Specifications for
General Construction

11th and Pike Field House Renovations

11th & Pike Streets
Reading, Berks County, Pennsylvania

September 27, 2013

OLSENDESIGNGROUP
ARCHITECTS

M/E/P Engineer:
Consolidated Engineers

Specifications for

11th and Pike Field House Renovations

11th & Pike Streets
Reading, Berks County, Pennsylvania

Owner:

City of Reading – Reading Recreation Commission
320 S. 3rd Street
Reading, Pennsylvania 19602
Telephone: (610) 655-6067
FAX: (610) 655-6612
Matthew.Lubas@readingpa.org

Architect:

Olsen Design Group Architects, Inc.
2345 Bernville Road
Reading, Pennsylvania 19605
Telephone: (610) 371-9606
FAX: (610) 371-9607
lolsen@odgarchitects.com
sweber@odgarchitects.com

Mechanical/Electrical/Plumbing Engineer:

Consolidated Engineers
1022 James Drive
Leesport, Pennsylvania 19533
Telephone: (610) 916-1600
FAX: (610) 916-1610
frankb@cemec.com

Contract Number: 32-10-00-4216
Project Number: 32-10-38-01
Architect's Project Number: 13016

Date: September 27, 2013

TABLE OF CONTENTS

NOTICES AND INSTRUCTIONS – PART I

Notice to Contractors
Instructions to Bidders
Notice of Requirement for Affirmative Action

DOCUMENTS TO BE SUBMITTED WITH BID – PART II

00411 Stipulated Sum
Bid Bond
Non-Collusion Affidavit
Certificate of Non-Indebtedness
Resolution & Statement Regarding Manufacture of Cement
Statement of Bidder's Qualifications
Equal Employment Opportunity and Section 3 Questionnaire
Certification of Non-Segregated Facilities
Contractor's Statement for Public Disclosure
Certificate of Acknowledgment of Receipt of Addendum (if required)

CONTRACT DOCUMENTS – PART III

AIA Document A101-1997 Standard From of Agreement between Owner and Contractor

AIA Document A201-1997 General Conditions of the Contract for Construction

00811 Supplementary General Conditions
Performance Bond
Payment Bond
Wage Rate Compliance Bond
Maintenance Bond
Statement Accepting Provisions of PA Workers' Compensation Act
Stipulation Against Liens
Indemnity Agreement
Notice to Proceed

DAVIS-BACON LABOR AND INDUSTRY WAGE RATES – PART IV

SECTION # REQUIREMENTS – PART V

GENERAL PROVISIONS – PART VI

SUPPLEMENTARY GENERAL TERMS AND CONDITIONS – PART VII

TECHNICAL SPECIFICATIONS – PART VIII

DIVISION 1 – GENERAL REQUIREMENTS

01040	Coordination and Meetings
01045	Cutting and Patching
01095	Reference Standards and Definitions
01100	Summary
01200	Price and Payment Procedures
01300	Administrative Requirements
01330	Submittal Procedures
01400	Quality Requirements
01500	Temporary Facilities and Controls
01600	Product Requirements
01700	Execution Requirements
01710	Final Cleaning
01720	Project Record Documents
01730	Operating and Maintenance Data
01740	Warranties

DIVISION 2 - SITE CONSTRUCTION

02221	Building Demolition
02225	Minor Demolition While Remodeling

DIVISION 3 - CONCRETE

Not Used

DIVISION 4 - MASONRY:

Not Used

DIVISION 5 - METALS:

OSHA Guardrail Design Specification
OSHA Guardrail Drawing

DIVISION 6 - WOOD AND PLASTICS:

Not Used

DIVISION 7 - THERMAL AND MOISTURE PROTECTION:

Not Used

DIVISION 8 - DOORS AND WINDOWS:

Not Used

DIVISION 9 - FINISHES:

09624 Resilient Flooring

DIVISION 10 - SPECIALTIES:

Not Used

DIVISION 11 – EQUIPMENT

Not Used

DIVISION 12 – FURNISHINGS

Not Used

DIVISION 13 – SPECIAL CONSTRUCTION

Not Used

DIVISION 14 – CONVEYING SYSTEMS

Not Used

DIVISION 15 – MECHANICAL

15010 Basic requirements – Mechanical Construction
15080 HVAC System Testing, Adjusting & Balancing
15090 HVAC System Insulation
15091 Plumbing System Insulation
15130 Domestic Water Piping
15161 Sanitary Waste & Vent Piping
15171 Natural Gas Piping
15200 Metal Ducts
15210 Duct Accessories
15230 Diffusers, Registers & Grilles
15400 Packaged Rooftop Air Handling Units
15530 Electric Heaters
15900 HVAC System Controls

DIVISION 16 – ELECTRICAL

16010 Basic Electrical Requirements
16281 Fuses
16286 Disconnect Switches
16500 Common Requirements – Electrical Construction
16519 Wires & Cables – 600V & Below
16526 Grounding

16529 Supporting Devices
16533 Raceways
16535 Electrical Boxes & Fittings
16553 Electrical Identification

SECTION 00411
BID FORM - STIPULATED SUM

Owner: Mayor Vaughn D. Spencer
City of Reading
815 Washington Street
Reading, PA 19601

Project: 11th & Pike Field House Renovations
11th & Pike Streets
Reading, Berks County, PA
City of Reading Contract No.: 32-10-00-4216
City of Reading Project No.: 32-10-38-01
Architect's Project No.: 13016

Date: _____

Submitted by:
(full name)

_____

(full address)

_____

_____

1. OFFER

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

Project No.: 32-10-38-01
Base Bid Price:

The Mechanical Base Bid shall include the upgrade of existing HVAC controls, system testing balancing and adjusting, installation on new electric heat, installation of new packaged through the wall heat pump (for Computer Room), demolition and modifications to existing ductwork, associated control wiring and power wiring, and system checkout as detailed in the contract documents.

_____ $_____ US Dollars

Bid Alternate #1:

State the amount to be added to the contract for the installation of new rooftop units RTU-1 and RTU-2. Include the demolition of the existing equipment, installation of the new units, curbs, new ductwork, insulation, power wiring (for these units), roofing, structural modifications, platforms, railings and natural gas piping.

NOTE: The Contractor **MUST** include with the Alternate Bid the RTU equipment shop drawings for review. In addition the contractor must verify the RTU equipment can be delivered within four (4) weeks of the order and the roof curbs can be shipped within five (5) days of order. Any bid without these shop drawings may be rejected.

ADD / DEDUCT

_____ $ _____ US Dollars

Bid Alternate #2:

State the amount to be added to the contract for the installation of new rooftop units RTU-3 and RTU-4. Include the demolition of the existing equipment, installation of the new units, curbs, new ductwork, insulation, power wiring (for these units), roofing, structural modifications, platforms, railings and natural gas piping.

NOTE: The Contractor **MUST** include with the Alternate Bid the RTU equipment shop drawings for review. In addition the contractor must verify the RTU equipment can be delivered within four (4) weeks of the order and the roof curbs can be shipped within five (5) days of order. Any bid without these shop drawings may be rejected.

ADD / DEDUCT

_____ $ _____ US Dollars

Bid Alternate #3:

State the amount to be added to the contract for the installation of the new hand washing sink in the Kitchen. Include all related general, plumbing and electrical work as indicated on the contract drawings. Include the work associated with removing and relocating an existing base cabinet shown on the contract drawings. Also include the work associated with the inspection and recharging of the hood fire suppression system, the insulation of the hood exhaust duct and the installation of the SS insulated panels between the appliance and the cabinets.

ADD / DEDUCT

_____ $ _____ US Dollars

Bid Alternate #4:

State the amount to be added to the contract to add an additional 1 ½" of fiberglass duct insulation to the existing interior supply and return duct located in the existing roof trusses as indicated in the specifications.

In addition the Contractor must include in this alternate the replacement and repair of a 3 ft. x 2 ft. section of 12" foil faced fiberglass batt insulation (typical 12 locations), located on the bottom of the existing trusses.

ADD / DEDUCT

_____ $ _____ US Dollars

Bid Alternate #5:

State the amount to be added to the contract for the installation of the new Gymnasium sports flooring material. Include all related general, removal of existing VCT flooring, demolition of existing section of slab to repair existing crack in concrete floor substrate, the installation of new resilient multipurpose flooring, game lines painting and new vinyl base as shown on contract drawings.

