. Finish: Plain or hot dipped galvanized where exposed to weather.

G. Plate Washers: ASTM A36/A36M.

H. Anchor Rods: ASTM F1554; Grade 55, weldable.
1. Shape: Hooked or Straight-headed.

I. Epoxy Anchors: Epoxy for anchor rod embedment into existing grouted masonry or concrete, Hilti HIT HY-70.

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

K. Shop Primer: SSPC Paint 15, Type 1, red oxide.

L. Touch-Up Primer: Match shop primer.

M. Touch-Up Primer for Galvanized Surfaces: SSPC Paint 20 Type I Inorganic.

2.2 LADDERS

A. ANSI A14.3, Steel welded construction:
   1. Side Rails: 1/2 x 3 inches side rails spaced at 20 inches.
   2. Rungs: one inch diameter solid rod spaced 14 inches on center.
   3. Mounting: Space rungs 10-1/2 inches from wall surface; with steel mounting brackets and attachments. Lags for wall attachment and epoxy anchor for floor attachment.
   4. Finish: Prime paint, one coat.

2.3 LINTELS

A. Lintels: Steel sections, size and configuration as indicated on Drawings, length to allow 8 inches minimum bearing on both sides of opening.
   1. Finish:
      a. Finish: Prime paint, one coat.
      b. Locations with Exterior Exposure: Galvanized.

2.4 STRUCTURAL SUPPORTS

A. Steel sections, size and configuration as indicated on Drawings.
   1. Finish: Prime paint, one coat.

2.5 DECORATIVE METAL COVER PLATES

A. Steel plate, size and configuration to match existing.
   1. Anchors: Fabricate as required for attachment to framing at opening using flat head countersunk screws matching finish.
   2. Finish: Powder coat finish after fabrication, color “flat black”.

2.6 ACCESSORIES

A. Non-Shrink Grout: ASTM C1107/C1107M; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days.

2.7 FABRICATION

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

B. Fabricate items with joints tightly fitted and secured.

C. Continuously seal joined members by continuous welds.

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 Welded Joints: NOMMA Guideline 1 Joint Finish.

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

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

2.8 FACTORY APPLIED FINISHES - STEEL

A. Prepare surfaces to be primed in accordance with SSPC SP 2.

B. Do not prime surfaces in direct contact with concrete or where field welding is required.

C. Prime paint items with one coat except where galvanizing is specified.

D. Galvanizing: ASTM A123/A123M; hot dip galvanize item to be exposed to the weather after fabrication.

E. Galvanizing for Fasteners, Connectors, and Anchors:
1. Hot-Dipped Galvanizing: ASTM A153/A153M.
2. Mechanical Galvanizing: ASTM B695; Class 50 minimum.

F. Powder Coat Paint Finish:
1. Prepare steel for powder coating as recommend by coating manufacturer.
2. Apply powder coating to uniform thickness using electrostatic spray equipment.
3. Cure coating following coating manufacturer’s instructions.
4. Package powder coated items to protect finish during transportation and installation.

2.9 FABRICATION TOLERANCES

A. Section 01 45 00 – Quality Control: Tolerances.

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

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

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

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

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

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 71 00 – Examination and Preparation: Requirements for examination and acceptance of preceding work.

B. Verify field conditions are acceptable and are ready to receive Work.

3.2 PREPARATION

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

3.3 INSTALLATION

A. Section 01 42 00 – Reference Standards and Definitions: Requirements for compliance with reference standards,

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

C. Make provisions for erection stresses. Install temporary bracing to maintain alignment, until permanent bracing and attachments are installed.

D. Field weld components indicated on shop drawings.

E. Perform field welding in accordance with AWS D1.1.

F. Obtain approval of Architect/Engineer prior to site cutting or making adjustments not scheduled.

G. After erection, touch up welds, abrasions, and damaged finishes with prime paint or galvanizing repair paint to match shop finishes.

3.4 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maximum Variation From Plumb: 1/4 inch per story or for every 12 ft in height whichever is greater, non-cumulative.

C. Maximum Offset From Alignment: 1/4 inch.

D. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

SECTION 06 10 53

MISCELLANEOUS ROUGH CARPENTRY

PART 1 GENERAL

1.1 SUMMARY

A. Section includes miscellaneous framing and sheathing; nailers, blocking, and preservative treatment of wood.

B. Related Sections:
1. Section 05 31 23 – Steel Roof Decking: Metal roof decking to receive wood nailers.
2. Section 10 12 -- Display Cases: Supports and blocking for display cases.
3. Section 10 51 13 – Metal Lockers: base construction for metal lockers.

1.2 REFERENCES

A. American National Standards Institute:
1. ANSI A208.1 - Mat-Formed Wood Particleboard.

B. American Wood-Preservers' Association:
1. AWPA M4 - Standard for the Care of Preservative-Treated Wood Products.
2. AWPA U1 - Use Category System: User Specification for Treated Wood.

C. ASTM International:
1. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
2. ASTM B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel
3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
4. ASTM F1667 - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.

D. National Lumber Grading Authority:
1. NLGA – Standard Grading Rules for Canadian Lumber.

E. Southern Pine Inspection Bureau:
1. SPIB - Standard Grading Rules for Southern Pine Lumber.

F. U.S. Department of Commerce National Institute of Standards and Technology:
1. DOC PS 1 - Construction and Industrial Plywood.
2. DOC PS 2 - Performance Standard for Wood-Based Structural-Use Panels.
3. DOC PS 20 - American Softwood Lumber Standard.

G. West Coast Lumber Inspection Bureau:
1. WCLIB - Standard Grading Rules for West Coast Lumber.

H. Western Wood Products Association:
1. WWPA G-5 - Western Lumber Grading Rules.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittals: Submittal procedures.

B. Product Data: Submit technical data on wood preservative and fire retardant treatment materials and application instructions.

1.4 QUALITY ASSURANCE

A. Section 01 42 00 – Reference Standards and Definitions: Requirements for compliance with reference standards.

B. Perform Work in accordance with the following:
1. Lumber Grading Agency: Certified by DOC PS 20.
2. Wood Structural Panel Grading Agency: Certified by EWA - The Engineered Wood Association.
3. Lumber: DOC PS 20.
4. Wood Structural Panels: DOC PS 1 or DOC PS 2.

C. Apply label from agency approved by authority having jurisdiction to identify each preservative treated material.

PART 2 PRODUCTS

2.1 MATERIALS

A. Lumber Grading Rules: NLGA, SPIB, WCLIB, or WWPA G-5 as applicable.

B. Miscellaneous Framing, Blocking and Curbing: SPF species, #2 grade or better, 19 percent maximum moisture content.

C. Miscellaneous Framing, blocking and curbing in contact with concrete or masonry: SYP species, #2 or better, 19 percent maximum moisture content after treatment

D. Plywood: APA/EWA Rated Sheathing, Grade C-D; Exposure Durability 1; sanded.

2.2 ACCESSORIES

A. Fasteners and Anchors:
1. Fasteners: ASTM A153/A153M, hot dipped galvanized steel for high humidity and treated wood locations, unfinished steel elsewhere.
2. Nails: ASTM F1667.
3. Anchors: Epoxy screen tube and bolt for anchorage to hollow masonry; Expansion shield and lag bolt type for anchorage to solid masonry or concrete; Bolt or ballistic fastener for anchorages to steel.

2.3 FACTORY WOOD TREATMENT

A. Wood Preservative (PT): AWPA UC2, Commodity Specification A-Sawn Products or F-Wood Composites using water-borne preservative.

B. Moisture Content after Treatment:

1. Lumber: Maximum 19 percent.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 71 00 – Examination and Preparation: Requirements for examination and acceptance of preceding work.

B. Verify substrate conditions are ready to receive blocking, curbing and framing.

3.2 PREPARATION

A. Coordinate placement of blocking, curbing and framing items.

3.3 INSTALLATION

A. Set members level and plumb, in correct position.

B. Place horizontal members, crown side up.

C. Construct curb members of solid wood sections.

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

E. Coordinate curb installation with installation of decking and support of deck openings.

F. Space framing 16 inches on center unless noted otherwise.

G. Secure sheathing to framing members with ends over firm bearing and staggered.

END OF SECTION

SECTION 06 20 00

FINISH CARPENTRY

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Interior Finish Carpentry:
      a. Standing and running trim.

B. Related Requirements:
   1. Section 09 90 00 - Painting and Coating: Painting and finishing of finish carpentry items.

1.2 REFERENCE STANDARDS

A. ASTM International:
   1. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
   2. ASTM B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel
   3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
   4. ASTM F1667 - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.

B. Architectural Woodwork Institute:
   1. AWI AWS - Architectural Woodwork Standards.

1.3 QUALITY ASSURANCE

A. Perform work in accordance with AWI AWS Section 6 Custom Grade.

B. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Protect work from moisture damage.

C. Maintain storage space relative humidity within ranges indicated in AWI AWS Section 2.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements.

B. During and after installation of Work of this section, maintain same temperature and humidity conditions in building spaces as will occur after occupancy.
   1. Maintain relative humidity within ranges indicated in AWI AWS Section 2.

PART 2 PRODUCTS

2.1 INTERIOR MATERIALS

A. Interior Softwood Lumber: DOC PS 20; Douglas fir species.
   1. Cut: Plain sawn.
   2. Finger Jointing: Not permitted.

B. Interior Hardwood Lumber: Red oak species.
   1. Cut: Plain sawn.
   2. Finger Jointing: Not permitted.

C. Lumber Moisture Content Range: 5-10 percent.

2.2 FINISHES

A. Sand work smooth and set exposed nails and screws.

B. Apply wood filler in exposed nail and screw indentations.

C. On items to receive transparent finishes, use wood filler matching surrounding surfaces and of types recommended for applied finishes.

D. Stain, seal, and varnish exposed to view surfaces.

E. Seal internal surfaces and semi-concealed surfaces.

F. Seal surfaces in contact with cementitious materials.

2.3 ACCESSORIES

A. Fasteners and Anchors:
   1. Fasteners: ASTM A153/A153M, hot dipped galvanized or ASTM B695, Class 55 mechanically galvanized steel for high humidity and treated wood locations, unfinished steel elsewhere.
   2. Nails and Staples: ASTM F1667.

B. Wood Filler: Solvent base, tinted to match surface finish color.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.

B. Verify adequacy of backing and support framing.

C. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.2 PREPARATION

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation preparation.

B. Prime paint surfaces of wood items and assemblies to be in contact with cementitious materials.

3.3 DEMOLITION

A. Modify and extend existing finish carpentry installations using materials and methods as specified.

3.4 INSTALLATION

A. Install work in accordance with AWI AWS Section 6 Custom Grade and manufacturer's instructions.

B. Set and secure materials and components in place, plumb and level.

C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

D. Install components and trim with nails, screws, bolts or with blind fasteners as indicated.

E. Preparation For Site Finishing:
1. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.
2. Site Finishing: Refer to Section 09 90 00.

3.5 TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Conform to AWI AWS Section 6 requirements for the following:
1. Smoothness.
2. Gaps.
3. Flushness.
4. Flatness.

C. Maximum Variation from Indicated Position: 1/16 inch.

D. Maximum Offset from Alignment with Abutting Materials: 1/32 inch.

END OF SECTION

SECTION 07 72 33

ROOF HATCHES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Prefabricated roof hatches, with integral support curbs, operable hardware, and safety accessories.

B. Related Sections:
1. Section 06 10 00 – Miscellaneous Rough Carpentry: Wood blocking for rough opening.

1.2 REFERENCES

A. Underwriters Laboratories Inc.:
1. UL - Building Materials Directory.

1.3 PERFORMANCE REQUIREMENTS

A. Design hatches to withstand live loads as calculated in accordance with applicable code.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit data on unit construction, sizes, configuration, jointing methods and locations when applicable, and attachment method.

PART 2 PRODUCTS

2.1 ROOF HATCHES

A. Manufacturer:
1. Babcock-Davis Hatchways, Model BRHPG 36x30 (Basis of Design)

B. Other acceptable manufacturers.
1. Bilco.
2. O'Keeffe's Inc.
3. Or equal.

C. Product Description: Manufacturer's standard zinc-coated steel, single leaf Personnel Access: 2'-6" x 3'-0" ladder access.

2.2 COMPONENTS

A. Cover and Liner: 14 gauge (0.075 inch) galvanized steel cover with 1 inch rigid fiberboard insulation and 22 gauge galvanized steel cover liner.

B. Curb: 14-gauge galvanized steel with 3/4 inch rigid fiberboard insulation at curb perimeter.

C. Hinges: Zinc plated steel tamperproof hinge contained within hatch as part of spring assembly.

D. Latch: Zinc plated steel slam latch with turn handle and inside/outside padlock hasps.

E. Springs: Greased heavy-duty compression springs in telescoping tubes.

F. Hardware: Zinc plated steel hold open arm(s) with red vinyl grip handle that automatically locks the door when opened. Furnish hatches with interior padlock hasp and EPDM draft seal.

G. Mounting Flanges:
   1. Double Wall Curb with 3.5” horizontal mounting flange.

2.3 ACCESSORIES

A. Safety Railing for Roof Hatch: Manufacturer’s standard complete system including rails, fittings, fasteners, mounting brackets, safety barrier at railing opening and all accessories required for a complete installation.
   1. Size: Size according to roof hatch size and application.
   2. Description: Railing mounting brackets designed to be bolted on exterior surfaces of curb counterflashing. Railing will provide protection of roof opening while roof hatch is open to comply with OSHA Standards CFR 29 1910.23 and OSHA 29 CFR 1926.502
      a. Test Load; 200 pounds.
      b. Top Rail Height: 42 +/- 3 inches above finished roof deck.
      c. Mid Rail spaced to eliminate passage of 21” diameter sphere.
      d. Upright post spacing of 8 feet maximum.
   3. Materials:
      a. Top rail, mid rail, and swinging gate.
         1) Pipe: Galvanized, 1-1/4 inch ID, A53 Grade B seamed pipe, galvanized
         2) Self Closing Gate; Galvanized Steel Pipe, 1 ¼” ID A53 Grade B, U bolt with hinge attachment and galvanized mounting bolts and nut hardware.
         3) Fittings: Manufacturer’s standard cast with set screw pipe mount
         4) Flat bar mounting bracket; zinc plated steel with nuts for easy bolt installation
         5) Fasteners: Manufacturer's standard 3/8-16 x .75 screws.

2.4 FABRICATION

A. Fabricate components free of visual distortion and free of defects. Weld corners and joints.

B. Provide for condensation occurring within components and within assembly to drain to exterior above roofing.

C. Fit components for weather tight assembly.

2.5 FINISH

A. Finish steel items in high reflectance white powder coat.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verification of Conditions: Examine areas and conditions under which Work is to be performed and identify conditions detrimental to proper or timely completion.

C. Verify tolerances and correct improper conditions.

D. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install roof hatch assembly, fastening securely to roof decking in accordance with manufacturer's instructions.

B. Final installation to be watertight assembly.

C. Coordinate with installation of roofing system and related flashings for weather tight installation.

D. Adjust hinges for smooth operation.

3.3 CLEANING

A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.

B. Wash down exposed surfaces; wipe surfaces clean.

C. Remove excess sealant.

END OF SECTION

SECTION 07 84 00

FIRESTOPPING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Firestopping through-penetrations of fire rated assemblies.
2. Smoke sealing penetrations and joints of smoke partitions.

1.2 REFERENCES

A. ASTM International:
1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
2. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
3. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
4. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems.

B. Intertek Testing Services (Warnock Hersey Listed):
1. WH - Certification Listings.

C. Underwriters Laboratories Inc.:
1. UL 263 - Fire Tests of Building Construction and Materials.
2. UL 1479 - Fire Tests of Through-Penetration Firestops.
3. UL 2079 - Tests for Fire Resistance of Building Joint Systems.
4. UL - Fire Resistance Directory.

1.3 DEFINITIONS

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

1.4 PERFORMANCE REQUIREMENTS

A. Conform to applicable code for fire resistance ratings and surface burning characteristics.

B. Provide certificate of compliance from authority having jurisdiction indicating approval of materials used.

1.5 SUBMITTALS

A. Section 01 33 00 - Submittals: Submittal procedures.

B. Product Data: Submit data on product characteristics, performance and limitation criteria.

C. Schedule: Submit schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance rating of adjacent assembly.

D. Manufacturer's Installation Instructions: Submit preparation and installation instructions.

E. Manufacturer's Certificate: Certify products meet or exceed applicable code requirements.

F. Engineering Judgements: For conditions not covered by UL or WH listed designs, submit judgements by licensed professional engineer suitable for presentation to authority having jurisdiction for acceptance as meeting code fire protection requirements.

1.6 QUALITY ASSURANCE

A. Section 01 40 00 – Quality Requirements: Requirements for compliance with reference standards.

B. Through Penetration Firestopping of Fire Rated Assemblies: UL 1479 or ASTM E814 with 0.10 inch water gage minimum positive pressure differential to achieve fire F-Ratings and temperature T-Ratings as indicated on Drawings, but not less than 1-hour.
   1. Wall Penetrations: Fire F-Ratings as indicated on Drawings, but not less than 1-hour.
   2. Floor and Roof Penetrations: Fire F-Ratings and temperature T-Ratings as indicated on Drawings, but not less than 1-hour.
      a. Floor Penetrations Within Wall Cavities: T-Rating is not required.

C. Through Penetration Firestopping of Non-Fire Rated Floor and Roof Assemblies: Materials to resist free passage of flame and products of combustion.
   1. Noncombustible Penetrating Items: Noncombustible materials for penetrating items connecting maximum of three stories.
   2. Penetrating Items: Materials approved by authorities having jurisdiction for penetrating items connecting maximum of two stories.

D. Fire Resistant Joints in Fire Rated Floor, Roof, and Wall Assemblies: ASTM E1966 or UL 2079 to achieve fire resistant rating as indicated on Drawings for assembly in which joint is installed.
   1. Smoke Barrier Joints Air Leakage: Maximum 5 cfm per foot at 0.30 inches water gage pressure differential

E. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Applicator: Company specializing in performing Work of this section with minimum three years documented experience.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Do not apply materials when temperature of substrate material and ambient air is below 60 degrees F.

B. Maintain this minimum temperature before, during, and for minimum 3 days after installation of materials.

C. Provide ventilation in areas to receive solvent cured materials.

PART 2 PRODUCTS

2.1 FIRESTOPPING

A. Manufacturers:
   1. A/D Fire Protection Systems, Inc.
   2. Hilti Corp.
   3. 3M Fire Protection Products
   4. Nelson Firestop Products
   5. Specified Technologies
   6. United States Gypsum Co.
   7. Substitutions: Or equal

B. Product Description: Different types of products by multiple manufacturers are acceptable as required to meet specified system description and performance requirements; provide only one type for each similar application.
   1. Silicone Firestopping Elastomeric Firestopping: Single component silicone elastomeric compound and compatible silicone sealant.
   2. Fiber Stuffing and Sealant Firestopping: Composite of mineral fiber stuffing insulation with silicone elastomer for smoke stopping.
   3. Mechanical Firestopping Device with Fillers: Mechanical device with incombustible fillers and silicone elastomer, covered with sheet stainless steel jacket, joined with collars, penetration sealed with flanged stops.
   4. Intumescent Firestopping: Intumescent putty compound which expands on exposure to surface heat gain.
   5. Firestop Pillows: Formed mineral fiber pillows.
   6. Mortar as specified in Section 04 05 03 where permitted by applicable code.

2.2 ACCESSORIES

A. Primer: Type recommended by firestopping manufacturer for specific substrate surfaces and suitable for required fire ratings.

B. Installation Accessories: Provide clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 14 00 – Quality Requirements: Requirements for examination and acceptance of preceding work.

B. Verify openings are ready to receive firestopping.

3.2 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter affecting bond of firestopping material.

B. Remove incompatible materials affecting bond.

C. Install damming materials to arrest liquid material leakage.

3.3 APPLICATION

A. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping, ductwork, conduit and other items, requiring firestopping.

B. Apply primer where recommended by manufacturer for type of firestopping material and substrate involved, and as required for compliance with required fire ratings.

C. Apply firestopping material in sufficient thickness to achieve required fire and smoke rating.

D. Compress fibered material to maximum 40 percent of its uncompressed size.

E. Remove dam material after firestopping material has cured.

3.4 CLEANING

A. Section 01 70 00 – Execution and Close-out Requirements: Final cleaning.

B. Clean adjacent surfaces of firestopping materials.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

A. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 08 31 13

ACCESS DOORS AND FRAMES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes fire resistive rated and non-rated access doors and panels with frames.

1.2 REFERENCES

A. ASTM International:
   1. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

B. Intertek Testing Services (Warnock Hersey Listed):
   1. WH - Certification Listings.

C. National Fire Protection Association:
   1. NFPA 80 - Standard for Fire Doors, Fire Windows.
   2. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.
   3. NFPA 288 - NFPA 288: Standard Method of Fire Tests of Floor Fire Door Assemblies Installed Horizontally in Fire Resistance-Rated Floor Systems.

D. Underwriters Laboratories Inc.:
   1. UL 10B - Fire Tests of Door Assemblies.
   2. UL 263 - Standard for Safety for Fire Tests of Building Construction and Materials.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate exact position of access door units.

C. Product Data: Submit literature indicating sizes, types, finishes, hardware, scheduled locations, fire resistance listings, and details of adjoining Work.

1.4 QUALITY ASSURANCE

A. Fire Rated Access Door Construction: Conform to one of the following:
   1. Wall Access Doors: NFPA 252 or UL 10B.

B. Attach label from agency approved by authority having jurisdiction to identify each fire rated access door.

PART 2 PRODUCTS

2.1 ACCESS DOORS AND PANELS

A. Manufacturer:

1. Karp Associates, Inc. Model KRP-150FR.

B. Other Acceptable Manufacturers
   1. J. L. Industries.
   2. Milcor LTD, Partnership.
   3. Nystrom Products Co.
   4. Or equal.

C. Fire Rated Access Door: Frames and nominal 1 inch wide exposed flanges of minimum 16 gage steel and door panels of 20 gage steel. Provide self closing and latching doors with keyed lock to match Owners existing key system.

2.2 FABRICATION

A. Fabricate units of continuous welded construction; weld, fill, and grind joints to assure flush and square unit.

B. Wall and Ceiling Access Door and Panel Hardware:
   1. Hinge: Standard continuous or concealed spring pin type, 175 degree steel hinges.
   2. Lock: Self-latching lock.

C. Size Variations: Obtain acceptance of manufacturer's standard size units which vary slightly from sizes shown or scheduled.

2.3 SHOP FINISHING

A. Stainless Steel: No. 4 finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify rough openings for access doors and panels are correctly sized and located.

3.2 INSTALLATION

A. Secure frames rigidly in place, plumb and level in opening, with plane of door and panel face aligned with adjacent finished surfaces.
   1. Set concealed frame type units flush with adjacent finished surfaces.

B. Position unit to provide convenient access to concealed work requiring access.

C. Install fire rated units in accordance with NFPA 80 and requirements for fire listing.

END OF SECTION

SECTION 09 24 00

PORTLAND CEMENT PLASTERING

PART 1 GENERAL

1.1 SUMMARY

A. Section includes Portland cement plaster system.

B. Related Sections:

1.2 REFERENCES

A. ASTM International:
1. ASTM A526 / A526M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality.
2. ASTM A641 - Standard Specification for Zinc–Coated (Galvanized) Carbon Steel Wire.
3. ASTM C847 - Standard Specification for Metal Lath.
4. ASTM C926 - Standard Specification for Application of Portland Cement-Based Plaster.
5. ASTM C1063 - Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster.

B. and Cement Association:
1. PCA - Portland Cement Plaster (Stucco) Manual.

1.3 PERFORMANCE REQUIREMENTS

A. Fabricate vertical elements to limit finish surface to 1/180 deflection under lateral point load of 100 lbs.

B. Fabricate horizontal elements to limit finish surface to 1/240 deflection under superimposed dead load.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittals: Submittal procedures.

B. Product Data: Submit data on plaster materials, characteristics and limitations of products specified.

C. Samples: Submit samples illustrating finish color and texture.

1.5 QUALITY ASSURANCE

A. Section 01 40 00 – Quality Requirements: Requirements for compliance with reference standards.

B. Perform Work in accordance with ASTM C926 and PCA Portland Cement Plaster (Stucco) Manual.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Interior Plaster Work: Do not apply cement plaster unless minimum temperature of 50 degrees F).has been and continues to be maintained in building for minimum 48 hours prior to plaster application, during application, and until cured.

PART 2 PRODUCTS

2.1 PORTLAND CEMENT PLASTER

A. Plaster Base Materials: Factory proportioned, alkali resistant, fiberglass reinforced, Portland cement based stucco designed for one-coat basecoat application. Equal to Base Coat Stucco – Pump Grade (No. 1139-86) as manufactured by the QUIKRETE® Companies, One Securities Centre, 3490 Piedmont Road, NE, Suite 1300, Atlanta, GA 30305; telephone (404) 634-9100.

B. Plaster Finish Materials: Factory proportioned stucco finish color and texture coat. Premixed Finishing Coat equal to Finish Coat Stucco (White – No. 120) as manufactured by the QUIKRETE® Companies, One Securities Centre, 3490 Piedmont Road, NE, Suite 1300, Atlanta, GA 30305; telephone (404) 634-9100.

C. Water: Clean, fresh, potable, and free of matter capable of affecting plaster.

D. Furring and Lathing: Runner and Cross-Furring Channels: Cold-rolled galvanized steel channels, 1 1/2 inch (38 mm) and 3/4 inch (19 mm), a minimum of 33,000 psi yield strength and a minimum of 0.0538-inch bare steel thickness, ASTM A526.

E. Expanded Metal Lath: ASTM C847, galvanized.

F. Tie Wire – 18 gauge galvanized and annealed low-carbon steel in compliance with ASTM A641 with Class I coating.

G. Casing Bead: Formed sheet steel, depth governed by plaster thickness, maximum possible lengths, expanded metal flanges, with square edges; galvanized.

H. Corner Bead: Formed sheet steel, depth governed by plaster thickness, maximum possible lengths, expanded metal flanges with radiused edge; galvanized.

2.2 MIXES

A. Mix plaster as recommended by manufacturer.

B. Mix only as much plaster as can be used prior to initial set.

C. Protect mixtures from freezing, frost, contamination, and excessive evaporation.

D. Do not retemper mixes after initial set has occurred.

PART 3 EXECUTION

3.1 EXISTING WORK

A. Extend existing Portland cement plaster installations using materials and methods as specified.

B. Repair existing damaged Portland cement plaster which remains or is to be remodeled.

3.2 INSTALLATION

A. Installation of Lathing Materials:
1. Suspended soffits/ceilings shall be erected so that the finished basecoat cement plaster surface is true to line and level, with allowable tolerance of 1/4 inch in 10 ft.
2. Hanger wires maximum support 16 sq. ft.
3. 1 1/2-inch main runner channels o.c. spacing 48 inches.
4. 3/4-inch cross-furring channels o.c. spacing 13 to 16 inches.
5. 3.4-pound-per-square-yard diamond-mesh lath.
6. Wire-tie lath to cross-furring channels with 18-gauge tie-wire, 6 inches (150 mm) o.c.

B. Installation of Accessories:
1. Install accessories in accordance with ASTM C1063.
2. Place corner bead at external wall corners; fasten at outer edges of lath only.
3. Place casing beads at terminations of plaster finish. Butt and align ends. Secure rigidly in place.

C. Plastering:
1. Apply plaster in accordance with ASTM C926. And PCA Plaster (Stucco) Manual.
2. Apply stucco first (“scratch”) coat in a nominal thickness of 3/8 inch. First coat should completely embed the lath. First coat should be thick enough to allow for scoring of cement plaster surface. Scratch horizontal grooves 1/8 inches (3 mm) deep across the surface of the basecoat mortar.
3. Moist cure the first (“scratch”) coat for a minimum of 48 hours before application of the second (“brown”) coat.
4. Apply stucco second (“brown”) coat in a nominal thickness of 3/8 inch (10 mm) over stucco first coat. Second coat thickness to bring the combined basecoats (first and second) thickness to a nominal thickness of 3/4 inch.
5. Apply the second coat with sufficient material and pressure to ensure a tight uniform bond to the first coat.
6. Screed the second coat to a true, even plane, filling surface defects with cement plaster.
   a. Trowel-float the second coat surface uniformly.

3.3 CURING BASECOAT

A. Basecoat Stucco must be water cured with a fine mist once it has achieved final set. Spray surface periodically for 48 hours. During hot and dry conditions, additional precautions may be necessary, including more frequent spraying, or the erection of barriers to deflect sunlight and wind.

B. The stucco basecoat should be protected from freezing for a period of 24 hours after application.

3.4 STUCCO FINISH COAT

A. Stucco basecoat (or concrete surface) is required to be in a proper condition before application of stucco finish coat or acrylic finish coat.

B. Dampen stucco basecoat evenly with a fine water spray. Do not soak surface.

C. Trowel or spray apply Finish Coat Stucco at a minimum 1/8 inches (3.2 mm) thickness.

D. Smooth Finish Coat Stucco with a darby and allow application to take an initial set prior to beginning texturing operations. Avoid overlapping previously dried areas.

E. Complete texture application while the mix is till workable. Surface texture to match existing.

3.5 CURING FINISH COAT

A. Finish Coat Stucco must be water cured with a fine mist once it has achieved final set. Care must be exercised to avoid erosion damage to the finish surface. Uneven curing may result in color variations. Spray the surface periodically for several days. During hot and dry conditions, additional precautions may be necessary, including more frequent spraying or the erection of barriers to deflect sunlight and wind.

3.6 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Control: Tolerances.

B. Maximum Variation from Flat Surface: 1/8 inch in 10 feet.

END OF SECTION

SECTION 09 51 13

ACOUSTICAL PANEL CEILINGS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Acoustic panels.
   2. Suspended metal grid ceiling system and perimeter trim.

1.2 REFERENCE STANDARDS

A. ASTM International:
   1. ASTM C635 - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
   2. ASTM C636 - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
   3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

B. Ceilings and Interior Systems Construction Association:
   1. CISCA - Acoustical Ceilings: Use and Practice.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittals: Requirements for submittals.

B. Product Data: Submit data on metal grid system components, acoustic units and panels.

C. Samples:
   1. Submit samples illustrating material and finish.
   2. Submit samples color samples of grid for selection where colored grid is specified.

D. Manufacturer's Instructions: Submit special procedures, and perimeter conditions requiring special attention.

1.4 QUALITY ASSURANCE

A. Conform to CISCA requirements.

B. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing work of this section with minimum three years documented experience.

PART 2 PRODUCTS

2.1 SUSPENDED ACOUSTICAL CEILINGS

A. Manufacturer List:
   1. United States Gypsum Company as basis of design.
   2. No substitutions.

B. Performance / Design Criteria:
   1. Suspension System: Rigidly secure acoustic ceiling system including integral mechanical and electrical components with maximum deflection of 1/240

2.2 COMPONENTS

A. Acoustic Panels SAT-1: Fifth Avenue as Manufactured by USG Interior Systems, conforming to the following:
   1. Size: 24 x 24 inches.
   2. Thickness: 5/8 inches.
   3. Composition: Mineral.
   4. Light Reflectance: 80 percent minimum.
   5. Edge: SQ
   6. Surface Color: White.
   7. Surface Finish: Perforated (small holes), fissured, directional, medium textured.

B. Grid:
   1. Non-fire Rated Grid: ASTM C635, intermediate duty; exposed T; components die cut and interlocking.
   2. Grid Materials: Cold rolled aluminum.
   3. Exposed Grid Surface Width: 15/16 inch.
   4. Perimeter Molding Width: Match grid width.
   5. Grid Finish: White where acoustic panels are scheduled, color to be selected where acoustic panels are to be omitted.
   6. Accessories: Trim for interior square and bullnose corners.
   7. Support Channels and Hangers: Galvanized steel; size and type to suit application and ceiling system flatness requirement specified.

2.3 ACCESSORIES

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

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 71 00 – Examination and Preparation: Examination and acceptance of preceding work.

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

3.2 INSTALLATION

A. Lay-In Grid Suspension System:

1. Install suspension system in accordance with ASTM C635, ASTM C636 and as supplemented in this section.
2. Locate system on room axis according to reflected plan.
3. Install after major above ceiling work is complete. Coordinate location of hangers with other work.
4. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
5. Where ducts or other equipment prevent regular spacing of hangers, reinforce nearest affected hangers and related carrying channels to span extra distance.
6. Do not support components on main runners or cross runners when 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.
7. Do not eccentrically load system or produce rotation of runners.
8. Perimeter Molding:
    a. Install edge molding at intersection of ceiling and vertical surfaces.
    b. Use longest practical lengths.
    c. Overlap and rivet corners.
    d. Install at junctions with other interruptions.
9. Install straight or bullnose trim cover at interior grid corners.

B. Acoustic Units:
1. Fit acoustic units in place, free from damaged edges or other defects detrimental to appearance and function.
2. Lay directional patterned units one way with pattern parallel to shortest room axis. Fit border trim neatly against abutting surfaces.
3. Install units after above ceiling work is complete.
4. Install acoustic units level, in uniform plane, and free from twist, warp, and dents.
5. Cutting Acoustic Units:
    a. Cut to fit irregular grid and perimeter edge trim.
    b. Cut square reveal edges to field cut units.

3.3 TOLERANCES

A. Section 01 45 00 - Quality Control: Tolerances.

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

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

END OF SECTION

SECTION 09 90 00

PAINTING AND COATING

PART 1 GENERAL

1.1 SUMMARY

A. Section includes surface preparation and field application of paints, and other coatings.

B. Related Sections:
1. Section 05 50 00 - Metal Fabrications: Shop primed items.

1.2 REFERENCES

A. ASTM International:
1. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications.
2. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials.
3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

B. Painting and Decorating Contractors of America:
1. PDCA - Architectural Painting Specification Manual.

C. SSPC: The Society for Protective Coatings:
1. SSPC - Steel Structures Painting Manual.

1.3 DEFINITIONS

A. Conform to ASTM D16 for interpretation of terms used in this section.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittals: Submittal procedures.

B. Product Data: Submit data on finishing products. Identify each component based upon paint system that it is used in.

C. Samples:
1. Submit paper chip samples illustrating range of colors available for each surface finishing product scheduled.

1.5 CLOSEOUT SUBMITTALS

A. Section 01 70 00 – Execution and Closeout Requirements: Submittal requirements.

B. Operation and Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.

1.6 QUALITY ASSURANCE

A. Section 01 40 00 – Quality Requirements: Requirements for compliance with reference standards.

B. Surface Burning Characteristics:
   1. Fire Retardant Finishes: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

B. Applicator: Company specializing in performing work of this section with minimum three years documented experience and approved by manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 – Material and Equipment: Product storage and handling requirements.

B. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

C. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

D. Paint Materials: Store at minimum ambient temperature of 45 degrees F and maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Do not apply materials when surface and ambient temperatures are outside temperature ranges required by paint product manufacturer.

B. Do not apply exterior coatings during rain or snow when relative humidity is outside humidity ranges, or moisture content of surfaces exceed those required by paint product manufacturer.

C. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

D. Minimum Application Temperature for Varnish Finishes: 65 degrees F for interior or exterior, unless required otherwise by manufacturer's instructions.

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

1.10 WARRANTY

A. Section 01 70 00 – Execution and Closeout Requirements: Product warranties and product bonds.

B. Furnish five year manufacturer warranty for paints and coatings.

PART 2 PRODUCTS

2.1 PAINTS AND COATINGS

A. Manufacturers: Paint
   1. Glidden Coatings and Resins
   2. Benjamin Moore and Company
   3. Sherwin Williams Company
   4. Valspar Corporation
   5. Devoe Paint Co.
   6. Fuller-O'Brien.
   7. PPG Architectural Finishes.

2.2 COMPONENTS

A. Coatings: Ready mixed, except field catalyzed coatings. Prepare coatings:
   1. To soft paste consistency, capable of being readily and uniformly dispersed to homogeneous coating.
   2. For good flow and brushing properties.
   3. Capable of drying or curing free of streaks or sags.

B. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve finishes specified; commercial quality.

C. Patching Materials: Latex filler.

D. Fastener Head Cover Materials: Latex filler.

2.3 FINISHES

A. Exterior Paint Systems EPS-1:
   1. System EPS-1: Gloss Alkyd Enamel:
      a. 1st Coat; (Primer):
         1) Ferrous Metal: Red oxide primer (TT-P-645).
         2) Galvanized Metal: Galvanized primer (TT-P-641).
      b. 2nd Coat and 3rd Coat:
         1) Gloss Alkyd Enamel (TT-E-489, Class A).
   2. Apply to the following scheduled exterior surfaces:
      a. Miscellaneous metal items.
      b. All grills, registers, and diffusers specified to be field finished.
      c. Gas piping and meter.

B. Interior Paint Systems IPS-1:
   1. Latex:
      a. 1st Coat; (Primer):
         1) Gypsum Drywall and or Plaster: Latex Primer.
         2) Concrete Masonry Units: Surface Filler.
         3) Concrete: Latex Primer.
      b. 2nd Coat and 3rd Coat: Latex base emulsion, Satin FInish. Color as selected by Architect.
   2. Apply to the surfaces as indicated in Drawings

C. Interior Paint System IPS-2:
   1. Enamel:
      a. 1st Coat; (Primer)
         1) Ferrous metal: Red oxide primer.
         2) Galvanized metal: Galvanized primer.
      b. 2nd Coat: Ferrous Metal and Galvanized Metal: Enamel Undercoater.
      c. 3rd Coat: Odorless Alkyd Enamel, Semi-Gloss.
   2. Apply to the following interior surfaces:
      a. Miscellaneous steel and metal items exposed to view except as noted otherwise.
      b. Other surfaces and rooms as indicated on the Room Finish Schedule.
      c. Exposed to view mechanical and electrical items specified to be field finished.

D. Interior Transparent Finish System ITF:
   1. System ITF; Oil Stain and Satin Finish.
      a. 1st Coat: Open grained wood; Paste wood filler.
      b. 2nd Coat: Interior Oil Stain.
      c. 3rd Coat: Elkyd (Sanding Sealer).
      d. 4th and 5th Coat: Elkyd Satin Finish.
   2. Apply to the following interior surfaces:
      a. New exposed to view standing and running wood trim.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 40 00 – Quality Requirements: Examination and acceptance of preceding work.

B. Verify surfaces and substrate conditions are ready to receive Work as instructed by product manufacturer.

C. Examine surfaces scheduled to be finished prior to commencement of work. Report conditions capable of affecting proper application.

D. Test shop applied primer for compatibility with subsequent cover materials.

E. Measure moisture content of surfaces using electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
   1. Plaster and Gypsum Wallboard: 12 percent.
   2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
   3. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
   4. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.
   5. Concrete Floors: 8 percent.

3.2 PREPARATION

A. Surface Appurtenances: Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.

B. Surfaces: Correct defects and clean surfaces capable of affecting work of this section. Remove or repair existing coatings exhibiting surface defects.

C. Marks: Seal with shellac those which may bleed through surface finishes.

D. Insulated Coverings: Remove dirt, grease, and oil from canvas and cotton.

E. Gypsum Board Surfaces: Fill minor defects with filler compound. Spot prime defects after repair.

F. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.

G. Concrete and Unit Masonry Surfaces Scheduled to Receive Paint Finish: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.

H. Plaster Surfaces: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.

I. Uncoated Steel and Iron Surfaces: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by [hand] [power tool] wire brushing or sandblasting; clean by washing with solvent. Apply treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Spot prime paint after repairs.

J. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.

K. Interior Wood Items Scheduled to Receive Paint Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats.

3.3 EXISTING WORK

A. Extend existing paint and coatings installations using materials and methods compatible with existing installations and as specified.

3.4 APPLICATION

A. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

B. Apply each coat to uniform appearance. Apply each coat of paint slightly darker than preceding coat unless specified otherwise.

C. Sand metal surfaces lightly between coats to achieve required finish.

D. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

E. Finishing Mechanical and Electrical Equipment:
   1. Refer to Mechanical and Electrical sections for schedule of color coding and identification banding of equipment, duct work, piping, and conduit.
   2. Paint shop primed equipment.

3. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
4. Prime and paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, except where items are shop finished.
5. Paint interior surfaces of air ducts visible through grilles and louvers with one coat of flat black paint to visible surfaces. Paint dampers exposed behind louvers, grilles, to match face panels.
6. Paint exposed conduit and electrical equipment occurring in finished areas.
7. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.
8. Color code equipment, piping, conduit, and exposed duct work in accordance with requirements specified in respective mechanical and electrical sections.
9. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.5 CLEANING

A. Section 01 70 00 – Execution and Close-out Requirements: Cleaning and Waste Management: Final cleaning.

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

END OF SECTION

DIVISION 23

SECTION 230000 - MECHANICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This Division includes all labor, materials, equipment, tools, supervision, start-up services, Owner's Instructions, including all incidental and related items necessary to complete installation and successfully test and start up and operate in a practical and efficient manner the Mechanical Systems indicated on Drawings and described in each Section of Division 23 Specifications and conforming with all Contract Documents.

B. Bidding: the Contractor shall bid the project in strict accordance with the plans and Specifications. Alternative methods or materials, beyond those indicated as "Base Bid", proposed by the Contractor shall be in the form of a voluntary alternate, with all details indicated, and a separate add or deduct price for these changes submitted with the Contractor's bid. (Reference General Requirements - Product Substitutions)

C. Mechanical systems, complete and in place, shall include the following:

SECTION 230000	MECHANICAL GENERAL PROVISIONS
SECTION 230010	BASIC MECHANICAL MATERIALS AND METHODS
SECTION 230510	HYDRONIC PIPING
SECTION 230545	CHEMICAL WATER TREATMENT
SECTION 230553	IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT
SECTION 230593	TESTING, ADJUSTING AND BALANCING FOR HVAC EQUIPMENT
SECTION 230700	THERMAL INSULATION
SECTION 230900	INSTRUMENTATION AND CONTROL FOR HVAC
SECTION 238223	UNIT VENTILATORS
SECTION 238300	BOILERS
SECTION 238900	DUCTWORK

D. The General Provisions of this Contract, including General and Supplementary Conditions and other General requirements Sections, apply to the Work specified in this Section.

E. This Section is not intended to supersede, but to clarify the definitions in Division 01, General Requirements and Supplementary Conditions.

F. Drawings and Specifications:

1. Drawings and Specifications are intended to complement each other, and all work specified and not shown or work shown and not specified shall be provided as though mentioned in both specifications and drawings.

2. Minor items and accessories or devices reasonably inferable as necessary to the complete and proper operation of any system shall be provided by the Contractor or Subcontractor for such system, whether or not they are specifically called for by the specifications or drawings.

3. Drawings are diagrammatic and indicate general arrangement of systems and work included in

the Contract, and shall serve only as design drawings, to represent design intent for general layout of various equipment and systems and not intended to be scaled for rough-in measurements or to service as measured shop drawings.

4. If directed by the Engineer, the Contractor shall, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades or for proper execution of the work. (Refer to General Requirements for co-ordination between trades).

1.02 RELATED WORK

A. Section 260000 - Electrical General Provisions
B. All building construction documents.

1.03 COORDINATION OF WORK

A. Responsibility:

1. The Mechanical Contractor shall be responsible for his Sub-Contractors and Suppliers, and include in his bid all materials, labor, and equipment involved, and install in accordance with all local customs, codes, rules, regulations, jurisdictional awards, and decisions; and secure compliance of all parts of the Specifications and Drawings regardless of Sectional inclusion in these Specifications.

2. The Mechanical Contractor and Sub-Contractor shall be responsible for all tasks applicable to their trades as directed by the General Contractor, in accordance with the Specifications, Drawings, and code requirements, and shall be responsible for coordinating locations and arrangements of their work to give best results with all other relevant Mechanical, Architectural, Structural and Electrical Contractors' Specifications, Drawings and shop drawings. Coordinate work so that sprinkler heads, lights, diffusers, etc. are coordinated into Project and are installed per the architectural reflected ceiling plan.

B. Site and Project Document Examination:

1. Submission of a proposal is considered evidence that the Contractor has visited site and acquainted themselves with all existing conditions, made all necessary measurements, examined the Drawings and Specifications of all trades, including Mechanical, Architectural, Structural, and Electrical, and has fully informed himself with all Project and site conditions, and is proficient, experienced and knowledgeable of all standards, codes, ordinances, permits and regulations which affect the installation of his respective trade, and that all costs are included in his proposal.

2. No allowance shall subsequently be made in his behalf for extra expense incurred due to failure or neglect on his part to make this visit and examination.

3. The Mechanical Contractor and/or Sub-Contractor shall obtain all required permits and assessments have been obtained prior to starting work. Contractor shall verify requirement to include privilege fees and permits as part of his formal bid, as described in General and Supplementary Conditions.

4. It is the responsibility of the Contractor to notify the Engineer, prior to submitting his bid, of any potential problems that he has identified during his site visit or from examination of the Contract documents.