ADD / DEDUCT

_____ $ _____ US Dollars

Bid Alternate #6:

State the amount to be added to the contract for the installation of the new Gymnasium protective ceiling netting. Include all related general, knotted, sewn border, square nylon polyamide fiber netting and anchoring devices for existing CMU wall construction as shown on contract drawings.

ADD / DEDUCT

_____ $ _____ US Dollars

Bid Alternate #7:

State the amount to be added to the contract for the installation of the Dedication Plaque as shown on contract drawings.

ADD / DEDUCT

_____ $ _____ US Dollars

- We have included, the required ten percent (10%) Bid Bond as required by the Instruction to Bidders.
- All applicable Federal, State of Pennsylvania, and local Business Privilege taxes are included in the Bid Price.
- All Cash, Contingency Allowances, Permits, and Licenses fees as required by the Instruction to Bidders are included in the Bid Price.
- All prices to be quoted F.O.B. Reading, Pa destination.
- The City of Reading is tax exempt.

2. BID SCHEDULE

Division 01:

A.	General Conditions	$_____
B.	Insurance	$_____
C.	Bonds	$_____
D.	Final Cleaning	$_____

Division 02:	$_____
Division 03:	$_____
Division 04:	$_____
Division 05:	$_____
Division 06:	$_____
Division 07:	$_____
Division 08:	$_____
Division 09:	$_____
Division 10:	$_____
Division 11:	$_____
Division 12:	$_____
Division 13:	$_____
Division 14:	$_____
Division 15:	$_____
Division 16:	$_____
Overhead & Profit:	$_____
TOTAL FOR BASE BID WORK ONLY	**$_____**

3. ACCEPTANCE

This offer shall be open to acceptance and is irrevocable for ninety (90) days following the opening and receipt of bids by the City of Reading.

If this bid is accepted by the City of Reading within the time period stated above, we will agree to:

- Execute the contract within ten (10) calendar days after mailing of contract documents by the City to Principal, enter into contract with the City on form as included within the bidding documents for the appropriate bonds, indemnities and insurances required.

- Execute the contract and furnish surety company bonds, on the forms enclosed in the Contract Documents, in the amount of one hundred percent (100%) of the contract price within ten (10) days of mailing of the contract documents from the City to the Principal, and to begin work within ten (10) days after receipt of NOTICE TO PROCEED from the City of Reading.

- Provide the City of Reading with a copy of all permits, and licenses with the first General Contractor's Payment Requisition.

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 the bid period is extended pursuant to Statute.

4. CONTRACT TIME

If this Bid is accepted:

- **The Project completion and final invoicing date shall be on or before the 20th day of December, 2013.**

- The owner reserves the right to assess **LIQUIATED DAMAGES** to the Prime(s) or General Contractor in the amount stated under Supplementary General Terms and Conditions in the event that Substantial Completion has not been achieved.

5. CHANGES TO THE WORK

When the Architect establishes that the method of valuation for Changes in the Work will be net cost plus a percentage fee in accordance with General Conditions, our percentage fee will be:

- 5 percent overhead and 3 percent profit for cost of work performed by the General Contractor's own forces.

- 5 percent overhead and 3 percent profit for cost of work performed as a Sub-Contractor.

- 3 percent markup to General Contractor for Sub-Contractor's work.

- On work deleted from the Contract, our credit to the Owner shall be the Architect and/or Engineer approved net cost plus _____ percent of the overhead and profit percentage noted above.

6. 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 Price.

Addendum # _____ Dated _____

Addendum # _____ Dated _____

Addendum # _____ Dated _____

7. UNIT PRICES: The undersigned hereby agrees that each unit price submitted represents full compensation for either additions or deductions from the Contract Sum for extra work or changes ordered under the Contract, as specified for Unit Prices under Instructions to Bidders and Division 1, General Requirements, in the Specifications.

Reserved

8. APPENDICES

Reserved

9. **SIGNATURES:** The undersigned hereby certifies that this proposal is genuine and not sham, collusive or fraudulent or made in the interest of or in behalf of any person, firm, corporation or entity not herein named; and that the undersigned has not, directly or indirectly, induced or solicited any bidder to submit a sham bid, or any other person, firm, corporation or entity from bidding and that the undersigned has not, in any manner, sought by collusion to secure for himself / herself any advantage over any other bidder.