C. General Supports:

1. Provide all necessary angle and channel brackets or supplementary steel as required for adequate support for all piping, specialties, and equipment which is hung or mounted above floor. No trade shall hang equipment from work of another trade (such as sprinkler lines hanging from heating lines or electrical conduit). Secure approval from Architect, in writing, before welding or bolting to steel framing or anchoring to concrete structure.

2. Where piping or equipment is suspended from concrete construction, set approved concrete inserts in formwork to receive hanger rods, such as Unistrut or Powerstrut, and where installed in metal deck, use Ramset or Welds as required.

D. Access Panels:

1. No valve, trap, control, fire damper, duct access opening, etc., shall be installed in inaccessible locations without access panels. Any subcontractor having items requiring access shall also include access panels for same unless Drawings indicate otherwise. Contractor shall be responsible for quantities of panels and receive approval for locations of panels from Architect/Engineer before installation.

2. Any wall, ceiling, or floor access panels required shall be equal to Milcor with hinged door and latch. Those in walls or floor shall be type to accept finished surface material. Those in ceiling shall be exposed metal.

3. Removable ceilings or sections of ceilings are acceptable as access panels. Panels in rated construction shall have U.L. label and proper rating and construction to match partition, ceiling, or roof assemblies in which they occur.

4. Purchase proper access panel, coordinate location, have General Contractor install access panel, and reimburse for installation. This trade is to coordinate the access panel manufacturer with the architectural access panels.

E. Field Changes:

1. This Contractor shall not make any field changes which affect timing, costs, or performance without written approval from the Architect/Engineer in the form of a Change Order, Field Change Order, or a Supplemental Instruction. In special circumstances, verbal approvals pending paperwork may be acceptable. The Contractor assumes liability for any additional costs for changes made without such instruction or approval. Should any unauthorized change be determined by the Architect/Engineer as lessening the value of the project, a credit will be determined and issued as a change to the contract in accordance with the General Requirements.

1.04 STANDARDS, CODE AND PERMITS

A. Refer to Division 01, General Requirements and Supplementary Conditions.

B. All work installed under Mechanical Sections shall comply with latest edition of applicable standards and codes of following:

ADAG	Americans with Disability Act Guidelines, Title III
ASA	American Standards Association
ASME	American Society of Mechanical Engineers
SMACNA	Sheet Metal & Air Conditioning Contractor Association
NSF	National Sanitation Foundation
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASTM	American Society of Testing Materials
ANSI	American National Standards Institute
AGA	American Gas Association
AWWA	American Water Works Association
NFPA	National Fire Protection Association
IBR	Institute of Boiler and Radiator Manufacturers
AWS	American Welding Society
UL	Underwriter's Laboratories
NEMA	National Electric Manufactures Association
NESC	National Electric Safety Code (H13)
OSHA	Occupational Safety and Health Act
ABMA	American Boiler Manufacturers Association
	Michigan Mechanical Code - 2015

C. All work shall be provided and tested in accordance with all applicable local, county, and state laws, ordinances, codes, rules, and regulations.

D. Contractor shall give all notices, file all drawings, obtain necessary approvals, obtain all permits, pay all fees, deposits, and expenses required for installation of all work under this Contract.

E. No work shall be covered or enclosed until work is tested in accordance with applicable codes and regulations, and successful tests witnessed and approved by authorized inspection authority. Written approvals shall be secured by Contractor and kept on file for inspection by the Engineer.

F. In general, all material, where applicable, shall be labeled or listed by Underwriters' Laboratories, Inc.

G. In the event that plans and specifications conflict with any rules, regulations, or codes applying, said rules, regulations, and codes shall govern the Contractor.

1.05 SUBMITTALS

A. Shop Drawings:

1. After a schedule of Sub-Contractors is approved by the Engineer, submit shop drawings electronically for equipment and materials indicated on drawings or in the specifications.

2. Submit complete manufacturer's shop drawings of all equipment, accessories, and controls, including dimensions, weights, capacities, construction details, installation, control methods, wiring diagrams, motor data, etc.

3. Engineer's approval of shop drawings is for general application only, and is a service that is not considered as a guarantee of total compliance with, or that relieves the Contractor of basic responsibilities under all Contract Documents, and does not approve changes in time or cost.

4. After approval, each Contractor is responsible for expeditiously providing information to all other trades involved in, or affected by, installation of his equipment and work.

B. Operating and Maintenance Instructions and Manuals:

1. Each Contractor shall provide for all major items of equipment two (2) copies, in 3-ring notebooks, of indexed sets of operating and maintenance instructions to Engineer for approval. After approval, manuals will be given to Owner by Engineer.

2. Manuals shall include a complete set of shop drawings submitted, repair parts lists, manufacturer's standard equipment manuals, valve tag schedule, and automatic control diagrams, all indexed with tabs for each section.

   a. Operating Instructions:
   Typewritten instructions regarding the starting and operating of all equipment and accessories. Operating instructions shall be encased in plastic and mounted in mechanical room. Provide additional copies of above materials in 3-ring notebooks. Operating instructions within notebooks shall also include locations of temperature control devices, switches, and equipment (including air handlers, pumps, etc.). Also, include steps of trouble-shooting and describe areas served by equipment.

   b. Maintenance Instructions:
   Provide a list of all mechanical contractors and subcontractors, including contact person and day/night telephone numbers. Upon completion of work, provide for periods not less than four (4) hours, competent person to instruct Owner in operation and maintenance of mechanical systems, equipment, controls, etc.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Standards:

1. All products shall be provided by established manufacturers regularly engaged in making the type of materials to be provided and shall be complete with all parts, accessories, trim, finish, safety guards and other devices and details needed for a complete installation and for the intended use and effect.

B. Substitution and Changes:

1. Contractor and/or Equipment Supplier may propose alternate equipment or materials of equal quality, function, durability, and appearance as described and permitted in Specification Section 230000, 1.01.B. The substitution will take the form of an "Add-Deduct" at the time of bid submittal. It is the submitter's responsibility to provide sufficient material for review as may be required by the Engineer's office. Acceptance and approval is the responsibility of the Engineer.

2. No substitutions will be accepted, except as authorized in a Project Addendum.

3. Contractor and/or Equipment Supplier is liable for any added costs to himself or others, and is responsible for verifying dimensions, clearance, and roughing-in requirements, when product not specifically named or described as the basis of design is used. The Contractor is responsible for advising other Contractors of variations and, if requested, submitting revised drawing layout for approval of the Engineer.

C. Explanation of Scheduled Manufacturers:

1. "Base Bid". This term designates that this equipment will be the product which the contractor generates his bid from. It is usually a component that is critical to maintaining the design intent. No other equipment suppliers will be allowed to bid as an "equal".

2. "Based On". This term designates that the equipment is designed around a certain product. Products of equal status are listed and may be bid as if they were the basis of design. The "based on" equipment shall serve as the standard to which equals will be judged.

2.02 ELECTRICAL REQUIREMENTS

A. Motor Starters and Controls:

1. Electrical Contractor shall provide all manual or magnetic motor starters as required for motors as indicated on the Electrical Drawings and specified in Division 26.

2. Mechanical Contractor shall provide factory installed motor starters and/or safety switches, integral with packaged equipment, containing thermal overcurrent protection in ungrounded conductors with heater coils selected for specific motor usage for motors.

3. "Package equipment" shall be defined as Mechanical, Architectural, Civil, or other Trade's equipment, and which is specified in other divisions of this specification, and which shall be furnished and installed complete with all associated electrical components by those trades.

   Other Trades providing package equipment shall also provide both integral and remotely located devices if necessary for a complete system, ready for operation except for a single incoming power source. These devices may include main disconnect switches, heavy duty disconnect switches, starters, control transformers, interlocks, relays, fuses, terminal blocks, capacitors, wire, wire and devise identification, conduit, and other necessary components.

   Any special work to be provided under this division of the specifications outside the definition of package equipment shall be as noted on the drawings accompanying these specifications, or as specially noted after the package equipment list entry hereinafter.

B. Electrical Wiring and Controls:

1. Mechanical Contractor shall provide all motors, drives, and controllers integral to packaged equipment and factory mounted controls for all mechanical equipment. When pre-wired equipment is used, control circuit shall be separately fused at control transformer, and shall always revert to a fail-safe condition.

2. Mechanical Contractor shall provide electrical devices requiring mechanical/electrical connections, such as pressure switches, limit switches, float switches, solenoid valves, motor operated valves, etc.

3. Electrical Contractor shall install power wiring and conduit to motors and/or factory mounted control panels as indicated on Drawings or in specifications.

4. All electrical wiring work by Mechanical Contractor shall be in accordance with Division 26 requirements.

PART 3 - EXECUTION

3.01 CLOSEOUT

A. Final Acceptance:

Final acceptance and payment will only be made after the final check list completion and receipt at Engineer's office of:

All Guarantees/Warranties
Test Reports
Operating and Maintenance Instruction Manuals (2)
Record Drawings (As-Built)
Certificates of Inspection
Lubrication and Valve Charts
Maintenance Contracts, if required
Spare Parts (i.e. filters, etc.)
Test and Balance Reports

B. Certificates of Inspection and Test Reports:

The Contractor is to provide the Engineer with evidence that the installation has been inspected and approved by municipal or state inspector having jurisdiction over that phase of work involved, i.e., plumbing, heating, boiler, fire protection, refrigeration, etc.

C. Guarantees and Warranties:

1. During the one year guarantee period (except if General Requirements specify a longer warranty period), make two complete inspections (at approximately 3 months and 10 months) of all systems, fixtures, equipment, safety devices, and controls to ensure that the equipment is operating properly, and report to the Engineer in writing. The visits are to be co-ordinated with the owner.

D. Record Drawings:

1. Maintain a white-print set of Mechanical Contract Drawings in clean, undamaged condition for mark-up of actual installation on Contract Drawings, which vary substantially (i.e. location of piping, ductwork, size changes, etc.) from the work as shown.

E. Operating and Maintenance Instructions:

1. Provide instruction of Owner's personnel in operation and maintenance procedures for all systems equipment such as boilers, HVAC equipment, temperature controls, etc.

2. Provide the Owner with instructions on the location of hand valves, and other concealed items,

etc.

F. Placing Systems into Operation:

1. Mechanical Contractor shall be responsible for all start-up procedures, system checks and balancing, and coordinating work of other Contractors and Sub-Contractors to assure cooperation.

2. All equipment shall be installed, tested and operated in accordance with the manufacturer's recommendations at normal operating conditions.

3. Permanent equipment may be operated during construction only with adequate protection from damage and dirt by straining of fluids, and replacing as often as necessary to keep mechanical systems reasonably clean and dust free and replacement at turnover to owner.

4. Place all systems into operation, when weather or other considerations require their use. Perform repair, adjustment and balancing operations as often as required to assure satisfactory operation before final acceptance.

5. Check, test and adjust pressure reducing and relief valves, thermometers, gauges, meters, safety controls and devices, and other instruments and controls to assure proper operation.

6. Tests:

   a. Make necessary tests to provide leak-proof and code-tested system under operation. Make tests before work is concealed or covered and perform all necessary repairs as required or as otherwise indicated by test results.

   b. See subsequent trade sections for additional requirements.

G. Adjustments and Balancing:

1. Subsequent to the installation of the HVAC systems and upon the beginning of operation, the Contractor shall make all necessary adjustments to equipment installed by him under this Contract so as to ensure proper operation of the same. The Contractor shall be responsible for balancing the air system to deliver the air quantities shown on the Plans. The Contractor shall have an independent AABC or NEBB subcontractor submit (2) copies of his balancing work sheets indicating preliminary and final results. All balancing shall be performed as specified in the SMACNA Manual and ADC Standards. **Balancing must be completed and report submitted before Engineer completes final check list.**

3.03 GUARANTEES AND WARRANTIES

A. All labor, materials and equipment shall be guaranteed by Contractor and/or warranted by the Manufacturer for one year after acceptance date and/or one normal continuous complete season's operation applicable to equipment or system except where specified longer for special equipment. Contractor shall secure such warranty from all Suppliers or the Contractor will assume the warranty and issue an Insurance Policy to the owner.

B. Acceptance date of substantial completion shall be Owner occupancy as determined by Architect/Engineer.

C. Contractor shall make all necessary alterations, repairs, adjustments, and replacements during guarantee periods as directed by Architect/Engineer to comply with Drawings and Specifications at no cost to Owner. The Contractor shall repeat as often as necessary to give satisfactory system in opinion of Engineer.

D. Repair or replacements made under guarantee shall bear further one year guarantee from date of acceptance of repair or replacement.

END OF SECTION

SECTION 230010 - BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL

This Specification is intended to describe general mechanical systems' methods and materials.

1.01 RELATED WORK

A. Division 23 - Mechanical General Provisions
B. Division 26 - Electrical General Provisions

1.02 WORKMANSHIP

A. Install work in accordance with best practice of trade.

1. Install new ductwork straight and true with no unnecessary offsets and parallel with walls, beams, floors, or ceilings.

1.03 PIPES AND PIPE FITTINGS

A. General:

1. Coordinate with work of other trades. Piping shall not be supported from ductwork or piping of other trades.

2. Support piping from structure using approved hangers; pipe straps shall not be permitted.

3. Allow for adequate expansion and contraction while maintaining alignment. Provide expansion joints or loops as required.

4. Use reducing fittings when changing pipe sizes. Bushings and "Orange Peeling" shall not be permitted.

5. Terminate piping to fixtures and equipment furnished by others including stop valves.

6. Install unions adjacent to each valve, and at the final connection to each piece of equipment having 2" and smaller connections, and elsewhere as indicated.

7. Dielectric Unions: Provide dielectric unions with appropriate end connections for the pipe materials in which installed (screwed, soldered, or flanged) which effectively isolate dissimilar metals, to prevent galvanic action, and stop corrosion.

8. Fit all openings in piping with temporary plugs and caps during construction.

9. Insulating couplings shall be installed at all locations where copper piping connects to other metals.

10. If leak occurs, pipe or fitting shall be replaced with new length or fitting. Ream out all pipe ends. Clean out debris and excess oil before installing. Use approved lubricant for all

threaded joints. Do not stop leaks by adding caulking to joints.

11. Fire Barrier Penetrations: Where pipes pass through fire rated walls, partitions, ceilings, or floors, the fire rated integrity shall be maintained. Refer to Architectural Drawings or Plans indicating walls, floors, or ceilings requiring ratings and the amount of rating.

B. Sleeves and Escutcheons:

1. Piping passing through concrete and masonry walls and floors shall be sleeved; wall sleeves shall be cut back 3/8" from face of wall.

2. Sleeves shall be fabricated from sections of PVC or steel pipe, 1/2" to 1" larger than pipe or insulation.

3. Sleeves passing through floors shall extend 3/8" above floor. Void between sleeve and pipe shall be caulked water tight. Use fire-rated sealants at rated floors and walls.

4. Sleeves shall be permanently mortared in.

5. Where pipes pass through exterior walls, seal pipe penetrations through exterior walls using sleeves and mechanical sleeve seals. Pipe sleeves smaller than 6" shall be steel or PVC; pipe sleeves 6" and larger shall be sheet metal.

C. Pipe Joints:

1. Steel Pipe Joints:

a. Pipe 2" and Smaller: Thread pipe with tapered pipe threads in accordance with ANSI B2.1. Apply pipe joint lubricant or sealant suitable for the service for which the pipe is to be used.

b. Pipe Larger than 2": Weld pipe joints for steel pipe (except for exterior water service pipe) in accordance with ASME Code for Pressure Piping, B31.

2. Brazed and Solder Joints: For copper tube and fitting, braze joints in accordance with ANSI B31.1.0 - Standard Code for:

a. Pressure Piping, Power Piping; ANSI B9.1 - *Standard Code for Mechanical Refrigeration.*

b. Solder: Type of solder shall conform to following schedule:

-Hot and cold water and recirculating lines - lead free solder.
-Heating piping - 95-5 tin lead.
-Drain piping - 50-50 tin lead.

3. Welding:

a. Qualifications: Welders shall be qualified according to provisions of *ASME Standard Qualifications for Welding Procedures, Welders and Welding Operators, or ASME Boiler and Pressure Vessel Code* for class of piping being welded. Submit welding qualifications for all welders on project when requested by Engineer.

b. Welding Procedure: Preparation of base metals and welding procedures shall conform to

ASME American Standard Code for Pressure Piping.

c. Filler Material: Conform to ASTM Specifications compatible with base metal being welded.

d. Field Fabricated Fittings: Mitered or segmental elbows, swages, orange-peel, bull plugs, or similar construction will not be permitted.

e. Branch Connections: Welding of branch connections directly to run will be permitted in lieu of tees, laterals, or crosses when branch sizes are less than 1/2 of main size unless detailed otherwise. Branch pipe shall not project beyond inside of main. Failure to comply with accepted standards of workmanship in making weld-in branch lines shall require that these connections be removed and replaced with ASA B 16.9 fittings.

D. Pipe:

1. Steel Pipe:

a. Highest quality, mild steel.

b. Manufacturer's name shall be stamped or rolled into each length of pipe.

E. Copper Pipe and Fitting (Heating & Drain):

1. Pipe: Conform to ASTM Specifications. Pipe shall be color coded or marked at factory for identification. Tubing shall conform to following:

a. Above Ground: Type L hard drawn, ASTM B-88.

2. Fittings:

a. General Service: Sweat type, wrought copper (cast fittings permitted only where wrought copper is not manufactured). Long radius elbows.

b. Drainage: Sweat type, wrought copper, drainage pattern. Specialty items such as closet elbows may be cast brass.

1.04 DUCTWORK

A. General:

1. Before proceeding with fabrication and installation of ductwork, inspect the contract documents, site conditions and determine that the location of work does not interfere with other work. In case of interference, notify the Engineer.

2. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

3. Where ductwork, structure, etc. can be seen behind grilles, registers, diffusers, etc. apply flat black paint to all visual surfaces.

B. Ductwork:

1. Steel Rectangular Ducts: ASTM A525 or ASTM A527 galvanized steel sheet, lock-forming quality, having zinc coating of 1.25 oz per square feet for each side in conformance with ASTM A90.

1.05 SUPPORTS AND ANCHORS

A. General: Furnish and install all necessary pipe hangers, rollers, and duct hangers required for all systems. Hanger rod shall be all-thread carbon steel type. Rod shall conform to ASA B1/1960 Class 2A fit.

B. Ductwork: Supports and hangers for ductwork and appurtenances shall conform to *Manual of Sheet Metal and Air Conditioning Contractors Association, Inc. and latest edition of American Society of Heating, Refrigeration, and Air Conditioning Engineers Handbook*.

1.06 MOTORS

A. Ratings: Motors shall meet NEMA Standards and shall be capable of operating at rated load with voltage variation of plus or minus 10%, rated frequency variation of plus or minus 5%, or combined variation of 10% without damage to motor.

B. Selection: Motors shall be selected for type of service involved and shall be selected at minimum of 15% above required rating of equipment served. Provide "quiet rated" motors where required.

1.07 MECHANICAL IDENTIFICATION

A. General: All system components shall be identified to allow proper operation and maintenance.

B. Duct Identification: All duct covering, insulation work, installed, except concealed or metal and aluminum foil jacketed work, shall be painted to match room/structure finish.

1.08 MECHANICAL SOUND, VIBRATION, AND SEISMIC CONTROL

A. General: Entire mechanical system shall be installed to provide quiet and vibration free environment in occupied spaces. Contractor shall replace or repair equipment and/or provide additional sound and vibration control equipment if Architect/Engineer deems system or its components do not meet design criteria for sound and vibration.

B. Vibration Isolation Supports and Hangers:

1. All mechanical equipment over 1 horsepower, unless otherwise noted, shall be isolated from structure by means of resilient vibration and noise isolators supplied by single manufacturer. Where isolator type and required deflection are not shown or tabulated, equipment shall be isolated in accordance with latest version of ASHRAE Systems Handbook. Isolator manufacturer's submittal shall include complete design for supplementary bases, tabulation of design data on isolators, including outside diameter, free, operating, and solid heights of springs, free and operating heights of neoprene, or fiberglass isolators.

2. Flexible Connections:

a. General: All equipment subject to vibration and noise transmission shall be provided with flexible connections.

PART 2 - PRODUCTS

Not Used.

PART 3 – EXECUTION

A. Installation:

1. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Use splitter dampers only where indicated.

2. Provide fire dampers or combination fire and smoke dampers at locations where ducts and outlets pass through fire rated components. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings, and hinges.

3. Demonstrate re-setting of fire dampers to authorities having jurisdiction and Owner's representative.

4. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.

5. Provide flexible connections immediately adjacent to equipment in ducts associated with fans and motorized equipment.

6. Provide support for all diffusers/grilles in any ceiling structure with a non-exposed-to-view support system. System is to support diffuser/grille and associated ductwork without adding weight to ceiling tile.

B. Duct Sealants:

1. Duct systems, including all seams, joints, fastener penetrations and connections, shall be effectively sealed in accordance with SMACNA Seal Class A requirements, and leak tested with total allowable leakage from high and medium pressure (4" W.C. or greater) ducts not to exceed one (1) percent of the total system design airflow rate. Joint sealants shall have fire and smoke hazard rating as tested by ASTM E-84, NFPA255, or U.L. 723 not to exceed: Flame spread 25; Smoke Developed 50. Exterior mastic sealant shall be certified to pass 500 hours QUV. Sealants shall also comply with ASTM freeze/thaw standard C731 and D2202.

2. Manufacturer, upon request shall be able to properly document an established record of experience and success in the specialized formulation of duct sealants, elastomeric tapes, and adhesives.

3. All duct work shall be suitably cleaned and prepared, and sealant applied in strict accordance with manufacturer's recommendations for cure time shall be followed before pressure testing is

begun. Any additional paint or coatings must conform to manufacturer's specifications.

4. Sealant Manufacturer: **HARDCAST INCORPORATED** or Engineer approved equal meeting above specifications.

END OF SECTION

SECTION 230510 - HYDRONIC PIPING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Pipe and pipe fittings.

B. Valves.

C. Heating water piping system.

1.02 RELATED WORK

A. Section 230010 - Basic Mechanical Materials and Methods

B. Section 230553 - Mechanical Identification for HVAC Piping and Equipment

C. Section 230700 - Thermal Insulation

1.03 REGULATORY REQUIREMENTS

A. Conform to the latest revision of ANSI/ASME B31.9.

1.04 SUBMITTALS

A. Submit product data under provisions of Section 230000. Include data on pipe materials, pipe fittings, valves, and accessories.

B. Submit a copy of the standard welding procedure specification together with the procedure qualification record as required by Section IX of the ASME B & PV Code.

C. Include welder's certification of compliance with ANSI/ASME SEC 9.

PART 2 PRODUCTS

2.01 HEATING WATER PIPING, ABOVE GROUND

ITEM	TYPE JOINT	SIZE	CLASS	MATERIAL
TUBING	95-5 TIN LEAD	UP THRU 2"	TYPE L	ASTM B88/HARD DRAWN
FITTINGS	95-5 TIN LEAD	UP THRU 2"	TYPE L	ANSI B16.29 WROUGHT COPPER
UNIONS		UP THRU 2"	300 LB.	BRONZE TO BRONZE SEAT

PIPE	WELD	2 1/2" & UP	SCH.40	ASTM A53/SEAMLESS
FITTINGS	WELD	2 1/2" & UP	STANDARD	ASTM A234/ANSI B16.9
FLANGES		2 1/2" & UP	150 LB.	ANSI B16.5

2.02 GROOVED PIPING: Heating Piping in Accessible Areas

A. **Pipe:** Schedule 10 ASTM A-120 with factory supplied roll grooves that meet grooved coupling manufacturer's latest specification. All field roll grooves must be measured with a pi-tape and meet specification prior to coupling assembly. **Note:** This assembly method is important and joints will be randomly field checked by the engineer.

B. **Gaskets:** Gaskets must be Grade "E" with a Flushseal center leg design as provided by Victaulic Company of America or engineer approved equal. All product submittals must be approved prior to bidding. All gaskets must be lubricated with a non-petroleum based lubricant compatible with the grooved coupling manufacturer's gasket. Approved grooved coupling manufacturers: Victaulic & Gruvlok.

C. **Fittings:** All grooved fittings must be domestic and of one manufacturer. All grooved fittings must be manufactured of ASTM A-536 Ductile Iron. Approved grooved fittings manufacturers are Victaulic Company of America & Grinnell Gruvlok. Victaulic grooved copper system is approved for domestic water service 2" and larger.

D. **Couplings:** All grooved couplings must be domestic and of one manufacturer. All couplings shall be Zero-Flex "rigid" design. All couplings must be installed as per the manufacturer's latest recommendations. Provide all necessary anchors, supports and restraints per the manufacturer's recommendations for all grooved pipe systems. Three (3) flexible grooved Style 77 or 75 couplings may be used at all pumps in lieu of flex connectors.

E. **Grooved Valves:**

1. All grooved butterfly and check valves must be of one domestic manufacturer and shall be rated to 300 PSI. All grooved valves shall have an internal and external PPS coating and the disc liner must be consistent with that of the grooved coupling gasket and be compatible for the service. All grooved butterfly valves must have a blowout proof stem. The disc and stem must be of a one piece ductile iron construction.

2. Tour & Anderson circuit balancing valves series 787 threaded, series 786 solder end & 789 grooved end arc are approved for heating services.

F. **Straining Devices:** Victaulic S/730 Tee strainer & 731 Suction Diffuser are approved for heating services.

G. Victaulic Carbon Pressfit utilizing Wheatland Pressfit pipe is an approved option for all fire suppression sprinkler systems 3/4" - 2".

2.03 GATE VALVES

A. Crane, Grinnell, Stockham, Powell, Conbraco or substitutions under provisions of Section 15000.

B. Up to 2 Inches: Bronze body, bronze trim and wedge, rising stem, and threaded ends.

C. Over 2 Inches: Cast iron body, bronze trim, rising stem, O.S. & Y., and flanged ends.

2.04 GLOBE VALVES

A. Crane, Grinnell, Stockham, Powell, Conbraco or substitutions under provisions of Section 15000.

B. Up to 2 Inches: Bronze body and disc, rising stem and handwheel, renewable composition disc, repackable under pressure and screwed ends.

C. Over 2 Inches: Cast iron body, bronze trim, rising stem, handwheel, O.S. & Y., plug-type disc, flanged ends, renewable seat and disc.

2.05 BALL VALVES

A. Crane, Grinnell, Stockham, Apollo or substitutions under provisions of Section 15000.

B. Up to 2 Inches: Bronze body, stainless steel ball, Teflon seats, and stuffing box ring and threaded ends.

2.06 BUTTERFLY VALVES

A. Crane, Grinnell, Stockham, Conbraco or substitutions under provisions of Section 15000.

B. Iron body, bronze disc, resilient replaceable seat for service to 250 degrees F, wafer or lug ends, extended neck, 10 position lever handle.

2.07 SWING CHECK VALVES

A. Crane, Grinnell, Stockham, Conbraco or substitutions under provisions of Section 15000.

B. Up to 2 inches: Bronze 45 degree swing disc, solder ends.

C. Over 2 inches: Iron body, bronze trim, 45 degree swing disc, renewable disc and seat, flanged ends.

2.08 SPRING LOADED CHECK VALVES

A. Crane, Grinnell, Stockham, Conbraco or substitutions under provisions of Section 15000.

B. Iron body, bronze trim, stainless steel spring, renewable composition disc, screwed, wafer or flanged ends.

2.09 RELIEF VALVES

A. Crane, Grinnell, Stockham, Conbraco or substitutions under provisions of Section 15000.

B. Bronze body, Teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labeled.

PART 3 EXECUTION

3.01 PREPARATION

A. Before proceeding with fabrication / installation of piping, inspect the contract documents and determine that the location of work does not interfere with other work. In case of interference, notify the Engineer.

3.02 INSTALLATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe. Remove scale and dirt on inside and outside before assembly. Prepare piping connections to equipment with flanges or unions.

B. Route piping in orderly manner, plumb and parallel to building structure, and maintain gradient. Group piping whenever practical at common elevations. Install valves with stems upright or horizontal, not inverted.

C. Install piping to conserve building space, and not interfere with use of space and other work.

D. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.

E. Provide clearance for installation of insulation, and access to valves and fittings. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors with other trades.

F. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding. Prepare pipe, fittings, supports, and accessories for finish painting.

3.03 APPLICATION

A. Use grooved mechanical couplings and fasteners only in accessible locations.

B. Install unions downstream of valves and at equipment or apparatus connections.

C. Install brass male adapters each side of valves in copper piped system. Sweat solder adapters to pipe.

D. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.

E. Provide 3/4 inch ball drain valves at main shut-off valves, low points of piping, bases of vertical risers, and at equipment.

F. Use butterfly valves in heating, water systems interchangeably with gate and globe valves.

G. Use only butterfly valves in chilled water systems for throttling and isolation service.

END OF SECTION

SECTION 230545 - CHEMICAL (WATER) TREATMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Cleaning of piping systems.

B. Chemical feeder equipment.

C. Hydronic Heating Water Treatment System.

1.02 RELATED SECTIONS

A. Section 230000 - Mechanical General Provisions

B. Section 230900 – Instrumentation and Control for HVAC

1.03 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 230000.

B. Submit shop drawings and product data for manufactured products and assemblies required for this project.

C. Include component sizes, rough-in requirements, service sizes, and finishes. Include product description, model and dimensions.

D. Submit inspection certificates for pressure vessels from authority having jurisdiction.

E. Submit manufacturer's installation instructions under provisions of Section 230000.

1.04 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data under provisions of Section 230000.

B. Include installation instruction, assembly views, lubrication instructions, and replacement parts list.

1.05 REGULATORY REQUIREMENTS

A. Conform to applicable code for addition of non-potable chemicals to building mechanical systems, and for delivery to public sewage systems.

PART 2 - PRODUCTS (Provided Under Part 3)

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.02 HYDRONIC WATER TREATMENT SYSTEM

A. General: Provide chemical cleaning for entire hydronic system. Provide all necessary mechanical equipment, chemicals, control equipment and service. All systems are provided or based on Enerco Corporation.

B. Pre-Cleaning: Thoroughly flush all piping with fresh water. Remove and clean all strainers, open drip legs or other non-flow piping to remove debris.

Determine loop capacity in gallons by carefully filling the loop from completely drained dry to full with air bled out. Loop capacity to be taken from water meter readings. Submit written report of loop capacity to water treatment subcontractor and owner.

Refill system with fresh water along with alkaline detergent cleaner at recommended use rates. Circulate 8 - 72 hours. Flush system, open, clean and inspect all strainers, drip legs and non-flow areas. Refill with fresh water, establish bleed, and allow system to makeup fresh water and bleed until water leaving system is of same quality as makeup.

Immediately introduce corrosion inhibitor to protect the clean system until normal start up.

C. Chemical Treatment: Provide chemical injection system for each hydronic loop. System to include the following equipment with installation as shown on the drawings and as recommended by the manufacturer.

1. Provide one (1) Electric Contact Head Water Meter of bronze construction up to 110 degrees, Fahrenheit with pressure up to 150 psig. Meter is to be of oscillating piston design using a magnetic drive to couple the measuring piston to the electric contact head. The electric contact switch shall be normally open and capable of handling control voltages up to 240V. Contacts to be rated 10 amp minimum. The gallons per contact to be initially set for 50 gpc, but must be readily field changeable. Water meter size and gallons per contact to be determined by water treatment sub-contractor.
2. One (1) Shotfeeder for each loop. Shotfeeder to include feeder body, funnel and control valves all constructed of materials compatible with the system. Pressure rating of the feeder to be 125 psig minimum.

3. Shotfeeder size selection guide.

Approximate Loop Size (Gal.)	Shotfeeder Size
100-1000 gal	4 qt
1000-2500 gal	6 qt
2500-4000 gal	8 qt
4000-6000 gal	10 qt
6000-8000 gal	5 gal

4. Provide one (1) filter vessel and cover of 304 stainless steel having pressure rating of 150 psig and temperature rating of 450F.

5. Provide pressure gauges on inlet and outlet of filter. Pressure range of gauge matched to system.

6. Provide one (1) circulation pump of close coupled design employing casing, impeller and diffuser of 304 stainless steel. 416 stainless steel shaft to be mechanically sealed with Buna/Ceramic seals.

7. Provide testing equipment to include portable kit as required for monitoring system scale and corrosion inhibitor.

8. Provide a one (1) year (after start-up) supply of all chemicals for control of scale and corrosion.

9. Provide a comprehensive service program that includes technical assistance to contractor during installation, supervision of cleaning, operator training and regular on-site testing with written reports for one (1) year after start up.

END OF SECTION

SECTION 230553 – IDENTIFICATION FOR HVAC EQUIPMENT

PART 1 GENERAL

1.01 WORK INCLUDED

A. Identification of mechanical products installed under Division 23.

1.02 REFERENCES

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

1.03 RELATED WORK

A. Section 230010 - Basic Mechanical Material and Methods

1.04 SUBMITTALS

A. Submit product data under provisions of Section 230000.

B. Submit list of wording, symbols, letter size, and color coding for mechanical identification.

PART 2 PRODUCTS

2.01 MATERIALS

A. Color: Unless specified otherwise, conform with ANSI/ASME A13.1.

B. Plastic Nameplates: Laminated three-layer plastic with engraved black letters on light contrasting background color.

C. Metal tags: Brass with stamped letters.

D. Stencils: With clean cut symbols and letters of the following size:

OUTSIDE DIAMETER OF INSULATION OR PIPE	LENGTH OF COLOR FIELD	SIZE OF LETTERS
3/4" - 1-1/4"	8"	1/2"
1-1/2" - 2"	8"	3/4"
2-1/2" - 6"	12"	1-1/4"
Equipment	---	2-1/2"

E. Stencil Paint: Semi-gloss enamel.

F. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and fluid being conveyed.

G. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and

printed markings.

H. Underground Plastic Markers: Bright colored continuously printed plastic ribbon tape of not less than 6" wide by 4 mil. thick, manufactured for direct burial service.

PART 3 EXECUTION

3.01 PREPARATION

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

3.02 INSTALLATION

A. Plastic or Metal Nameplates: Install with corrosive-resistant mechanical fasteners, adhesive or corrosive-resistant chain.

B. Plastic Tape or Plastic Pipe Markers: Install complete around pipe in accordance with manufacturer's instructions.

C. Equipment: Identify air handling units, pumps, tanks, heat transfer equipment, with plastic nameplates. Small devices, such as in-line pumps, may be identified with plastic or metal tags.

D. Controls: Identify control panels and major control components outside panels with plastic nameplates.

E. Piping: Identify piping, concealed or exposed, with plastic tape pipe markers or stenciled painting. Tags may be used on small diameter piping. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and "T", at each side of penetration of structure or enclosure, and at each obstruction.

F. Underground Plastic Pipe Markers: Install 6 to 8 inches below finished grade, directly above buried pipe.

3.03 MECHANICAL IDENTIFICATION SCHEDULE

A. HVAC – rooftop equipment, unit ventilators, exhaust fans, boilers, pumps, equipment.

END OF SECTION

SECTION 230593 - TESTING, ADJUSTING AND BALANCING FOR HVAC

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. The mechanical contractor will contract with an independent testing, adjusting, and balancing (TAB) agency to test, adjust, and balance the HVAC systems. This contractor shall perform TAB work solely and exclusively as their primary source of business.

B. The work included in this section consists of furnishing labor, instruments, and tools required in testing, adjusting, and balancing the HVAC and Hydronic systems, as described in these specifications and/or shown on accompanying drawings. Services shall include checking equipment performance, taking the specified measurements, and recording and reporting the results.

C. The items requiring testing, adjusting, and balancing are described in detail in section 1.06 and generally include the following:

AIR SYSTEMS:
Air Moving Equipment
Exhaust Fans
Zone Branch and Main Ducts
Diffusers, Registers and Grilles

HYDRONIC SYSTEMS:
Pumps
System Mains and Branches

1.02 RELATED SECTIONS

A. Section 230000 - Mechanical General Provisions.

B. Section 230010 - Basic Mechanical Materials and Methods.

1.03 ALLOWANCES

A. Installation is included as part of this Section and is to be included in the Contract Sum.

1.04 BALANCING AGENCY QUALIFICATIONS

A. An impartial, independent Test & Balancing Company will provide the TAB services required for this project. This contractor shall specialize in performing TAB work solely and exclusively as their primary source of business. This Company shall have performed TAB work on projects similar in size and scope and shall be prepared to provide documented proof of such as requested by the engineer, architect and owner.

B. Agency Qualifications: The TAB Company shall be a current and certified member of a Test & Balance institution that offers comprehensive training and certification of its members or they shall be a TAB company specializing in this type of work with a minimum of 5 years documented work

experience. The TABB company shall be prepared to submit records of experience in the field of air and hydronic system balancing or any other data as requested by the Engineer.

C. Final Approval: Note that the Owner, Architect, and Engineer shall select and make the FINAL APPROVAL of the TABB Contractor for this project which will be the best value for the owner and not necessarily the low bidder. This contractor shall be prepared to provide a list of owner and engineer references for past projects.

Approved Balancing Companies:

1. **Northern Test and Balance-Traverse City, MI, Phone-231-360-6036**
2. **Integrity Test & Balance, Inc.–Traverse City, MI, Phone-231-929-0940**

D. Personnel Qualifications: The TAB Company shall submit a company resume listing personnel and project experience in air and hydronic system balancing.

E. Procedures and Agenda: The TAB Company shall submit the TAB procedures and agenda proposed to be used.

F. Sample Forms: The TAB Company shall submit sample forms, which shall include the minimum data required as set forth in these specifications.

G. Provide bound reports with a cover page, letter size, manuals, complete with index page and/or tabs.

1.05 SUBMITTALS

A. Submit name of independent adjusting and balancing agency for approval, see Specification Section 230000.

B. Submit test reports as a submittal under provisions of Section 230000.

1.06 TAB PREPARATION AND COORDINATION

A. It will be necessary for the TABB Company to perform his services in close coordination with the Mechanical Contractor on a critical path network. It is the TABB Companies responsibility to initiate this continuing coordination to determine his schedule for final testing and balancing services and periodic inspections required during construction.

B. Shop drawings, submittal data, up-to-date revisions, change orders, and other data required for planning, preparation, and execution of the TAB work shall be provided by the Mechanical Contractor or construction manager to the TAB Company no later than 60 days prior to the start of TAB work. This information shall include but not necessarily limited to the following:

1. Project drawings and specification.

2. Approved construction revisions pertaining to the HVAC systems.

3. Approved submittal data on HVAC equipment and systems to be installed by the mechanical contractor.

4. Approved Temperature Control System wiring diagrams, submittals and system diagrams.

1.07 MECHANICAL CONTRACTOR RESPONSIBILITES

A. The Mechanical Contractor shall complete the installation and start-up of all HVAC systems to ensure they are working properly and shall perform all other items as described hereinafter to assist the TABB Company in performing the testing and balancing of the HVAC and Hydronic systems.

B. Air Distribution Systems:

1.Verify installation for conformity to design, manufacturer guidelines and industry standards.

2.Terminate all exhaust ducts, and pressure test them for leakage, as required by the specifications.

3.Ensure that all volume, splitter, extractor and fire dampers are properly located, functional and open. Volume dampers found to be non-functional or obstructed for proper adjustment shall be repaired/replaced by this mechanical contractor. Dampers serving outside, return, and relief air shall provide for tight closure and full opening, with smooth free operation.

4.All volume damper handles and manual locking quadrants shall be freely visible and exposed for identification and use. These devices found to be covered over by duct insulation shall require the mechanical contractor and/or the insulation contractor to survey **all** of the installed volume dampers and correct such measures at no additional cost to the owner.

5.Verify that all supply, return, exhaust and transfer grilles, registers and diffusers are open and installed for proper operation.

6.Ensure that all HVAC units and associated apparatus, such as heating coil line penetrations , filter sections, mixing box sections, access doors etc., are blanked and/or sealed to eliminate excessive bypass or leakage of air.

7.Ensure that all fans are operating and free of vibration and drives packages are checked for proper rotation and belt tension. Overload protection devices shall be of proper sizing and rating as verified by Electrical Contractor and confirmed to the Mechanical Contractor.

8.Insure that all HVAC units have newly installed and clean air filters prior to commencing with the air balance.

A.Water Circulating Systems

1.Verify installation for conformity to design, manufacturer guidelines and industry standards.

2.Check all pumps to verify proper pump and motor coupling alignment and rotation.

3.Ensure that systems have been flushed, cleaned, construction strainers removed from pumps and final strainers installed for normal operation. System shall be properly be filled to operating pressure and expansion tanks pressurized accordingly.

4.Check all pump motors for current and voltage to ensure that motors do not exceed manufacturers name plate FLA amperage rating.

5.Overload protection devices shall be of proper sizing and rating as verified by Electrical Contractor and confirmed to the Mechanical Contractor.

6.Check and set operating temperatures of heat exchangers, boilers and fuel fired equipment to manufacturers and design requirements.

1.08 REPORTS

A. Final TAB Report - The TAB Company shall submit the final TAB report for review by the engineer. All outlets, devices, HVAC equipment, etc. shall be identified, along with a numbering system corresponding to report unit identification. The TAB company shall submit an Project Performance Certification and Guaranty, assuring that the project systems were tested, adjusted, and balanced in accordance with the project specifications. Submit four (6) copies of the report form for final approval.

B. Forms shall include the following information:

1. Title Page

2. Air Moving Equipment:
   a. Location
   b. Manufacturer
   c. Model
   d. Serial Number
   e. Air flow, specified and actual
   f. Return air flow, specified and actual
   g. Outside air flow, specified and actual
   h. Total static pressure and external static pressure, specified and actual
   i. Component (coils, filters, air blenders etc.) static pressure drop, specified and actual
   j. Inlet pressure
   k. Discharge pressure
   l. Fan and motor RPM, design and actual

m. Sheave size, manufacturers model number.
n. Belt size, manufacturer and center distance from motor shaft to fan shaft.

3. Exhaust Fan Data:
   a. Location
   b. Manufacturer
   c. Model
   d. Air flow, specified and actual
   e. Total static pressure (total external), specified and actual
   f. Inlet pressure
   g. Discharge pressure
   h. Fan and motor RPM, design and actual
   i. Sheave size, manufacturers model number.
   j. Belt size, manufacturer and center distance from motor shaft to fan shaft.

4. Return Air/Outside Air Data:
   a. Identification/location
   b. Design combined air flow
   c. Actual combined air flow
   d. Design return air flow
   e. Actual return air flow
   f. Design outside air flow
   g. Actual outside air flow

5. Electric Motors:
   a. Manufacturer
   b. HP/BHP
   c. Phase, voltage, amperage; nameplate, actual.
   d. RPM, nameplate and actual
   e. Service factor
   f. Starter size, rating, heater elements
   g. Motor sheave size, manufacturer number, number of turns open-actual.

6. Duct Traverse:
   a. System zone/branch
   b. Duct size
   c. Area
   d. Design air flow
   e. Test velocity
   f. Test air flow
   g. Duct static pressure
   h. Air temperature

7. Air Distribution Test Sheet:

a. Air terminal number
b. Room number/location
c. Terminal type-manufacturers model number
d. Terminal size-duct/collar connection size.
e. Area factor if flow hood is not used
f. Design air flow
g. Test (final) velocity/air volume

8. Pump Data
   a. Identification/number
   b. Manufacturer
   c. Size/model
   d. Impeller
   e. Service
   f. Design flow rate, pressure drop
   g. Actual flow rate, pressure drop
   h. Discharge pressure
   i. Suction pressure
   j. Total operating head pressure
   k. Shut off, discharge and suction pressures
   l. Shut off, total head pressure-verify impeller size.

9. Hydronic Equipment
   a. Identification/number
   b. Location
   c. Service
   d. Manufacturer
   e. Air flow, design and actual
   f. Water flow, design and actual
   g. Water pressure drop, design and actual
   h. Air pressure drop, design and actual
   i. Circuit setter manufacturer, size, model number, required pressure drop for design flow rate.
   j. Circuit setter adjustment setting, final pressure drop and corresponding flow rate.

10. Test Instrument Inventory and Calibration

    a. Test Instrument
    b. Manufacturer
    c. Model Number
    d. Serial Number
    e. Type-Analog, electric, digital
    f. Application for testing
    g. Date of most recent calibration. Note: N.I.S.T certification of calibration will be provided upon request for proof of compliance.

1.09 DEFICIENCIES

A. Any deficiencies in the installation or performance of a system or component observed by the TAB Company shall be brought to the attention of the construction manager or his on site representative.

B. The work necessary to correct items on the deficiency listing shall be performed and verified by the affected contractor before the TAB Company returns to retest. Unresolved deficiencies shall be noted in the final report.

PART 3 - EXECUTION

3.01 GENERAL

A. The specified systems shall be reviewed and inspected for conformance to design documents. Testing, adjusting, and balancing on each identified system shall be performed. The accuracy of measurements shall be in accordance with standards set forth in section 1.03

B. Equipment settings, including manual damper quadrant positions, manual valve indicators, fan speed control levers, and similar controls and devices shall be marked to show final settings.