Signed: _____ Date: _____

Witness: _____ Date: _____

Is business an individual, partnership or corporation? _____

CORPORATE SEAL

Name of state under which incorporated _____

If the Corporation has been organized under laws other than the Commonwealth of Pennsylvania, complete as appropriate, the following statement:

The corporation (has) (has not) been granted a certificate of authority to do business in the Commonwealth of Pennsylvania.

Fictitious Name or Trade Name registered under Pennsylvania Law*:

* If a Fictitious Name or Trade Name is used in the conduct of business, insert such name.

Signature of Authorized Representative _____

Date: _____

END OF SECTION 00411

DRAFT

AIA® Document A101™ – 2007

Standard Form of Agreement Between Owner and Contractor

where the basis of payment is a Stipulated Sum

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

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

« »« »
« »
« »
« »

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

« »« »
« »
« »
« »

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

«11th and Pike Field House Renovations~~11th and Pike field house~~»
«11th and Pike Streets
Reading, Berks County, Pennsylvania–»
« »

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

« »« »
« »
« »
« »

The Owner and Contractor agree as follows.

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

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

AIA Document A201™–2007, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

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TABLE OF ARTICLES

1 THE CONTRACT DOCUMENTS

2 THE WORK OF THIS CONTRACT

3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

4 CONTRACT SUM

5 PAYMENTS

6 DISPUTE RESOLUTION

7 TERMINATION OR SUSPENSION

8 MISCELLANEOUS PROVISIONS

9 ENUMERATION OF CONTRACT DOCUMENTS

10 INSURANCE AND BONDS

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

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

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be the date of this Agreement unless a different date is stated below or provision is made for the date to be fixed in a notice to proceed issued by the Owner.
(Insert the date of commencement if it differs from the date of this Agreement or, if applicable, state that the date will be fixed in a notice to proceed.)

« »

If, prior to the commencement of the Work, the Owner requires time to file mortgages and other security interests, the Owner's time requirement shall be as follows:

« »

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

§ 3.3 The Contractor shall achieve Substantial Completion of the entire Work not later than « » (« ») days from the date of commencement, or as follows:
(Insert number of calendar days. Alternatively, a calendar date may be used when coordinated with the date of commencement. If appropriate, insert requirements for earlier Substantial Completion of certain portions of the Work.)

« »

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Portion of Work	Substantial Completion Date

, subject to adjustments of this Contract Time as provided in the Contract Documents.
(Insert provisions, if any, for liquidated damages relating to failure to achieve Substantial Completion on time or for bonus payments for early completion of the Work.)

« »

ARTICLE 4 CONTRACT SUM

§ 4.1 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 « » ($ « »), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 The Contract 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.)

« »

§ 4.3 Unit prices, if any:
(Identify and state the unit price; state quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price Per Unit ($0.00)

§ 4.4 Allowances included in the Contract Sum, if any:
(Identify allowance and state exclusions, if any, from the allowance price.)

Item	Price

ARTICLE 5 PAYMENTS

§ 5.1 PROGRESS PAYMENTS

§ 5.1.1 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.

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

« »

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the « » day of a month, the Owner shall make payment of the certified amount to the Contractor not later than the « » day of the « » month. If an Application for Payment is received by the Architect after the application date fixed above, payment shall be made by the Owner not later than « » (« ») days after the Architect receives the Application for Payment.
(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

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§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 Subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

.1 Take that portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Sum allocated to that portion of the Work in the schedule of values, less retainage of « » percent (« » %). Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included as provided in Section 7.3.9 of AIA Document A201™–2007, General Conditions of the Contract for Construction;

.2 Add that portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction (or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing), less retainage of « » percent (« » %);

.3 Subtract the aggregate of previous payments made by the Owner; and

.4 Subtract amounts, if any, for which the Architect has withheld or nullified a Certificate for Payment as provided in Section 9.5 of AIA Document A201–2007.