C. All information necessary to complete a proper TAB project and report shall be per the standards in section 1.03, unless otherwise noted. The descriptions for work required, as listed in this section, are a guide to the minimum information needed.

3.02 EXAMINATION

A. Before commencing work, verify that systems are complete and operable. Ensure the following:

1. Equipment is operable and in a safe and normal condition.

2. Temperature control systems are installed complete and operable.

3. Proper thermal overload protection is in place for electrical equipment.

B. Report any defects or deficiencies noted during performance of services to the Engineer.

C. Promptly report abnormal conditions in mechanical systems or conditions which prevent system balance.

D. If, for design reasons, system cannot be properly balanced, report as soon as observed.

E. Beginning of work means acceptance of existing conditions.

3.03 PREPARATION

A. Provide instruments required for testing, adjusting, and balancing operations.

B. Provide additional balancing devices as required.

3.04 INSTALLATION TOLERANCES

A. Adjust air handling systems to plus or minus 10 percent for supply systems and plus or minus 10 percent for return and exhaust systems from figures indicated.

B. Adjust hydronic systems to plus or minus 10 percent of design conditions indicated.

3.05 ADJUSTING

A. Adjust work under provisions of Section 230000.

B. Recorded data shall represent actually measured, or observed condition.

C. Permanently mark settings of dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.

D. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

E. Leave systems in proper working order, restoring controls to specified settings.

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

2. Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gauges to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.

3. Adjust systems to provide specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.

B. Specific:

1. The TAB Company shall perform the following standards:
   For Supply Fans:
   a. Fan Speeds - Test and adjust fan RPM to achieve maximum or design CFM.
   b. Current and Voltage - Test and record motor voltage and amperage, and compare data with the nameplate limits to ensure fan motor is not in or above the service factor.
   c. Pitot-Tube Traverse - Perform a Pitot-tube traverse of main supply and return ducts, as applicable to obtain total CFM.

d. Outside Air - Test and adjust the outside air on applicable equipment using a Pitot-tube traverse. If a traverse is not practical, use the mixed-air temperature method if the inside and outside temperature difference is at least 20 degrees F., or use the difference between Pitot-tube traverses of the supply and return air ducts.
e. Static Pressure - Test and record system static profile of each supply fan.

For Exhaust Fans:
a. Fan Speeds - Test and adjust fan RPM to achieve maximum or design CFM.
b. Current and Voltage - Test and record motor voltage and amperage, and compare data with the nameplate limits to ensure motor is not in or above the service factor.
c. Pitot-Tube Traverse - Perform a Pitot-tube traverse of main exhaust ducts to obtain total CFM.
e. Static Pressure - Test and record system static profile of each exhaust fan.

For Zone, Branch and Main Ducts:
a. Adjust ducts to within design CFM requirements. As applicable, at least one zone balancing damper shall be completely open. Multi-diffuser branch ducts shall have at least one outlet or inlet volume damper completely open.

For Diffusers, Registers, and Grilles:
a. Tolerances - Test, adjust, and balance each diffuser, grille, and register to within 10% of design requirements. Minimize drafts.
b. Identification - Identify the type, location, and size of each grille, diffuser, and register. This information shall be recorded on air outlet data sheets.

For Coils:
a. Air Temperature - Once air flows are set to acceptable limits, take differential pressure readings across coils and take wet bulb and dry bulb air temperatures on the entering and leaving side of each cooling coil. Dry bulb temperature shall be taken on the entering and leaving side of each heating coil.

3.07 WATER SYSTEM PROCEDURE

A. General:

1. Adjust water systems to provide required or design quantities.

2. Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gauges to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.

3. Adjust systems to provide specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.

4. Affect system balance with automatic control valves fully open to heat transfer elements.

5. Affect adjustment of water distribution systems by means of balancing cocks, valves and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.

6. Where available pump capacity is less than total flow requirements or individual system parts, full flow in one part may be simulated by temporary restriction of flow to other parts.

B. Specific:

1. The TAB Company shall perform the following standards:

For Pumps:
a. Test and adjust chilled water and hot water pumps to achieve maximum or design GPM. Check pumps for proper operation. Pumps shall be free of vibration and cavitation. Record appropriate gauge readings for final TDH and Block-Off/Dead head calculations.
b. Current and Voltage - Test and record motor voltage and amperage, and compare data with the nameplate limits to ensure pump motor is not in or above the service factor.

For System Mains and Branches:
a. Adjust water flow in pipes to achieve maximum or design GPM.

For Coils:
a. Tolerances - Test, adjust, and balance all chilled water and hot water coils within 10% of design requirements.
b. Verification - Verify the type, location, final pressure drop and GPM of each coil. This information shall be recorded on coil data sheets.

3.08 ADDITIONAL TAB SERVICES

A. Temperature Testing:

To verify system control and operation, a series of three temperature tests shall be taken at approximately two hour intervals in each separately controlled zone. The resulting temperatures shall not vary more than two degrees F. from the thermostat or control setpoint during the tests. Outside temperature and humidity shall also be recorded during the testing periods.

END OF SECTION

SECTION 230700 - THERMAL INSULATION

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Ductwork insulation, jackets and lining.

B. Piping insulation.

1.02 RELATED WORK

A. Section 230010 - BASIC MECHANICAL MATERIALS AND METHODS.

1.03 QUALITY ASSURANCE

A. Applicator: Company specializing in piping insulation application with three years minimum experience.

B. Insulation materials shall be 100% asbestos free.

1.04 SUBMITTALS

A. Submit product data under provisions of Section 230000.

B. Include product description, list of materials and thickness for each service or equipment scheduled, and locations. Provide manufacturer's installation instructions.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Owens Corning, Manville, Armstrong, Certain Teed, Knauf or substitutions under provisions of Section 230000.

2.02 MATERIALS

A. Type A: Fiberglass pipe insulation equal to Owens Corning Fiberglass ASJ/SSL-II Pipe Insulation with a "k" value of 0.25 @ 75 F, ASTM C547, Class 1, including vapor barrier.

Vapor Retarder Jacket: White kraft paper reinforced with glass fiber yarn and bonded to aluminum foil, secure with self sealing longitudinal laps and butt strips or jacket with outward clinch expanding staples coated with vapor barrier mastic as needed.

B. Type B: Closed-Cell, Elastomeric foam rubber insulation equal to Armstrong AP Armaflex . (Pipe and/or sheet insulation in accordance with ASTM C-534; with a "K" value not to exceed .27 @ 75 F), max flame spread 25, max smoke developed 50.

C. Type C: Rigid board duct, class 1, insulation equal to Owens Corning type 703 with a maximum thermal conductivity of .22 @ 75 F, and FRK vapor barrier facing, ASTM C612, Class 1.

D. Type D: Flexible duct insulation equal to Owens Corning all service duct wrap type 100 with a maximum thermal conductivity of .27 @ 75 F, and FRK vapor barrier facing ASTM C553, Type 1, Class B-4.

E. Type E: Acoustical duct liner equal to Owens Corning Aeroflex duct liner type 150 with a maximum thermal conductivity of .28 @ 75 F. Ductwork dimensions indicated are inside dimensions required for air flow. For applications involving indoor air quality concerns, use Armstrong's self-adhering, non-fibrous, Armaflex duct liner (3/4" thick).

PART 3 - EXECUTION

3.01 PREPARATION

A. Install materials after piping or ductwork has been tested and approved. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics and insulation cements.

3.02 INSTALLATION

A. Install materials in accordance with manufacturer's instructions, building codes and industry standards.

B. Continue insulation with vapor barrier through penetrations.

C. Exterior insulated piping shall be jacketed with .016" aluminum jacket, banded on 18" centers and sealed watertight with mastic. Sealing not required if Type B insulation (elastomeric foam) is installed per manufacturer's instructions (entire insulation system is air/water tight, vapor barrier).

D. All fittings and valves shall be insulated with corresponding pipe insulation. Domestic hot water line valves, mechanized fittings and joints (i.e., unions, etc.) may be uninsulated if they are concealed in walls or above ceilings.

E. Unions and flanges on insulated cold water piping shall be insulated, but on other systems shall not be insulated. Terminate insulation neatly at each side of union and/or flange with insulating cement, so unions and flanges may be taken apart without disturbing insulation.

F. Rigid board insulation shall be impaled over Mechanical fasteners, (SMACNA fastener standard), on 12 in. x 18 in. centers. Use a minimum of two rows of fasteners per side.

G. Flexible insulation shall be firmly adhered to ducts with full coverage of fire retardant adhesive. For flexible insulation on ducts 24 inches or more in width, use both adhesive and mechanical fasteners on the bottom of the duct to prevent possible sagging. Mechanical fasteners and spacing shall be as specified for rigid board insulation.

H. Acoustical duct liner shall be adhered to the sheet metal with 100% coverage of adhesive, and all exposed leading edges and all transverse joints coated with adhesive. Duct liner shall also be secured using mechanical fasteners which shall compress the liner sufficiently to hold it firmly in place.

I. Field Applied Jackets

1. PVC Plastic: One piece molded type fitting covers and jacketing material, gloss white.

a. Connections: Tacks, pressure sensitive color matching vinyl tape.

2. Canvas Jacket: UL Listed fabric, 6 oz./sq. yd., plain weave cotton treated with dilute fire retardant lagging adhesive.

3. Aluminum Jacket: 0.016 inch thick sheet finish, with longitudinal slip joints and 2 inch laps, die shaped fitting covers with factory applied moisture barrier.

4. Stainless Steel Jacket: Type 304 stainless steel, 0.010 inch.

3.03 INSULATION SCHEDULE

SERVICE	SIZE	INSULATION TYPE & THICKNESS
HEATING HOT WATER HWS & HWR	THRU 1-1/2"	TYPE A, 1" or TYPE B, 3/4"
HEATING HOT WATER HWS & HWR	OVER 1-1/2"	TYPE A, 1-1/2" or TYPE B, 1"
ALL RECTANGULAR OUTSIDE AIR DUCTS	ALL SIZES	TYPE C, 1-1/2" or TYPE B, ¾"
EXHAUST AIR DUCTS WITHIN 10' OF OUTSIDE TERMINATION	ALL SIZES	TYPE D, 2", or TYPE B, 3/4"
SUPPLY AIR DUCTS	ALL SIZES	TYPE D, 2", or TYPE B, 3/4"
SUPPLY AND RETURN AIR DUCTS (ASSOCIATED WITH HEATING/COOLING EQUIP.) WITHIN 10' OF MECHANICAL EQUIPMENT OR AS SHOWN ON PLANS	ALL SIZES	TYPE E, 1", OR TYPE B, 3/4" (Armstrong's self-adhering, non-fibrous, Armaflex duct liner)

END OF SECTION

SECTION 230900 – INSTRUMENTATION AND CONTROL FOR HVAC

PART 1 - GENERAL

1.01 CONTROL SYSTEM DESCRIPTION

A. The Building Automation System shall be as indicated on the drawings and described in these specifications. System must be fully integrated and coordinated with mechanical equipment DDC controllers furnished and installed in the equipment manufacturer's factory as specified in those sections. The intent of the BAS is to integrate all mechanical equipment into one system for global monitoring, control, and alarming associated with the building. It is the BAS manufacturer's responsibility to provide all the design, engineering, and field coordination required to ensure all equipment sequence of operations are met as specified and the designated BAS operators have the capability of managing the building mechanical system to ensure occupant comfort while maintaining energy efficiency.

B. The BAS shall meet both BACnet and LonTalk communication standards to ensure the system maintains "interoperability" to avoid proprietary arrangements that will make it difficult for the Owner to consider other BAS manufacturers in future projects. These open protocol communication standards are discussed in more detail later in this specification.

Approved Manufacturers

Carrier i-Vu Building Automation System

Note: This is the only system that the owner will consider.

Note: The system is to be installed by Gateway Refrigeration only

C. BAS controllers shall be listed by BACnet Testing Laboratories (BTL) with appropriate classification.

1. System controller shall be BTL listed BACnet Building Controller (B-BC)

2. Equipment Controllers shall be BTL listed BACnet Application Specific Controller (B-ASC) or BACnet Advanced Application Controller (B-AAC), as appropriate for the purpose of the controller.

D. Direct Digital Control (DDC) technology shall be used to provide the functions necessary for control of mechanical systems and terminal devices on this project.

E. The existing equipment installed in the year 2000 on DDC control shall be integrated to the new Carrier iVu System so that all equipment is viewable and control from one system. It is the responsabiltiy of the bidder to verify existing equipment to be intergrated, and equipment compatability.

F. The BAS shall accommodate simultaneous multiple user operation. Access to the control system data should be limited only by the security permissions of the operator role. Multiple users shall have access to all valid system data. An operator shall be able to log onto any workstation on the control system and have access to all appropriate data.

G. Communication between DDC controllers and all workstation(s) shall be over a high-speed network. All nodes on this network shall be peers. The operator shall not have to know the controller identifier or location to view or control a point (object). Application Specific Controllers shall be constantly scanned by the Building Controllers to update point information and alarm information globally.

H. The BAS manufacturer shall provide all hardware and software necessary to implement the functions and sequence of operations specified.

1.02 SYSTEM PERFORMANCE

A. Performance Standards. The BAS system shall conform to the following:

1. Graphic Display. The system shall display a graphic with a minimum of 20 dynamic points. All current data shall be displayed within 10 seconds of the operator's request.

2. Graphic Refresh. The system shall update all dynamic points with current data within 10 seconds.

3. Object Command. The maximum time between the command of a binary object by the operator and the reaction by the device shall be 5 seconds. Analog objects shall start to adjust within 5 seconds.

4. Object Scan. All changes of state and change of analog values shall be transmitted over the high-speed network such that any data used or displayed at a controller or workstation will be current within the prior 10 seconds.

5. Alarm Response Time. The maximum time from when an object goes into alarm to when it is annunciated at the workstation shall not exceed 10 seconds.

6. Program Execution Frequency. Custom and standard applications shall be capable of running as often as once every 5 seconds. The Contractor shall be responsible for selecting execution times consistent with the mechanical process under control.

7. Programmable Controllers shall be able to execute DDC PID control loops at a selectable frequency from at least once every 5 seconds. The controller shall scan and update the process value and output generated by this calculation at this same frequency.

8. Multiple Alarm Annunciations. All workstations on the network shall receive alarms within 5 seconds of each other.

9. Reporting Accuracy. Table 1 lists minimum acceptable reporting accuracies for all values reported by the specified system.

a. Table 1: Reporting Accuracy

Measured Variable	**Reported Accuracy**
Space Temperature	±0.5°C [±1°F]
Ducted Air	±1.0°C [±2°F]
Outside Air	±1.0°C [±2°F]
Water Temperature	±0.5°C [±1°F]
Delta –T	±0.15°C[±0.25°F]
Relative Humidity	±5% RH
Water Flow	±5% of full scale
Air Flow (terminal)	±10% of reading *Note 1
Air Flow (measuring stations)	±5% of reading
Air Pressure (ducts)	±25 Pa [±0.1 "W.G.]
Air Pressure (space)	±3 Pa [±0.01 "W.G.]
Water Pressure	±2% of full scale *Note 2
Electrical Power	5% of reading *Note 3
Carbon Monoxide (CO)	± 50 PPM
Carbon Dioxide (CO2)	± 50 PPM

Note 1: (10%-100% of scale) (cannot read accurately below 10%)
Note 2: for both absolute and differential pressure
Note 3: * not including utility supplied meters

PART 2 - PRODUCTS

2.01 COMMUNICATION

A. This project shall be comprised of a high speed Ethernet network utilizing BACnet/IP communications between System Controllers and Workstations. Each System Controller shall function as a BACnet Router to each unit controller providing a unique BACnet Device ID for all controllers within the system. Communications between System Controllers and sub-networks of Custom Application Controllers and/or Application Specific Controllers shall be as defined below.

1. Each System Controller shall perform communications to a network of Custom Application and Application Specific Controllers using BACnet/Zigbee (802.15.4) as defined by the Zigbee Standard.

2. Each communication interface shall be Zigbee Building Automation Certified product as defined by the BACnet Standard and the Zigbee Alliance.

3. Each System Controller shall function as a BACnet Router to each unit controller providing a unique BACnet Device ID for all controllers within the system.

4. Wireless equipment controllers and auxiliary control devices shall conform to:

a. IEEE 802.15.4 radios to minimize risk of interference and maximize battery life, reliability, and range.

b. Communication between equipment controllers shall conform to ZigBee Building Automation (ZBA) standard as BACnet tunneling devices to ensure future integration of other ZBA certified devices.

c. Operating range shall be a minimum of 200 feet (60 m); open range shall be 2,500 ft. (762 m) with less than 2% packet error rate.

d. To maintain robust communication, mesh networking and two-way communications shall be used to optimize the wireless network health.

e. Wireless communication shall be capable of many-to-one sensors per controller to support averaging, monitoring, and multiple zone applications.

f. Certifications shall include FCC CFR47 - RADIO FREQUENCY DEVICES - Section 15.247 & Subpart E

5. Each System Controller shall perform communications to a network of Custom Application and Application Specific Controllers using BACnet/MSTP (RS485) as defined by the BACnet standard.

6. Each System Controller shall perform communications to a network of Custom Application and Application Specific Controllers using LonTalk (FTT10) as defined by the LonTalk standard.

a. All LonTalk Unit Controllers shall conform to the LonTalk standard and conform to a LonMark Profile.

b. Points within LonTalk unit controllers shall be exposed as standard BACnet points within the System Controller without need for manual intervention by an operator.

2.02 OPERATOR INTERFACE

A. Local Occupant Interface – Touch sensitive display

1. A wall mounted touch screen display shall be provided for local access to the system.

2. The local occupant interface shall provide a single point from which to control set points from multiple pieces of equipment.

3. The local occupant interface shall optionally provide scheduling with the ability to schedule events at least 1 year in advance.

4. The local occupant interface shall optionally include pin control and limited temperature adjustments.

5. The local occupant interface shall display contact information of a service provider.

6. The Local occupant interface shall display alerts that require service of the connected equipment.

7. The local occupant interface shall be English.

8. Local Occupant Interface Touch Sensitive Display Hardware Requirements:

   a. Input power: 9-12 VDC

   b. Temperature: 0°C to 40°C)

   c. Humidity: 85%

   d. Mounting Type: VESA (75 mm x 75 mm)

9. Local Occupant Interface Touch Screen Display must meet the following Agency Compliance:

a. ROHS

b. FCC CFR Title 47, Part 15

c. CE Compliant

d. Multiple Mounting Options (Ability to be mounted on a VESA mount (75 mm x 75 mm), or remotely mounted).

10. Wireless Zone Sensors

a. Battery life shall be 15 years or greater to minimize the need for battery replacement in typical operating conditions.

b. To check for proper operation, wireless space temperature sensors shall include a signal strength on the space sensor display.

c.To allow local troubleshooting without specialized tools, error codes shall be displayed on the digital display. Error codes shall include: not associated, address to 000, improper software configuration, input voltage too high, or general sensor failure. Codes shall be indicated on inside of sensor back cover.

d. To support use by the physically impaired, the wireless space sensor shall be a minimum font size of 12 points, and the LCD model shall be readable in low light conditions.

e. An optional 2% relative humidity sensors module shall be available for humidity control applications to minimize the need for wired sensors, and shall not shorten typical battery life to less than 15 years.

2.03 CONTROLLER SOFTWARE

A. Furnish the following applications software for building and energy management. All software applications shall reside and run in the system controllers. Editing of applications shall occur at the building operator interface.

1. Scheduling. Provide the capability to schedule each object or group of objects in the system. Each of these schedules shall include the capability for start, stop, optimal start, optimal stop, and night economizer actions. Each schedule may consist of up to [10] events. When a group of objects are scheduled together, provide the capability to define advances and delays for each member. Each schedule shall consist of the following:

    a. Weekly Schedule. Provide separate schedules for each day of the week.

    b. Exception Schedules. Provide the ability for the operator to designate any day of the year as an exception schedule. This exception schedule shall override the standard schedule for that day. Exception schedules may be defined up to a year in advance. Once an exception schedule is executed it will be discarded and replaced by the standard schedule for that day of the week.

    c. Optimal Start. The scheduling application outlined above shall support an optimal start algorithm. This shall calculate the thermal characteristics of a zone and start the equipment prior to occupancy to achieve the desired space temperature at the specified occupancy time. The algorithm shall calculate separate sets of heating and cooling rates for zones that have been unoccupied for less then and greater than 24 hours. Provide the ability to modify the start algorithm based on outdoor air temperature. Provide an early start limit in minutes to prevent the system from starting before an operator determined time limit.

2.04 BUILDING CONTROLLERS

A. There shall be one or more independent, standalone microprocessor based System Controllers to manage the global strategies described in Application and Control Software section.

B. The System Controller shall have sufficient memory to support its operating system, database, and programming requirements.

C. The controller shall provide a USB communications port for connection to a PC.

D. The operating system of the Controller shall manage the input and output communications signals to allow distributed controllers to share real and virtual point information and allow central monitoring and alarms.

E. All System Controllers shall have a real time clock.

F. Data shall be shared between networked System Controllers.

G. The System Controller shall continually check the status of its processor and memory circuits. If an abnormal operation is detected, the controller shall:

1. Assume a predetermined failure mode.

2. Generate an alarm notification.

3. Create a retrievable file of the state of all applicable memory locations at the time of the failure.

4. Automatically reset the System Controller to return to a normal operating mode.

H. Environment. Controller hardware shall be suitable for the anticipated ambient conditions. Controller used in conditioned ambient shall be mounted in an enclosure, and shall be rated for operation at -40° C to 50° C [-40° F to 122° F].

I. Clock Synchronization.

1. All System Controllers shall be able to synchronize with a NTP server for automatic time synchronization.

2. All System Controllers shall be able to accept a BACnet time synchronization command for automatic time synchronization.

3. All System Controllers shall automatically adjust for daylight savings time if applicable.

J. Serviceability

1. Provide diagnostic LEDs for power, communications, and processor.

2. The System Controller shall have a display on the main board that indicates the current operating mode of the controller.

3. All wiring connections shall be made to field removable, modular terminal connectors.

4. The System controller shall utilize standard DIN mounting methods for installation and replacement.

K. Memory. The System Controller shall maintain all BIOS and programming information indefinitely without power to the System controller.

L. Immunity to power and noise. Controller shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shut-down below 80% nominal voltage.

M. BACnet Test Labs (BTL) Listing. Each System Controller shall be listed as a Building Controller (B-BC) by the BACnet Test Labs with a minimum BACnet Protocol Revision of 14.

END OF SECTION

SECTION 238223 - UNIT VENTILATORS

PART 1 GENERAL

References

A. ANSI/NFPA 70 - National Electric Code.

B. AHRI 840, "Unit Ventilators"

C. AHRI 440, "Room Fan Coil and Unit Ventilator"

D. ASHRAE 62, "Ventilation for Acceptable Indoor Air Quality"

E. AHRI 350-- Standard for Sound Rating of Non-Ducted Indoor Air-Conditioning Equipment.

1.02 Warranty

A. The equipment purchaser shall be provided, at no additional cost, a standard parts warranty that covers a period of one year from unit start-up or 18 months from shipment, whichever occurs first. This warrants that all products are free from defects in material and workmanship and have capacities and ratings set forth in the equipment manufacturer's catalog and bulletins.

B. Blow-through unit ventilators are the basis of design. Draw-through unit ventilators Will Not be accepted.

1.03 Regulatory Requirements

A. Manufacturers must participate in the AHRI Certification program. Unit performance data must be rated and certified in accordance with AHRI Standard 440, and must display the AHRI Symbol on all standard units. If a manufacturer does not participate in the AHRI Certification program, specified equipment engineer shall select a representative sample that must be witnessed tested at the manufacturers expense by the engineer to meet the criteria of the specification.

B. Conform to UL1995 for internal wiring of factory-wired equipment.

PART 2 PRODUCTS

2.01 General

A. Unit Construction

1. The cabinets shall be constructed of 16-gauge zinc-coated steel. All steel surfaces are cleaned, phosphatized, rinsed, and dried before application of final finish paint. The paint shall be applied by an electrostatic powder spray system. The paint shall result in an appliance-grade finish.

2. Cabinet end pockets shall be a minimum of 12 inches wide to facilitate piping and service. If less than 12 inches, unit manufacturer shall provide an extended cabinet or piping enclosure.

B. Ceiling-Mounted Unit Ventilators

1. Ceiling-mounted units shall be constructed with 2 hinged bottom panels for ease of maintenance. Access to filters, controls, and piping shall be easily available through the two bottom panels. All components of the fan/motor assembly must be removable from the bottom of the unit.

2. The discharge opening of the unit shall be fitted with a bar grille, from the manufacturer, as shown on the plans.

3. Recessed units shall be furnished with a trim flange.

4. Units shall have end panels factory installed.

5. Units shall be finished in one of five baked enamel finishes to be selected by the architect.

C. Fan Board and Motor

1. For quick maintenance, the fan board assembly shall be a single, rigid assembly including fans, fan housing, bearing, and fan shaft.

2. Fan/coil arrangement shall be blow-through design to eliminate debris from falling into the spinning fan. This safety consideration helps prevent personal injury, noise, or equipment damage. The blow-through design shall protect the coil from freezing by placing the coil farther away from the inlet and mixing the room air and fresh air before it blows across the coil. The coil shall be placed near the discharge opening in order to attenuate fan noise. Units with a draw-through design must provide a discharge grille screen and a face & bypass damper to protect fans in the line of sight.

3. Provide quick connects for the fan motor for easy maintenance and removal.

4. Motor: All motors shall be Brushless DC (BLDC)/Electronically Commutated Motors (ECM) factory programmed and run tested in assembled units.

   a. The motor controller shall be mounted in a touch-safe control box with a built in integrated user interface and LED tachometer.

   b. If adjustments are needs, motor parameters shall be adjustments through momentary contact switches accessible without factory service personnel on the motor control board.

   c. Motors shall have a soft ramp between speeds to lessen the acoustics due to sudden speed changes.

d. Motors shall be operated at three speeds or with variable speed. The motor will choose the highest speed if there are simultaneous/conflicting speed requests.

e. All motors shall have integral thermal overload protection with a maximum ambient operating temperature of 104F and are permanently lubricated.

f. Motors shall be capable of starting at 50 percent of rated voltage and operating at 90 percent of rated voltage on all speed settings.

g. Motors shall be capable of starting at 50 percent of rated voltage and operating at 90 percent of rated voltage on all speed settings.

5. Fan Speed Control: wall mount or unit mount fan speed control will provide an interface to factory wiring, including variable speed/High-Medium-Low (HML) control. The control box will contain a line voltage to 24-volt transformer and ECM motor controller

a. A unit mounted fan speed switch will be factory wired and electrically tested. The fan speed switch shall open a factory-installed outside air damper when a fan speed is selected, and close the outside damper when the fan speed switch is in the OFF position.

b. A ship-with, wall mounted fan speed switch shall open a factory-installed outside air damper when a fan speed is selected, and close the outside damper when the fan speed switch is in the OFF position.

D. Fresh Air and Room Air Dampers

1. The unit shall be equipped with a dual-blade mixing damper with a compressible seal to ensure proper modulation and mixing of the room air and fresh air.

2. The damper shall be capable of varying the proportion of mixed air from 100 percent room air to 100 percent fresh air.

3. Provide an ultra-low leak damper seal made of closed cell EPDM material. Leakage shall be less than 1 percent against 0.5 inches of external static pressure.

4. Damper shall contain a continuous divider placed between the damper blades to separate the fresh air and room air compartments to prevent blow-through.

E. Ventilation Performance

1. Unit manufacturer shall provide airflow performance data by specific option and size per AHRI 840-98. If the manufacturer cannot provide AHRI 840 certified airflow data they must provide, at their expense, certified, independent, balancing reports verifying compliance with AHRI 840. These reports shall be submitted to the mechanical engineer for approval.

F. Drain Pan

1. The drain pan shall be easily removable for cleaning.

2. Unit drain pans are to be positively sloped internal or external to the unit.

3. A drain outlet shall be provided on both ends of the pan with one outlet capped. The drain hand connection shall be easily field-reversed by relocating the cap to the opposite end.

4. The drain pan shall be constructed of smooth, corrosion resistant material. The bottom of the drain pan shall be sloped in two planes that pitch the condensate to the drain connection. Stainless steel drain pans shall be provided as an equal to polymer resin drain pans.

5. The condensate drain shall be internally or externally trapped via accepted ASHRAE guidelines.

G. Coils

1. Coils shall be selected in accordance with AHRI 440.

2. Hydronic Coils

a. Hydronic coils shall be constructed with copper tubes and mechanically bonded aluminum corrugated plate fins. All coils shall have aluminum individual unshared fin surfaces.

b. A threaded drain plug shall be furnished at the lowest point of the coil.

c. A manual air vent shall be provided at the highest point of the coil.

H. Filters: Each unit shall be equipped with a single 1-inch thick, throwaway filter accessible without the removal of the unit front panel.

I. Underwriters Laboratory: Unit Ventilators shall be listed by Underwriters Laboratory, Inc. for the United States and Canada.

2.02 MANUFACTURERS - UNIT VENTILATORS

A. Acceptable Manufacturers

1. Trane

2.03 Controls

A. Unit shall be provided with field installed controls.

PART 3 EXECUTION

3.01 Installation

A. Furnish and install where shown on plans, a complete unit ventilator with capacities, airflow, and configuration as listed on unit schedule.

3.02 Schedule – Reference drawing M5.1.

PART 4 SEQUENCE OF OPERATIONS – Reference drawing M5.1.

END OF SECTION

SECTION 238300 - BOILERS

PART 1 GENERAL

PART 2 PRODUCTS

A. Unit Construction

1. The **BOILER** shall be a **LOCHINVAR KNIGHT XL** Model **KBX_**_0650_____**(N)** having a modulating input rating of _650,000_____ Btu/Hr, an output of __631,000_____ Btu/Hr and shall be operated on (Natural Gas) (L.P. Gas). The **BOILER** shall be capable of following performance:

Model	Turndown	Minimum Input	Maximum Input
KBX0650(N,L)	10:1	65,000	650,000

2. Maximum unit dimensions shall be: 50 inches Length, 24 inches Width and 45 inches Height. Maximum operating (wet) unit weight shall be no more than 567 pounds.

3. The **BOILER** shall bear the ASME "H" stamp for 160 psi working pressure and shall be National Board listed. The **BOILER** shall have a fully welded, stainless steel, water tube heat exchanger. Multiple pressure vessels in a single enclosure are not acceptable. There shall be no banding material, bolts, gaskets or "O" rings in the pressure vessel construction. The heat exchanger shall be designed for a single-pass water flow to limit the water side pressure drop. Pressure drop shall be no greater than 2.2 psi at 75 GPM. The condensate collection basin shall be constructed of welded stainless steel. The complete heat exchanger assembly shall carry a ten (10) year limited warranty.

4. The heat exchanger shall have a volume of water no less than:

Model	Water Content
KBX0650(N,L)	6.2 gallons

5. The **BOILER** shall be certified and listed by C.S.A. International under the latest edition of the harmonized ANSI Z21.13 test standard for the U.S. and Canada. The **BOILER** shall comply with the energy efficiency requirements of the latest edition of ASHRAE 90.1 and the minimum efficiency requirements of the latest edition of the AHRI BTS-2000 Standard as defined by the Department of Energy in 10 CFR Part 431. The **BOILER** shall operate at a minimum of 97% Combustion and Thermal Efficiency at full fire as registered with AHRI. The **BOILER** shall be certified for indoor installation.

6. The **BOILER** shall be constructed with a heavy gauge steel jacket assembly, primed and pre-painted on both sides. The combustion chamber shall be sealed and completely enclosed, independent of the outer jacket assembly, so that integrity of the outer jacket does not affect a proper seal. A burner/flame observation port shall be provided for observing the burner flame and combustion chamber. The burner shall be a premix design constructed of high temperature stainless steel with a woven Fecralloy outer covering to provide smooth operation at all modulating firing rates. The **BOILER** shall be supplied with a

negative pressure regulation gas valve and be equipped with a pulse width modulation blower system to precisely control the fuel/air mixture to the burner. The **BOILER** shall operate in a safe condition with gas supply pressures as low as 4 inches of water column. The burner flame shall be ignited by direct spark ignition with flame monitoring via a flame sensor.

7. The **BOILER** shall utilize a 24 VAC control circuit and components. The control system shall have a factory installed display for boiler set-up, boiler status, and boiler diagnostics. All components shall be easily accessed and serviceable from the front and top of the jacket. The **BOILER** shall be equipped with a temperature/pressure gauge; high limit temperature control with manual reset; ASME certified pressure relief valve set for 50 psi (standard); outlet water temperature sensor with a dual thermistor to verify accuracy; system supply water temperature sensor; outdoor air sensor, flue temperature sensor with dual thermistor to verify accuracy; low water cut off with manual reset, blocked drain switch and a condensate trap for the heat exchanger condensate drain.

2.02 MANUFACTURERS - BOILERS

A. Acceptable Manufacturers

1. Lochinvar

2.03 CONTROLS

1. The **BOILER** shall feature the "SMART TOUCH™" control with CON-X-US which is standard and factory installed with a 7" liquid crystal touch screen display, password security, outdoor air reset, pump delay with freeze protection, pump exercise, ramp delay featuring six steps, domestic hot water prioritization with limiting capabilities and PC port connection. A secondary control that is field mounted outside or inside the appliance is not acceptable. The **BOILER** shall have alarm contacts for any failure, runtime contacts and data logging of runtime at given modulation rates, ignition attempts and ignition failures. The **BOILER** shall have a built-in "Cascade" to sequence and rotate while maintaining modulation of up to eight boilers of different Btu inputs without utilization of an external controller. The internal "Cascade" function shall be capable of lead-lag, efficiency optimization, front-end loading, and rotation of lead boiler every 24 hours. The control must include cascade redundancy to allow a member boiler to become the temporary leader if the original lead boiler shall loose communication with the members. The **BOILER** shall be capable of controlling an isolation valve (valve shall be offered by manufacturer) during heating operation and rotation of open valves in standby operation for full flow applications. The control must be equipped with standard BACnet MSTP and Modbus communication protocol with a minimum 55 readable points. The **BOILER** shall have an optional gateway device which will allow integration with LON or BACnet (IP) protocols.

2. The "SMART TOUCH™" control shall include CON-X-US communication platform that will allow remote access via a smart phone or Tablet. This will allow the ability to monitor and manage multiple KNIGHT XL Boilers and send alerts via text or e-mail notifying of changes in system status. A user shall have the ability to check system status or re-program any boiler function remotely.

3. The "SMART TOUCH™" control shall increase fan speed to boost flame signal when a weak flame signal is detected during normal operation. A 0 -10 VDC output signal shall control a variable speed boiler pump (pump to be offered by manufacturer) to keep a fixed

delta t across the boiler regardless of the modulation rate. The **BOILER** shall have the capability to receive a 0 – 10 VDC input signal from a variable speed system pump to anticipate changes in system heat load in order to prevent flow related issues and erratic temperature cycling.

4. The **BOILER** shall be equipped with two terminal strips for electrical connection. A low voltage connection board with 44 connection points for safety and operating controls, i.e., Alarm Contacts, Runtime Contacts, Louver Proving Switch, Tank Thermostat, Domestic Hot Water Building Recirculation Pump Contacts, Domestic Hot Water Building Recirculation Temperature Sensor Contacts, Remote Enable/Disable, System Supply Temperature Sensor, Outdoor Temperature Sensor, Tank Temperature Sensor, Modbus Building Management System Signal and Cascade Control Circuit. A high voltage terminal strip shall be provided for Supply voltage. Supply voltage shall be 120 volt / 60 hertz / single phase on all models. The high voltage terminal strip plus integral relays are provided for independent pump control of the System pump, the Boiler pump and the Domestic Hot Water pump.

2.04 BOILER VENTING

A. The **BOILER** shall be installed and vented with a:

1. Direct Vent system with vertical roof top termination of both the exhaust vent and combustion air. The flue shall be Category IV approved material constructed of PVC, CPVC, Polypropylene or Stainless Steel. A separate pipe shall supply combustion air directly to the boiler from the outside. The boiler's total combined air intake length shall not exceed 150 equivalent feet. The boiler's total combined exhaust venting length shall not exceed 150 equivalent feet. The air inlet must terminate on the rooftop with the exhaust.

2. Rooftop Termination the M.C. shall use the owners roofing contractor to provide sealing of all rooftop terminations.

END OF SECTION

SECTION 238900 - DUCTWORK

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Low pressure ducts.

B. Duct cleaning.

1.02 RELATED WORK

A. Section 230010 – Basic Mechanical Materials and Methods.

B. Section 230593 - Testing, Adjusting and Balancing.

C. Section 230700 - Thermal Insulation.

1.03 REFERENCES

A. ASHRAE - Handbook 1989 Fundamentals; Duct Design.

B. ASHRAE - Handbook 1988 Equipment; Duct Construction.

C. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.

D. NFPA 90B - Installation of Warm Air Heating and Air Conditioning Systems.

E. SMACNA - Low Pressure Duct Construction Standards.

H. UL 181 - Factory-Made Air Ducts and Connectors.

1.04 DEFINITIONS

A. Duct Sizes: Inside clear dimensions. For lined ducts, maintain sizes inside lining.

B. Low Pressure: Three pressure classifications: 1/2 inch WG positive or negative static pressure and velocities less than 2,000 fpm; 1 inch WG positive or negative static pressure and velocities less than 2,500 fpm and 2 inch WG positive or negative static pressure and velocities less than 2,500 fpm.

1.05 REGULATORY REQUIREMENTS

A. Construct ductwork to NFPA 90A, NFPA 90B and NFPA 96 (if applicable) standards.

1.06 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 230000.

B. Indicate duct fittings, particulars such as gauges, sizes, welds, and configuration prior to start of work for low pressure systems.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General: Non-combustible or conforming to requirements for Class 1 air duct materials, or UL 181.

B. Steel Rectangular Ducts: ASTM A525 or ASTM A527 galvanized steel sheet, lock-forming quality, having zinc coating of 1.25 oz per square feet for each side in conformance with ASTM A90.

C. Insulated Flexible Ducts: Flexible duct wrapped with flexible glass fiber insulation, enclosed by seamless aluminum pigmented plastic vapor barrier jacket; maximum 0.23 K value at 75 deg. F.

D. Round Spiral Ducts: ASTM A-527-71, galvanized steel, spiral locking seam equal to United McGill Uni-Seal.

E. Internal Insulated Round Spiral Ducts: ASTM A-527-71, galvanized steel, spiral locking seam equal to United McGill Uni-Rib k-27.

2.02 LOW PRESSURE DUCTWORK

A. Fabricate and support in accordance with SMACNA Low Pressure Duct Construction Standards and ASHRAE handbooks, except as indicated. Provide duct material, gauges, reinforcing, and sealing for operating pressures indicated.

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

C. Construct tees, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows are used, provide turning vanes. Where acoustical lining is indicated, provide turning vanes of perforated metal with glass fiber insulation.

D. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible. Divergence upstream of equipment shall not exceed 30 degrees; convergence downstream shall not exceed 45 degrees.

E. Provide easements where low pressure ductwork conflicts with piping and structure. Where easements exceed 10 percent duct area, split into two ducts maintaining original duct area.

F. Connect flexible ducts to metal ducts with adhesive plus sheet metal screws.

G. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.

H. Use double nuts and lock washers on threaded rod supports.

PART 3 - EXECUTION

3.01 PREPARATION/INSTALLATION

A. Before proceeding with fabrication and installation of ductwork, inspect the contract documents and determine that the location of work does not interfere with other work. In case of interference, notify the Engineer.

B. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.

C. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

D. Connect diffusers or troffer boots to low pressure ducts with 5 feet maximum length of flexible duct in areas where a ceiling is installed. Hold in place with strap or clamp.

E. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

3.02 DUCTWORK APPLICATION SCHEDULE

AIR SYSTEM	MATERIAL
Low Pressure Supply	Rectangular or spiral round as indicated on drawings.
Return and Relief	Rectangular or spiral round as indicated on drawings.
Toilet Exhaust	Galvanized Steel
Outside Air Intake	Galvanized Steel
Acoustically Lined Supply	Internally insulated as indicated.

3.03 ADJUSTING AND CLEANING

A. If air handling equipment is used to supply temporary heat during construction, 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.

B. If air handling equipment is used to supply temporary heat during construction, clean duct systems with high power vacuum machines. Protect equipment which may be harmed by excessive dirt with filters, or bypass during cleaning. Provide adequate access into ductwork for cleaning purposes.

END OF SECTION

SECTION 260000 - ELECTRICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This Division includes labor, materials, equipment, tools, supervision, start-up services, Owner's Instructions, including all incidental and related items necessary to complete installation and successfully test, start-up and operate in a practical and efficient manner the Electrical Systems indicated on drawings and described in each Section of Division 26 Specification and conforming with all Contract Documents.

B. Bidding: the Contractor shall bid the project in strict accordance with the plans and Specifications. Alternative methods or materials, beyond those indicated as “Base Bid”, proposed by the Contractor, shall be in the form of a voluntary alternate, with details indicated, and a separate add or deduct price for these changes submitted with the Contractor's bid. (Reference General Requirements - Product Substitutions).

C. Electrical systems, complete and in place, shall include the following:

SECTION 260000 - ELECTRICAL GENERAL PROVISIONS
SECTION 260010 - BASIC ELECTRICAL MATERIALS AND METHODS
SECTION 260526 – GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
SECTION 260529 – HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
SECTION 260534 – CONDUIT
SECTION 262416 - PANELBOARDS
SECTION 265100 – LIGHTING SYSTEMS

D. The General Provisions of this Contract, including General and Supplementary Conditions and other General Requirements Sections, apply to the Work specified in this Section.

E. This Section is not intended to supersede, but to clarify, the definitions in Division 1, General Requirements and Supplementary Conditions.

F. Drawings and Specifications

1. Drawings and Specifications are intended to complement each other, and work specified and not indicated or indicated and not specified shall be provided as though mentioned in either Specifications or Drawings.

2. Minor items and accessories or devices reasonably inferable as necessary to the complete and proper operation of any system shall be provided by the Contractor or Subcontractor for such system, whether or not they are specifically called for by the specifications or drawings.

3. Drawings are diagrammatic and indicate general arrangement of systems and work included in the Contract, and shall serve only as design drawings, to represent design intent for general layout of various equipment and systems and not intended to be scaled for rough-in measurements or to serve as measured shop drawings.

4. If directed by the Architect/Engineer, the Contractor shall, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades or for proper execution of the work. (Refer to General Requirements for co-ordination between trades).

1.02 COORDINATION OF ELECTRICAL WORK

A. Responsibility:

1. The Electrical Contractor shall be responsible for his Sub-Contractors and Suppliers, and include in his bid materials, labor, and equipment involved, and install in accordance with local customs, codes, rules, regulations, jurisdictional awards, and decisions; and secure compliance of parts of the Specifications and Drawings regardless of Sectional inclusion in these Specifications.

2. The Electrical Contractor and Sub-Contractor(s) shall be responsible for tasks applicable to his trade, as directed by the General Contractor, in accordance with the Specifications, Drawings, code requirements and shall be responsible for coordinating locations and arrangements of his work with all other relevant Mechanical, Architectural, Structural and Electrical Contractor's Specifications, Drawings and shop drawings. Coordinate work so that sprinkler heads, lights, diffusers, etc. are coordinated into Project and are installed per the architectural reflected ceiling plan.

B. Site and Project Document Examination:

1. Submission of a proposal is considered evidence that the Contractor has visited site and acquainted themselves with all existing conditions, made all necessary measurements, examined the Drawings and Specifications of all trades, including Mechanical, Architectural, Structural, and Electrical, and has fully informed himself with all Project and site conditions, and is proficient, experienced and knowledgeable of all standards, codes, ordinances, permits and regulations which affect the installation of his respective trade, and that all costs are included in his proposal.

2. The Electrical Contractor and/or Sub-Contractor(s) shall obtain all required permits and assessments prior to starting work. Contractor shall verify requirement to include permits as part of his formal bid, as described in the General and Supplementary Requirements.

3. No allowance shall subsequently be made in the Contractor's behalf for extra expense incurred due to failure or neglect on his part to make this site visit and examination.

4. It is the responsibility of the Contractor to notify the Engineer, prior to submitting his bid, of any potential problems that he has identified during his site visit or from examination of the Contract documents.

C. General Supports:

1. Provide all necessary angle, channel, brackets or supplementary steel as required for adequate support for all conduit, specialties and equipment which is hung or mounted above floor. Secure approval from Architect, in writing, before welding or bolting to steel framing or anchoring to concrete structure.

2. Where conduit or equipment is suspended from concrete construction, set approved concrete inserts in formwork to receive hanger rods, such as structural steel channel, and where installed in metal deck use Ramset or welds as required.