§ 5.1.7 The progress payment amount determined in accordance with Section 5.1.6 shall be further modified under the following circumstances:

.1 Add, upon Substantial Completion of the Work, a sum sufficient to increase the total payments to the full amount of the Contract Sum, less such amounts as the Architect shall determine for incomplete Work, retainage applicable to such work and unsettled claims; and
(Section 9.8.5 of AIA Document A201–2007 requires release of applicable retainage upon Substantial Completion of Work with consent of surety, if any.)

.2 Add, if final completion of the Work is thereafter materially delayed through no fault of the Contractor, any additional amounts payable in accordance with Section 9.10.3 of AIA Document A201–2007.

§ 5.1.8 Reduction or limitation of retainage, if any, shall be as follows:
(If it is intended, prior to Substantial Completion of the entire Work, to reduce or limit the retainage resulting from the percentages inserted in Sections 5.1.6.1 and 5.1.6.2 above, and this is not explained elsewhere in the Contract Documents, insert here provisions for such reduction or limitation.)

« »

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 FINAL PAYMENT

§ 5.2.1 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 12.2.2 of AIA Document A201–2007, and to satisfy other requirements, if any, which extend beyond final payment; and

.2 a final Certificate for Payment has been issued by the Architect.

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

« »

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ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 INITIAL DECISION MAKER

The Architect will serve as Initial Decision Maker pursuant to Section 15.2 of AIA Document A201–2007, unless the parties appoint below another individual, not a party to this Agreement, to serve as Initial Decision Maker.
(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

« »
« »
« »
« »

§ 6.2 BINDING DISPUTE RESOLUTION

For any Claim subject to, but not resolved by, mediation pursuant to Section 15.3 of AIA Document A201–2007, the method of binding dispute resolution shall be as follows:
(Check the appropriate box. If the Owner and Contractor do not select a method of binding dispute resolution below, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.)

[« »] Arbitration pursuant to Section 15.4 of AIA Document A201–2007

[« »] Litigation in a court of competent jurisdiction

[« »] Other *(Specify)*

« »

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2007.

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2007.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2007 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 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.)

« » % « »

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

« »
« »
« »
« »
« »
« »

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

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« »
« »
« »
« »
« »
« »

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

§ 8.6 Other provisions:

« »

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 The Contract Documents, except for Modifications issued after execution of this Agreement, are enumerated in the sections below.

§ 9.1.1 The Agreement is this executed AIA Document A101–2007, Standard Form of Agreement Between Owner and Contractor.

§ 9.1.2 The General Conditions are AIA Document A201–2007, General Conditions of the Contract for Construction.

§ 9.1.3 The Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

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

Section	Title	Date	Pages

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

Number	Title	Date

§ 9.1.6 The Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to bidding requirements are not part of the Contract Documents unless the bidding requirements are also enumerated in this Article 9.

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

.1 AIA Document E201™–2007, Digital Data Protocol Exhibit, if completed by the parties, or the following:

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.2 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201–2007 provides that bidding requirements such as advertisement or invitation to bid, Instructions to Bidders, sample forms and the Contractor's bid are not part of the Contract Documents unless enumerated in this Agreement. They should be listed here only if intended to be part of the Contract Documents.)

« »

ARTICLE 10 INSURANCE AND BONDS

The Contractor shall purchase and maintain insurance and provide bonds as set forth in Article 11 of AIA Document A201–2007.
(State bonding requirements, if any, and limits of liability for insurance required in Article 11 of AIA Document A201–2007.)

Type of insurance or bond	Limit of liability or bond amount ($0.00)

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

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

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AIA® Document A201™ – 2007

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)
«11th and Pike Field House Renovations»
«11th and Pike Streets
Reading, Berks County, Pennsylvania»

THE OWNER:
(Name, legal status and address)
« »« »
« »

THE ARCHITECT:
(Name, legal status and address)
« »« »
« »

TABLE OF ARTICLES

1	GENERAL PROVISIONS
2	OWNER
3	CONTRACTOR
4	ARCHITECT
5	SUBCONTRACTORS
6	CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS
7	CHANGES IN THE WORK
8	TIME
9	PAYMENTS AND COMPLETION
10	PROTECTION OF PERSONS AND PROPERTY
11	INSURANCE AND BONDS
12	UNCOVERING AND CORRECTION OF WORK
13	MISCELLANEOUS PROVISIONS
14	TERMINATION OR SUSPENSION OF THE CONTRACT
15	CLAIMS AND DISPUTES

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

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(842094128)

INDEX
(Topics and numbers in bold are section headings.)