D. Equipment Clearance:

1. Electrical Contractor to coordinate with the Architectural and Mechanical trades for equipment locations and to ensure adequate clearance is maintained, as required by the National Electrical Code and applicable state and local codes, as well as accessibility for future maintenance and operation.

2. Electrical work shall be arranged with building construction to provide minimum 6'-8" overhead clearance where possible.

E. Wall, Floor and Ceiling Openings:

1. Locate openings and advise the General Contractor/Construction Manager of details and templates of all openings necessary for inspection of electrical work.

2. In general, openings and required lintels shall be provided through the General Contractor/Construction Manager. Size and location is the responsibility of this Contractor. Cracks and rough edges left following installation of equipment shall be caulked or covered by Electrical Contractor.

3. Openings through drywall or concrete surfaces for supporting electrical equipment, including conduit penetrations, shall be drilled in a neat and work-like manner.

4. Electrical penetration holes through fire rated materials and systems shall be sealed in a manner to maintain the fire rating of that material and system.

5. Foam type sealer shall be used in accordance with the manufacturer's instructions for storage, hole preparation, mixing, and application. Two part foam type fire sealer shall be Dow Corning Silicone RTV, or approved equal.

6. Mechanical type fire stops shall be fitted to the opening and cable sizes, assembled, and installed per the manufacturer's instructions. Stops shall be Crouse-Hinds "TW Series, Thru-Wall-Barrier", Nelson Electric "Multi-Cable Transits", or approved equal.

F. Access Panels:

1. Items of equipment which require accessibility, adjustment, maintenance or observation such as junction boxes, controls, etc., shall be located and arranged for ready access either directly or through the use of access doors.

2. Notify the Engineer and all affected trades where and of what size and/or configuration access doors will be installed. Secure the approval of the Architect/Engineer for these locations and configurations.

3. Such access doors/panels shall meet or exceed the fire barrier rating of the floor, wall or partition into which they are inserted.

4. Access doors or panels, where required, shall be provided by the Contractor or Subcontractor whose equipment requires the access unless otherwise noted. This trade is to coordinate the access panel manufacturers with the architectural access panels.

G. General Cleaning:

1. It shall be the responsibility of this Contractor to keep the premises free of accumulations of surplus material or rubbish caused by his operations and/or the operations of his

Subcontractors. Combustible rubbish and debris shall be removed immediately. The trades shall remove their rubbish and debris from the project site promptly upon its accumulation.

2. Upon completion of the installation, the Contractor shall thoroughly clean all fixtures, equipment, boxes, raceways, controls, enclosures and other applicable equipment and accessories free of all foreign material.

3. All patching, repairing and painting required of surfaces damaged or allowed to deteriorate in the performance of this work made by this Contractor, where directed by the Architect/Engineer, shall be at this Contractor's expense.

4. If a Contractor does not remove rubbish or clean the systems as specified above, the Owner's representative reserves the right to have the work performed by others, with the cost back-charged to the Contractor who made the removal or cleaning necessary.

H. Field Changes:

1. The Contractor shall not make any field changes that affect timing, costs or performance without written approval from the Architect/Engineer in the form of a Change Order, Field Change Order or a Supplemental Instruction. The Contractor assumes liability for any additional costs for changes made without such instruction or approval. Should any unauthorized change be determined by the Architect/Engineer as lessening the value of the project, a credit will be determined and issued as a change to the contract.

2. For any extra work electrical work which may be proposed, this Contractor shall furnish to the General Contractor, an itemized breakdown of the estimated cost of the materials and labor required to complete this work. The Contractor shall proceed only after receiving a written order from the General Contractor establishing the agreed price and describing the work to be done.

1.03 STANDARDS, CODES AND PERMITS

A. Refer to Division 01, General Requirements and Supplementary Conditions.

B. All work installed under Electrical Sections shall comply with latest edition of applicable standards and codes of the following, including local codes and variances:

ADAG	Americans with Disabilities Act Guidelines
AEIC	Association of Edison Illuminating Companies
ANSI	American National Standards Institute
ANSI	Dimensions of Attachment Plugs and Receptacles
ASA	American Standards Association
ASTM	American Society of Testing Materials
ICEA	Insulated Power Cable Engineers Association
IEEE	Institute of Electrical and Electronics Engineers
OSHA	Occupational Safety and Health Act
NEC	Latest edition of (NFPA 70) as approved by the local authority having jurisdiction
NECA	Standards for Installation
NEMA	National Electric Manufacturers Association
NESC	National Electric Safety Code (H13)
NETA	National Electrical Testing Association, Inc.
NFPA	National Fire Protection Association
UL	Underwriter's Laboratories

American Standard Safety Code for Elevators.

Regulations of the local power utility company.

Regulations of the local telephone utility company.

C. Work shall be provided and tested in accordance with all applicable local, county, state laws, governmental ordinances, codes, rules and regulations.

D. Contractor shall give all notices, file all drawings, obtain necessary approvals, obtain all permits, pay all fees, deposit and expenses required for installation of all work under this Contract.

E. No work shall be covered or enclosed until work is tested in accordance with applicable codes and regulations, and successful tests witnessed and approved by authorized inspection authority. Written approvals shall be secured by Contractor and kept on file for inspection by the Engineer.

F. In general, material where applicable shall be labeled or listed by Underwriters' Laboratories, Inc. Assembled electrical equipment supplied to the job site shall be listed or labeled and/or approved by the authority having jurisdiction.

G. In the event plans and specifications conflict with any rules, regulations or codes applying, said rules, regulations and codes shall govern the Contractor.

1.04 SUBMITTALS

A. Shop Drawings:

1. After a schedule of Sub-Contractors is approved by the Engineer, submit shop drawings electronically with one device or fixture of each type clearly identified (high-lighted, bolded, underlined, etc.) in each set on equipment and materials indicated on drawings or in the specifications. Refer to other sections of electrical specifications for additional requirements.

   a. Disconnect Switches
   b. Fire Alarm System
   c. Wiring Devices
   a. Lighting

2. Submit complete manufacturer's shop drawings of equipment, accessories and controls, including dimensions, weights, capacities, construction details, installation, control methods, wiring diagrams, and motor data, etc.

3. Engineer's approval of shop drawings is for general application only and is a service only and not considered as a guarantee of total compliance with or as relieving Contractor of basic responsibilities under Contract Documents, and does not approve changes in time or cost.

4. After approval, each Contractor is responsible to provide information to other trades involved in, or affected by, installation of his equipment and work.

B. Operating and Maintenance Instructions and Manuals:

1. Electrical Contractor shall provide for all major items of equipment two (2) bound and indexed

sets of operating/installation and maintenance instructions to Engineer for approval. After approval, manuals will be given to Owner by Engineer.

2. Manuals shall include a complete set of shop drawings submitted, indexed with tabs for each section.

PART 2 – PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Standards:

1. Products shall be of established manufacturers regularly engaged in making type of materials to be provided and complete with all parts, accessories, trim, finish, safety guards and other devices and details needed for a complete installation and for the intended use and effect.

B. Substitution and Changes:

1. Contractor and/or Equipment Supplier may propose alternate equipment or materials of equal quality, function, durability and appearance as described and permitted in Specification Section 260000, 1.01.B. The substitution will take the form of an "Add-Deduct" to the bid proposal. It is the submitter's responsibility to provide sufficient material for review as required by Engineer's office. Acceptance and approval is the responsibility of the Engineer.

2. No substitutions will be accepted, except as authorized in a Project Addendum.

3. Contractor and/or Equipment Supplier is liable for any added costs to himself or others and is responsible for verifying dimensions, clearance and roughing-in requirements, when product not named as the basis of design is used and the Contractor is responsible for advising other Contractors of variations and, if requested, submit revised drawing layout for approval by the Engineer.

C. Explanation of Scheduled Manufacturers:

1. “Base Bid”. This term designates that this equipment will be the product which the contractor generates his bid from. It is usually a component that is critical to maintaining the design intent. No other equipment suppliers will be allowed to bid as an “equal”.

2. “Based On”. This term designates that the equipment is designed around a certain product. Products of equal status are listed and may be bid as if they were the basis of design. The “based on” equipment shall serve as the standard to which equals will be judged.

2.02 EQUIPMENT REQUIREMENTS AND CONNECTIONS

A. Motor Starters and Controls:

1. Electrical Contractor shall provide manual or magnetic motor starters as required for motors not provided by Mechanical Trades and as indicated on Electrical Drawings and as specified within this Specification.

2. Mechanical Contractor shall provide factory installed motor starters integral with packaged equipment containing thermal overcurrent protection in ungrounded conductors with heater coils selected for specific motor usage for motors, unless otherwise shown on electrical drawings.

B. Electrical Wiring and Controls:

1. Mechanical Contractor shall provide motors, drives, controllers and safety switches integral to packaged equipment and factory mounted controls for mechanical equipment as indicated. When pre-wired equipment is used, control circuit shall be separately fused at control transformer and shall always revert to a fail-safe condition.

2. Mechanical Contractor shall provide electrical devices requiring mechanical connections, and/or electrical connections, such as pressure switches, limit switches, float switches, solenoid valves, motor operated valves, motor operated dampers, thermostats, override timers, etc.

3. Mechanical Contractor shall provide Class 2 and 3 wiring, conduit, boxes for their associated equipment unless otherwise noted.

4. Electrical Contractor shall install power wiring and conduit to motors and/or factory mounted control panels as indicated on Drawings or as indicated in other sections of the Specifications.

5. Electrical wiring work by Mechanical Contractor and Temperature Control Contractor shall be in accordance with Division 26 requirements.

C. Owner Supplied Equipment:

1. Electrical Contractor is to provide power wiring, conduit, starters and safety switches on equipment as indicated on the drawings. Make final power connections to equipment. Any control wiring or remote power supplied by the equipment to remote units shall be provided by the Owner.

PART 3 - EXECUTION

3.01 INSTALLATION OF EQUIPMENT

A. Install all equipment in strict accordance with all directions and recommendations furnished by the manufacturer. Where such directions are in conflict with the drawings and specifications, report such conflicts to the Architect/Engineer for resolution.

3.02 CHASES AND RECESSES

A. Provided by the architectural trades, but the contractor shall be responsible for their accurate location and size.

3.03 CLOSEOUT

A. Final Acceptance:

Final acceptance and payment will only be made after final punch list completion and receipt at Engineer's office of:

Certificates of Inspection
Test Reports
Guarantees/Warranties

Record Drawings (As-Builts)
Operating and Maintenance Instruction Manuals (2)

B. Certificates of Inspection and Test Reports:

The Contractor shall submit to the Engineer's Office evidence that installation has been inspected and approved by municipal or state electrical inspector and/or the authority having jurisdiction.

C. Guarantees and Warranties:

1. During the one year period of continuous operation (except if General Requirements specify a longer warranty period), make two complete inspections (one at 3 months and one at 6 months) of all systems, fixtures, equipment, safety devices and controls to ensure equipment operating properly, and report to Engineer in writing. Contact the Owner's Operation/Maintenance Supervisor to schedule site inspection.

D. Record Drawings:

1. Maintain a white-print set of Electrical Contract Drawings in clean, undamaged condition for mark-up of actual installation on Electrical Contract Drawings which vary substantially from the work as shown. These drawings are to be available for inspection by the Engineer on a weekly basis.

2. Submit as-built record drawings consisting of separate plans and riser diagrams for following systems:

Power
Lighting and Controls
Door Control and Security System

Each system drawing shall show location, size and conductor fill for conduits, junction boxes and outlets. Specification changes shall also be submitted.

E. Operating and Maintenance Instructions:

1. Provide instruction of Owner's personnel in operation and maintenance procedures for all systems equipment.

F. Placing Systems into Operation:

1. Electrical Contractor shall be responsible for all start-up procedures, system checks and balancing associated with his equipment.

2. Equipment shall be installed, tested and operated in accordance with manufacturer's recommendations at normal operating conditions.

3. Permanent electrical equipment operated during construction periods shall be cleaned, and damaged equipment replaced.

G. Adjustments and Balancing:

1. Subsequent to beginning operation of the electrical power and distribution systems, the

Contractor shall make all necessary adjustments to equipment installed or connected by him under this contract so as to ensure proper operation of the same. The Contractor shall measure, phase balance and make necessary adjustments to any portion of the electrical system that is substantially out of balance.

3.04 GUARANTEES AND WARRANTIES

A. Labor, materials and equipment shall be guaranteed by Contractor and/or warranted by manufacturer for one year after acceptance date and/or one normal continuous complete season's operation applicable to equipment or system except where specified longer for special equipment. Contractor shall secure such warranty from Suppliers (not one year from shipment date), or Contractor to assume warranty.

B. Acceptance date of substantial completion shall be Owner occupancy as determined by Architect/Engineer.

C. Contractor shall make necessary alterations, repairs, adjustments, replacements during guarantee periods as directed by Architect/Engineer to comply with Drawings and Specifications at no cost to Owner.

D. Repair or replacements made under guarantee bear further one year guarantee from date of acceptance of repair or replacement.

END OF SECTION

SECTION 260010 - BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.01 MATERIALS

A. All materials and equipment furnished for installation on this project shall be new and in strict accordance with Contract Documents. Packaged materials shall be delivered in their original containers which shall show the manufacturer's name and the identifying designations as to size, quality, etc. Materials delivered to the project unmarked or mutilated packages will be ordered to be removed from the site at once. Materials or equipment judged as "damaged" by the Architect/Engineer, General Contractor, or Construction Manager shall be removed from the project and site.

B. Should any dispute arise to the quality of any material, the decision shall rest entirely with the Architect/Engineer, General Contractor, or Construction Manager and shall be based on the requirement that materials furnished shall be first class in every respect, and what is usual or customary in erecting other buildings shall in no way enter into the consideration or decision whatever as it pertains to the project under consideration.

C. Materials and equipment furnished under work of Division 26 Sections shall be UL approved and listed, and shall bear the Underwriters' Label.

1.02 IDENTIFICATION

A. Service switches, motor disconnects, controllers, etc., whether or not furnished under this Division shall be marked to identify the equipment served and the origin of the power source. Branch panelboards, distribution panels, and switchboards shall be identified as to designation and voltage characteristics. **All identification shall be done with engraved plastic plates, black with white letters**.

1.03 DIRECTORIES

A. **Provide each panel with a typewritten index**. Insert index into a transparent plastic holder secured to the inside of the panel door.

1.04 SUBMITTALS

A. Shop Drawings

1. Submit shop drawings for the following:

a. Wiring Devices and Switches.
b. Specialty Wiring Devices.
c. Starters.

PART 2 - PRODUCTS

2.01 RACEWAYS

A. Wiring shall be installed in approved raceways where required by code and be a minimum size of 3/4" for homeruns unless otherwise noted. 1/2" conduit will be permitted for switch and receptacle runs in walls. Conduit or tubing shall be installed in a manner which complies with all applicable provisions of the National Electrical Code.

B. Ends of conduit or tubing shall terminate in a bushing or fitting having factory installed insulating liners. Provide plastic bushings on conduit or tubing with wire larger than #4 AWG. Exposed runs shall be supported by hangers, clamps, or straps secured by toggle bolts in hollow construction or expansion bolts or inserts in poured or brick walls.

C. Every precaution shall be taken to protect the conduit from damage and from water, dirt, concrete, etc., getting into the system during construction. Capped bushings shall be used on conduit terminations until wire is installed. If, in the opinion of the Engineer, conduit or tubing has become damaged or contains un-removable foreign matter, it shall be replaced at the Contractor's expense. Aluminum conduit is not acceptable in this contract.

D. Intermediate metallic conduit (IMC) shall be hot dipped galvanized steel, and shall be used on all runs above 2-1/2" unless otherwise noted. Intermediate metallic conduit may be used in all poured construction, fill, outside masonry walls, areas exposed to weather, under drives and walks, and in areas where tubing may become damaged.

E. Cast and threaded fittings for IMC shall be used on exposed conduit installed on walls below 8’-0" and on conduit exposed to weather.

F. Plastic conduit shall be high strength smooth inner with polyvinyl chloride, heavy wall type equal to Carlon Schedule 40 for use as direct burial without concrete encasement, except as required by code. Couplings shall be the solvent welded type. Circuits run in PVC conduit require a separate grounding conductor.

G. Electric-metallic-tubing (thinwall conduit) shall be standard weight with manufacturer's name and Underwriters' Label on each length. Maximum permissible size tubing shall be 2-1/2".

H. Tubing may be used for feeders and branch circuits above suspended accessible ceilings; for switch and receptacle legs which terminate above suspended accessible ceilings and for exposed feeders and branch circuits.

I. Metal conduit and EMT fittings should be galvanized malleable iron, steel or aluminum. Connectors and couplings shall be threaded, set-screw, or compression type, and concrete-tight and/or rain-tight where required. Conduit bodies shall be malleable iron or aluminum cover gaskets exposed to weather.

    1. Expansion Fittings: cast or malleable iron bodies, with threaded end caps for receiving fixed and moveable conduits, metallic pressure packing, and copper bonding jumper assembly. Fittings shall provide for minimum 2" of movement of conduit in either direction. Fittings shall be Appleton type "XJ" or similar fittings by another approved manufacturer.

    2. Expansion-Deflection Fittings: neoprene sleeve secured to silicon bronze threaded couplings by means of stainless steel bands. Fitting shall be designed to provide for movement of not less than 3/4" from normal in all directions and shall be complete with tinned flexible copper braid bonding jumper protected by neoprene sleeve and securely bolted to couplings for grounding continuity through joint. Fittings shall be O.Z./Gedney Electric Company, type "DX" or similar fittings by another approved manufacturer.

3. Locknuts: malleable iron or steel. Bushings shall be malleable iron or steel, or plastic. Malleable iron or steel bushings shall be zinc or cadmium plated and shall have insulating insert of thermosetting plastic molded and locked into bushing ring. Plastic bushings shall be thermosetting phenolic insulating type conforming to Federal Specification W-F-406 and Amendment 6. Use of non-rigid plastic bushings is prohibited.

J. Flexible metal conduit shall be used for connections to the following equipment: Motors and mechanical equipment. Maximum length of flexible metallic conduit shall be 6'-0". Minimum size shall be 1/2". Flexible metal conduit used for lighting fixture connections shall be "Greenfield" type. Fittings shall be insulated throat, flex-steel connectors. Flexible metal conduit used for equipment other than lighting fixtures shall be similar to "Greenfield" except jacketed with a plastic outer cover and terminated with appropriate factory-installed fittings, UL Labeled.

K. Flexible metallic conduit shall have separate grounding conductor.

L. Space around conduits at wall penetrations shall be filled with mortar, or other approved filler, maintaining the rating of wall/ceiling construction as required.

2.02 WIRES AND CABLES

A. Wiring shall be Class B stranded copper, single conductor, and shall be installed in conduit or tubing unless specified otherwise.

B. Conductors shall be continuous between outlets or junction boxes with splice made only within such boxes.

C. No wire smaller than #12 may be used unless specified under descriptions of special systems. Control wiring may be #14 AWG or smaller as indicated, and shall be stranded.

D. Cables for smoke detection systems or for use in plenums without conduit shall be UL listed, UL Style 1330, meeting ASTM D-2116 and ICEA color codes.

E. Wire for general interior, exterior, and control use, sizes #14 AWG through 500 MCM, shall be single conductor, insulated for a minimum of 75 degrees C, NEC type MC cable (for use in accessible areas only), THHN, THWN, or XHHW, elsewhere, and be rated 600 volts. Where required ampacities can only be satisfied by conductor sizes larger than 500 MCM, parallel conductors shall be used.

F. Wire for use in fluorescent fixture wiring channels shall conform to NEC Types THHN or XHHW, rated 90 degrees C, 600 volts.

G. Ground wire for interior use shall be green insulated, stranded copper. and shall meet requirements of wire for general interior use.

I. Branch circuit wiring shall be color coded, red, black, blue for phase wiring, and white neutral. Bonding conductors shall be green or bare. Phase color coding shall be consistent throughout the entire branch circuit system.

J. All neutral runs including feeders shall be white full length of conductor.

2.03 WIRE CONNECTORS AND JOINTS

A. Conductors #6 AWG and smaller shall be joined with electrical spring connectors with vinyl insulating cap. Conductors larger than #6 shall be joined by compression type connectors.

2.04 OUTLET BOXES

A. A standard galvanized outlet box shall be installed for each and every outlet shown.

B. Set boxes squarely with faces flush to finished surfaces. The exact location of all outlets shall be approved by the Architect/Engineer before same are placed and Contractor shall consult Architect/Engineer at all times relative to the location of outlets. No outlets shall be placed behind plumbing or heating pipes or where they will interfere with ducts, pipes, equipment, or other work. Outlets not located in accordance with these instructions shall be relocated when so directed by the Architect or General Contractor by this Contractor at his expense including cost of any cutting and patching the work of other trades as may be required by such relocation.

C. Each outlet shall be rigidly supported from the building construction (independent of the raceway system).

D. Ceiling outlet boxes shall be 4" octagon, minimum 1-1/2" deep, with fixture hickey, and supported to withstand 80 pounds.

E. Convenience outlet and switch boxes shall be a minimum of 2-1/8" deep. When installed in poured walls, 2-1/2" minimum deep box shall be used; when installed in masonry, 3-1/2" minimum deep box shall be used.

2.05 JUNCTION BOXES AND PULL BOXES

A. When used, pull boxes and junction boxes shall be galvanized and have flat steel covers fastened with screws and set flush with the finished surface and located in an accessible area. When installed in damp locations, gaskets and seals shall be provided. Junction boxes shall be sized to meet N.E.C. Standards based on conduit and conductors. Provide identifying labels on each box.

2.06 WIRING DEVICES

A. Receptacles

1. Receptacles shall be mounted approximately 1'-4" above floor to bottom or at other heights indicated on Drawings.

2. Contractor shall be responsible for masking receptacles for protection from painting, plastering, etc.

3. Receptacles shall be commercial specification grade as manufactured by Hubbell, Leviton, General Electric, Arrow-Hart, or P & S, equal to the following models:

   a. 20 Amp, 125 Volt, duplex, ground fault, (NEMA 5-20R), Hubbell GF-5352-W series, with #CWP26H outdoor weatherproof cover for exterior use.

   b. 20 Amp, 125 Volt, duplex (NEMA 5-20R), Hubbell CBR20W series.

   c. 20 Amp, 125 Volt, duplex with isolated ground (NEMA 5-20R), Hubbell IG5362 series.

NOTE: GFCI receptacles must meet UL 2003 Standards.

B. Wall Switches

1. Wall switches shall be mounted approximately 4'-0" above floor to top unless they interfere with trim. Switches shall be commercial specification grade, totally enclosed molded composition, silent type, spring action silver contacts, and rated at 120/277 volts A.C. Switches shall be binding screw type, side and back wired type.

2. Contractor shall be responsible for masking switches for protection from painting, plastering, etc.

3. Contractor shall confirm door swings with Building Trades Contractor before installing switches.

4. Switches shall be rated at 20 Amp, white in color, Hubbell CSB120 series, or Arrow-Hart, Leviton, General Electric, or P & S switches of equivalent grade. Switches shall be single pole, double pole, three-way, keyed (master), or other type as indicated.

C. Wall Plates

1. Wall plates shall be installed plumb and level with all edges in contact with attaching surface. Plates shall be nylon in finished areas and brushed smooth stainless steel in mechanical areas. Provide blank cover plates for all data and telephone outlet boxes shown on plans. Plates used on exposed surface mounted outlets shall be the raised pressed metal type, stainless steel finish, to accommodate the device and cover the outlet box, without fillers of any kind. Mounting screws shall be metal with same finish as plate and with countersunk head. Plates shall be single, ganged, or combination, to accommodate arrangement indicated on drawings. Arrow-Hart, Leviton, General Electric, Hubbell, or P & S plates of equivalent grade will be acceptable.

2.07 SPECIALTY WIRING DEVICES

A. Thermostat/Sensors:
For each of the thermostats/sensors shown, a single gang box with a 1/2" conduit stubbed to the unit being controlled. Up to accessible ceiling or from controller to unit in non-accessible ceilings. Box mounted at 44" A.F.F.

2.08 SINGLE PHASE MOTOR STARTERS

A. Manual starters for fractional horsepower single phase motors shall be single or double pole with pilot lights and thermal overload relay elements. Enclosure shall be NEMA 1, surface or flush mounted as indicated with provision for padlocking unless described otherwise on drawings. Thermal overload elements shall be sized on basis of motor rating and starter manufacturer's instructions. Units shall be General Electric "Type CR-101," Square D "Class 2510," or Cutler Hammer.

2.09 FUSESTATS

A. Fusestats shall provide overload protection and may be used for permanently wired motors rated up to 1/2 HP, 125 Volt A.C. only.

B. Fusestat base shall be constructed of pre-galvanized steel plate with a hood of galvanized steel and fit on a standard double gang 4" square box.

C. Fusestat shall consist of a fused outlet and switch and be by Steel City, Catalog No. F8-S, or equal by other approved manufacturer.

2.10 FUSES

A. Fuses 600 Amperes and Less: Dual element, current limiting, time delay, one-time fuse, 250 or 600 volt as required, UL Class J.

B. Interrupting Rating: 200,000 rms amperes.

2.11 SAFETY SWITCHES

A. Furnish and install required safety switches.

B. Safety switches shall be NEMA heavy duty type "HD", fusible or non-fusible as indicated, and Underwriter's Laboratory approved. Switches shall be furnished in NEMA-1 enclosures unless otherwise shown on drawings. Weatherproof switches shall be NEMA-3R (raintight).

C. Switches shall be horsepower rated with interlocking provisions to prevent unauthorized opening of the switch covers in the "ON" position.

D. Switches shall be Square D, or equal by General Electric or Cutler Hammer.

2.12 SUPPORTS AND HANGERS

A. Provide and install necessary steel brackets, rods, clamps, etc., for support of work under this contract. Supports shall be plated or painted and shall be secured to structural members after Architect's approval.

2.13 SLEEVES AND INSERTS

A. This Contractor shall be responsible for the proper location on all sleeves, chases, openings and inserts for the installation of his equipment.

B. Holes through walls, floors, or structural members for electrical conduit and equipment shall be drilled in a work-like manner and be located only where permitted by the Architect or Engineer.

PART 3 - EXECUTION

3.01 PREPARATION

A. Conduits shall be cut, bent, joined, and installed per manufacturer's instructions, U.L. General Information, and the N.E.C.

B. Outdoor and underground encased coupling and conduit threads shall be treated with mastic or similar compound to prevent entry of water.

3.02 INSTALLATION METHODS

A. Conduit runs shall be placed neatly and orderly at parallel or perpendicular lines to building walls.

B. Conduits shall not be installed directly under cold water pipes.

C. No more than two concealed conduits shall cross over at same point in a poured slab.

D. Conduit and pull boxes shall be installed mechanically secure to permit pulling in or pulling out of cable proposed for same. Double locknuts and bushing shall be used for termination of conduit at boxes and equipment.

E. Provide insulating bushings at open ends of telephone and data system conduits or raceways.

F. Joints of conduits shall be tight, low resistance connections.

G. **A #6 pullcord shall be provided for new empty conduits**. Pullcord shall be wax impregnated, nylon, or other synthetic material resistant to moisture and mildew to prevent deterioration.

END OF SECTION

SECTION 260526 – GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SCOPE

A. The grounding system shall be in accordance with the drawings, specifications and with the National Electrical Code, NEMA, USASI and IEEE Standards, latest editions, where these standards apply. The ground bar of the main service disconnect enclosure shall be bonded to water mains, structural steel, and driven ground rods, by grounding electrode conductor, and as indicated on the drawings. Methods in accordance with good accepted practice for this type of work which cover conditions not indicated on the drawings or described in these specifications and which meet with the approval of the Engineer shall be used in order to secure a good substantial and permanent grounding system. Maximum ground resistance to be per N.E.C.

B. All interconnections, risers, cables, etc. shall be provided and installed for grounding main switchboard, panelboards and other equipment. Bonding jumpers shall be copper, equal in cross section to the corresponding ground connectors and attached by solderless lugs, compression connections, or clamps. All ground connectors shall have brazed connections, unless otherwise indicated, such as Cadwell, Burndy, Thomas and Betts or equal as approved.

C. Ground cables shall be protected by sleeves where the cable extends through a concrete surface. Ground inserts shall be used where ground cables extending through the surface would be exposed to mechanical damage during or after construction.

D. Where ground cables are installed in rigid metal conduit, the cables shall be bonded to the conduit at both ends of the run.

E. Welds on ground cables shall be cleaned and painted with an asphalt base paint where buried underground or imbedded in concrete.

F. Miscellaneous and special systems shall be properly grounded in accordance with the requirements of each system.

1.02 BRANCH CIRCUIT GROUND WIRE

A. Provide a #12AWG green grounding wire in each conduit in addition to the circuit wires (phase and neutral wires). The grounding wire shall be connected to grounding terminal bars (to be furnished with each distribution panel) in panelboards, and these bars shall be grounded to the system master ground at switchboard.

B. All equipment, fixtures, receptacles, etc. shall be grounded by means of a separate green ground wire. These wires shall be connected to the respective distribution panel grounding bar, equipped with the required quantity of screw terminals.

C. All isolated ground receptacles require a separate #12AWG ground wire from the receptacle to the isolated ground bus within the panel.

D. Circuits run in PVC conduit will require a separate grounding conductor, provided and installed at no additional cost.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that final backfill and compaction has been completed before driving rod electrodes.

3.02 INSTALLATION

A. Install ground electrodes at locations indicated. Install rod electrodes as required to achieve specified resistance to ground.

B. Do not use existing conduit, or any other existing mechanical duct to secure ground conductors.

C. Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus or bushing. Raceways shall not be used as grounding conductors.

D. Grounding conductors shall be at permanently accessible locations.

END OF SECTION

SECTION 260529 – HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Conduit and equipment supports.

B. Anchors and fasteners.

1.02 REFERENCE STANDARDS

A. NECA 1 – Standard Practices for Good Workmanship in Electrical Contracting; national Electrical Contractors Association; 2006.

B. NFPA 70 – National Electrical Code; national Fire Protection Association; 2005.

C. ANSI/TIA/EIA 568 Commercial Building Telecommunications Cabling Standard, current revision level.

D. ANSI/TIA/EIA 569 Commercial Building Standard for Telecommunications pathways and Spaces, current revision level.

1.03 SUMMARY

A. ASTM A682 Standard Specification for Steel, Strip, High-Carbon, Cold-Rolled, Spring Quality.

B. The work covered under this specification consists of the furnishing of all necessary labor, supervision, materials, equipment and services to completely execute the system of conduit hangers and supports as described in this section.

1.04 QUALITY ASSURANCE

A. Conforming to the requirements of NFPA 70.

B. Products: Listed and classified by Underwriters laboratories Inc. as suitable for the purpose specified and indicated.

C. Conduit hangers and supports shall have the manufacturer’s name and part number stamped on the part for identification.

D. Manufacturer: Company specializing in manufacturing products specified in this section with as minimum of five years documented experience in the industry, and certified ISO 9000.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Power-Strut, Division of Allied Support systems.

B. Thomas & Betts Corporation: www.tnb.com.

C. Hilti Corporation.

D. B-Line Systems, Inc.

E. ERICO, Inc.

2.02 MATERIALS

A. Hangers, Supports, Anchors and Fasteners – General: Protective zinc coating either Electro-Plated (ASTM B633 SCI or SC3), Pre-Galvanized (ASTM a525 coating designation G90) or Hot-Dipped Galvanized after fabrication (ASTM A123). The minimum thickness of zinc coating shall be 0.2 mils.

B. Provide materials of size and type adequate to carry the loads of equipment and conduit, including weight of wire in conduit.

C. Supports: All structural steel or formed steel members shall be manufactured from galvanized ASTM A570 grade 33 steel, #16 gauge minimum.

D. Supports and channels which sag, twist or show signs of inadequate or improper structural support for it's intended purpose, as determined by the Engineer, shall be replaced by the contractor. All costs associated with the replacement of supports and channels shall be incurred by the contractor.

E. Anchors and Fasteners:

1. Concrete Structural Elements: Use expansion anchors.

2. Steel Structural Elements: Use beam clamps.

3. Concrete Surfaces: Use expansion anchors.

4. Hollow Masonry, Plaster and Gypsum Board Partitions: Use toggle bolts or hollow wall fasteners.

5. Solid Masonry Walls: Use expansion anchors or preset inserts.

F. Powder-Actuated Anchors:

1. Product: Hilti DX series.

G. Conduit Hangers:

1. Shall have a vertical load limit of 100 lbs. and a horizontal load limit of 25 lbs.

2. Shall be available with either a plain hole for ¼" bolt or a ½-20 thread impression.

3. Shall be available for 3/8" through 2" EMT, rigid and aluminum conduit.

4. Shall be available pre-assembled with manufacturer's specialty fasteners for connection to building structures like beam, flange, drop wire/rod, concrete and acoustical grid.

H. Wire Rope Hangers:
   1. Wire rope hangers assemblies shall be made of galvanized steel.
   2. Hanger shall meet the fire rating requirements for DIN 4102-2 for 30 minutes at 30 percent rated load.
   3. Rope hangers shall have a minimum safety factor of 5:1.
   4. Rope hangers are not permitted to support conduits.
   5. Rope hangers are permitted to hang light fixtures, where applicable.
   6. Hangers shall be fully adjustable.
   7. Manufacturer of wire rope hangers shall be:
      a. ERICO, INC., Speed Link Series.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install hangers and supports as required to adequately and securely support electrical system components, in a neat and workmanlike manner, as specified in NECA 1.
   1. Install products in accordance with manufacturer's instructions.
   2. Do not fasten supports to pipes, ducts, mechanical equipment or conduit.
   3. Do not use spring clips or beam clamps.
   4. Obtain permission from Architect before drilling or cutting structural members.
   5. Do not exceed load ratings specified by manufacturer.

B. Rigidly weld support members or use hexagon-head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.

C. Install surface-mounted cabinets and panelbaords with minimum four anchors.

D. In wet and damp locations use steel channel supports to stand cabinets and panelbards 1 inch off wall.

E. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.

F. Installation and configuration shall conform to the requirements of the current revision levels of ANSI/EIA/TIA Standards 568 & 569, NFPA 70, applicable local codes and to the manufacturer's installation instructions.

END OF SECTION

SECTION 260534 – CONDUIT

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Conduit, fittings and conduit bodies..

1.02 REFERENCE STANDARDS

A. ANSI C80.1 – American Standard for Electrical Rigid Steel Conduit (ERSC); 2005.

B. ANSI C80.3 – American Standard for Steel Electrical metallic Tubing (EMT); 2005.

C. NECA 1 – Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2006.

D. NECA 101 – Standard for Installing Steel Conduit (Rigid, IMC, EMT); National Electrical Contractors Association; 2006.

E. NEMA FB 1- Fittings, Cast Metal Boxes and Conduit Bodies for Conduit, Electrical Metallic Tubing and Cable; National Electrical Manufacturers Association; 2007.

F. NEMA TC 3 – PVC Fittings FOR Use with Rigid PVC Conduit and Tubing; National Electrical Manufacturers Association; 2004.

G. NFPA 70 – National Electrical Code; National Fire Protection Association; 2005.

1.03 QUALITY ASSURANCE

A. Conform to the requirements of NFPA 70.

B. Products: Listed and classified by Underwriters laboratories, Inc. as suitable for purpose specified and shown.

PART 2 - PRODUCTS

2.01 CONDUIT REQUIREMENTS

A. Conduit Size: Comply with NFPA 70.

1. Minimum Size: ½ inch unless otherwise specified.

B. Dry Locations:

1. Concealed: Use electrical metallic tubing (EMT).

2. Exposed: Use rigid steel conduit or electrical metallic tubing up to 8’-0” above grade on vertical conduit runs, all other exposed conduit and horizontal runs shall utilize PVC.

2.02 METAL CONDUIT

A. Manufacturers:

1. Allied Tube and Conduit: www.alliedtube.com.
2. Beck Manufacturing, Inc. www.beckmfg.com.
3. Wheatland Tube Company: www.wheatland.com.

B. Rigid Steel Conduit: ANSI C80.1

C. Fittings and Conduit Boxes: NEMA FB 1; material to match conduit.

2.03 FLEXIBLE METAL CONDUIT

A. Manufacturers:

1. AFC Cable, Systems, Inc.: www.afcweb.com.
2. Electri-Flex Company: www.electriflex.com.
3. International Metal Hose: www.metalhose.com.

B. Description: Interlocked aluminum construction.

C. Fittings: NEMA FB 1.

2.04 ELECTRICAL METALLIC TUBING (EMT)

A. Manufacturers:

1. Allied Tube and Conduit: www.alliedtube.com.
2. Beck Manufacturing, Inc. www.beckmfg.com.
3. Wheatland Tube Company: www.wheatland.com.

B. Description: ANSI C80.3; galvanized tubing.

C. Fittings and Conduit Boxes: NEMA FB 1; steel or malleable iron compression type.

D. Factory painted conduit: Allied Tube & Conduit “True Color EMT”

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on drawings.

B. Verify routing and termination locations of conduit prior to rough-in.

C. Conduit routing is shown on drawings in approximated locations unless dimensioned. Route as required to complete the wiring system.

3.01 INSTALLATION

A. Install conduit securely, in a neat and workmanlike manner, as specified in NECA 1.

B. Install steel conduit as specified in NECA 101.

C. Arrange supports to prevent misalignment during wiring installation.

D. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers and split hangers.

E. Group related conduits, support using conduit rack. Construct rack using steel cannel; provide space on each for 25 percent additional conduits.

F. Fasten conduit supports to building structure and surfaces under provisions of Section 260529.

G. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.

H. Do not attach conduit to ceiling support wires.

I. Arrange conduit to maintain headroom and present neat appearance.

J. Route exposed conduit parallel and perpendicular to walls.

K. Route conduit installed above accessible ceiling parallel and perpendicular to walls.

L. Route conduit in and under slab from point to point.

M. Maintain adequate clearance between conduit and piping.

N. Maintain 12 inch clearance between conduit and surfaces with temperatures exceeding 104 degrees F.

O. Cut conduit square using saw or pipe cutter; de-burr cut ends.

P. Bring conduit to shoulder of fittings; fasten securely.

Q. Install no more than equivalent of three 90 degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one shot bender to fabricate bends in metal conduit larger than 2 inch size.

R. Provide suitable pull string in each empty conduit except sleeves and nipples.

S. Use suitable caps to protect installed conduit against entrance of dirt and moisture.

T. Ground and Bond conduit under provisions of Section 260526.

U. Identify conduit under provisions of Section 260553.

3.03 INTERFERENCE WITH OTHER PRODUCTS

A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.

END OF SECTION

SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Section 260010 – Basic Electrical Materials and Methods.

B. Section 260526 – Grounding and Bonding for Electrical Systems.

1.02 REFERENCE STANDARDS

A. NECA 1 – Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2006.

B. NEMA KS 1 – Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts maximum); National Electrical Manufacturers Association; 2001 (R2006).

C. NEMA PB 1 – Panelboards; national Electrical Manufacturers Association; 2006.

D. NEMA PB 1.1 – General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or less; National Electrical Manufacturers Association; 2007.

E. NFPA 70 – National Electrical Code; National Fire Protection Association; 2006.

1.03 SUBMITTALS

A. See Section 013000 – Administrative Requirements for submittal procedures.

B. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.

C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation and installation of product.

D. Maintenance Data: Include spare parts listing; source and current prices of replacement parts and supplies; recommended maintenance procedures and intervals.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Square D: www.squared.com. – BASE BID.

2.01 PANELBOARDS

A. Description: NEMA PB1, circuit breaker type, lighting and appliance branch circuit panelboard.

B. Panelboard Bus: Copper, ratings as indicated. Provide copper ground bus in each panelboard; provide insulated ground bus where scheduled.

1. Flush or surface mounted galvanized steel cabinet as indicated.

C. Minimum Integrated Short Circuit Rating: As indicated.

1. 240 Volt Panelboards: 22,000 amperes rms symmetrical.

D. Main Circuit Breaker panelboards shall have the main breaker rated for 100% (fully rated).

E. Molded Case Circuit Breakers: Thermal magnetic trip circuit breakers, bolt-on type, with common trip handle for all poles; UL listed.

1. Type SWD for lighting circuits.

2. Class A ground fault interrupter circuit breakers where scheduled.

3. Do not use tandem circuit breakers.

F. Enclosure: NEMA PB 1, Type 1.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Practice of drilling and tapping or drilling and using self-tapping fasteners in aluminum conductor bars for making electrical or mechanical support connections is prohibited in panelboard construction. Connections may be made by use of through-bolts with lock washers, Belleville washers, steel nuts or steel inserts. Steel helical inserts are not acceptable.

B. Manufacturers who cannot or prefer not to use such methods, shall provide copper bus bars. Copper shall also be provided where required by local or state ordinances.

C. Install panelboards in accordance with NEMA PB 1.1 and NECA 1.

D. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads.

E. Ground and bond panelboard enclosure to Section 260526.

3.02 ADJUSTING

A. Measure steady state load currents at each panelboard feeder; rearrange circuits in the panelboard to balance the phase loads to within 20 percent of each other. Maintain proper phasing for multi-wire branch circuits.

END OF SECTION

SECTION 265100 - LIGHTING SYSTEMS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This Contractor shall provide all labor and materials, tools, and equipment necessary and reasonably incidental to the installation of lighting fixtures as shown on the Drawings, and as specified herein.

1.02 SECTION INCLUDES

A. Light Fixtures and accessories.

B. Exit Signs.

1.03 REFERENCE STANDARDS

A. ANSI C78.379 – American National Standard for Electric Lamps – Reflector Lamps – Classification of Beam Patterns; 2006.

B. ANSI C82.1 – American National Standard for Lamp Ballast – Line Frequency Fluorescent Lamp Ballast; 2004.

C. NECA/IESNA 500 – Standard for Installing Indoor Commercial Lighting Systems; National Electrical Contractors Association; 2006.

D. NEMA WD 6 – Wiring Devices – Dimensional Requirements; National Electrical Manufacturers Association; 2002.

E. NFPA 70 – National Electrical Code; National Fire Protection Association; 2005.

F. NFPA 101- Code for Safety to Life from Fire in Buildings and Structures; National Fire Protection Association; 2006.

1.04 SUBMITTALS

A. Shop drawings for lighting fixtures shall be neatly bound into the required number of sets with one fixture of each type included in each set.

B. Cover of submittals shall contain project name and account number and Architect/Engineer's names. Index shall include complete description of contents.

C. The literature shall be complete indicating materials, gauges, weight, finish, dimensions, installation methods, ballast specification sheet from manufacturer, N.E.C. requirements, and E.T.L. photometric curves.

D. Shop drawings shall be reviewed and checked by the Contractor for compliance with Drawings and Specifications. Deviations shall be called to the attention of the Architect/Engineer in writing.

E. Shop drawings shall be stamped with Contractor's approval prior to being submitted to Architect/Engineer.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70 and NFPA 101.

B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

1.06 EXTRA MATERIALS

A. See Section 016000 – Product Requirements, for additional provisions.

B. Furnish two of each plastic lens type.

C. Furnish ten replacement lamps for each lamp type.

D. Furnish two of each ballast type.

PART 2 - PRODUCTS

2.01 LIGHTING FIXTURES

A. Refer to the Light Fixture Schedule on the Electrical Drawings for desired fixture types and manufacturers.

2.02 WIRING

A. All fixtures shall be wired to meet the requirements of U.L. Standards and must be listed and labeled.

2.03 EXIT SIGNS

A. Exit Signs: Exit sign fixture suitable for use as emergency lighting unit.

1. Directional Arrows: Universal type for field adjustment.

2. Mounting: As indicated.

3. Battery Charger: Dual-rate type, with sufficient capacity to recharge discharged battery to full charge within twelve hours.

4. Lamps: LED type.

2.04 FINISHES

A. The finish on all fixtures shall be uniform in color and of high quality, durable and free from any defects.

B. All poles shall be finished as noted on lighting fixture schedules, unless otherwise specified.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install fixtures securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting).

B. Install fixtures as indicated on plans. If there are any questions, contact the Architect prior to roughing-in.

C. Install all fixtures in accordance with manufacturer's recommendations and instructions.

D. All fixtures shall be independently supported from suspended ceilings with hidden supports fastened to the building structure per NEC requirements.

E. Install surface mounted light fixtures and exit signs plumb and adjust to align with building lines and each other. Secure to prevent movement.

F. Install wall mounted exit signs at height indicated on architectural drawings.

G. Install accessories furnished with each light fixture.

H. Connect light fixtures and exit sign to branch circuit outlets provided under Section 260010.

I. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within light fixture.

J. Bond products and metal accessories to branch circuit equipment grounding conductor.

3.02 CLEANING

A. Clean electrical parts to remove conductive and deleterious materials.

B. Remove dirt and debris from enclosures.

C. Clean photometric control surfaces as recommended by manufacturer.

D. Clean finished and touch up damage.

3.02 PROTECTION

A. Replace light fixtures that have failed lamps at Substantial Completion.

END OF SECTION