Acceptance of Nonconforming Work
9.6.6, 9.9.3, **12.3**
Acceptance of Work
9.6.6, 9.8.2, 9.9.3, 9.10.1, 9.10.3, 12.3
Access to Work
3.16, 6.2.1, 12.1
Accident Prevention
10
Acts and Omissions
3.2, 3.3.2, 3.12.8, 3.18, 4.2.3, 8.3.1, 9.5.1, 10.2.5, 10.2.8, 13.4.2, 13.7, 14.1, 15.2
Addenda
1.1.1, 3.11
Additional Costs, Claims for
3.7.4, 3.7.5, 6.1.1, 7.3.7.5, 10.3, 15.1.4
Additional Inspections and Testing
9.4.2, 9.8.3, 12.2.1, **13.5**
Additional Insured
11.1.4
Additional Time, Claims for
3.2.4, 3.7.4, 3.7.5, 3.10.2, 8.3.2, **15.1.5**
Administration of the Contract
3.1.3, **4.2**, 9.4, 9.5
Advertisement or Invitation to Bid
1.1.1
Aesthetic Effect
4.2.13
Allowances
3.8, 7.3.8
All-risk Insurance
11.3.1, 11.3.1.1
Applications for Payment
4.2.5, 7.3.9, 9.2, **9.3**, 9.4, 9.5.1, 9.6.3, 9.7, 9.10, 11.1.3
Approvals
2.1.1, 2.2.2, 2.4, 3.1.3, 3.10.2, 3.12.8, 3.12.9, 3.12.10, 4.2.7, 9.3.2, 13.5.1
Arbitration
8.3.1, 11.3.10, 13.1, 15.3.2, **15.4**
ARCHITECT
4
Architect, Definition of
4.1.1
Architect, Extent of Authority
2.4, 3.12.7, 4.1, 4.2, 5.2, 6.3, 7.1.2, 7.3.7, 7.4, 9.2, 9.3.1, 9.4, 9.5, 9.6.3, 9.8, 9.10.1, 9.10.3, 12.1, 12.2.1, 13.5.1, 13.5.2, 14.2.2, 14.2.4, 15.1.3, 15.2.1
Architect, Limitations of Authority and Responsibility
2.1.1, 3.12.4, 3.12.8, 3.12.10, 4.1.2, 4.2.1, 4.2.2, 4.2.3, 4.2.6, 4.2.7, 4.2.10, 4.2.12, 4.2.13, 5.2.1, 7.4, 9.4.2, 9.5.3, 9.6.4, 15.1.3, 15.2
Architect's Additional Services and Expenses
2.4, 11.3.1.1, 12.2.1, 13.5.2, 13.5.3, 14.2.4
Architect's Administration of the Contract
3.1.3, 4.2, 3.7.4, 15.2, 9.4.1, 9.5
Architect's Approvals
2.4, 3.1.3, 3.5, 3.10.2, 4.2.7
Architect's Authority to Reject Work
3.5, 4.2.6, 12.1.2, 12.2.1
Architect's Copyright
1.1.7, 1.5
Architect's Decisions
3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 4.2.14, 6.3, 7.3.7, 7.3.9, 8.1.3, 8.3.1, 9.2, 9.4.1, 9.5, 9.8.4, 9.9.1, 13.5.2, 15.2, 15.3
Architect's Inspections
3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 13.5
Architect's Instructions
3.2.4, 3.3.1, 4.2.6, 4.2.7, 13.5.2
Architect's Interpretations
4.2.11, 4.2.12
Architect's Project Representative
4.2.10
Architect's Relationship with Contractor
1.1.2, 1.5, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2, 3.5, 3.7.4, 3.7.5, 3.9.2, 3.9.3, 3.10, 3.11, 3.12, 3.16, 3.18, 4.1.2, 4.1.3, 4.2, 5.2, 6.2.2, 7, 8.3.1, 9.2, 9.3, 9.4, 9.5, 9.7, 9.8, 9.9, 10.2.6, 10.3, 11.3.7, 12, 13.4.2, 13.5, 15.2
Architect's Relationship with Subcontractors
1.1.2, 4.2.3, 4.2.4, 4.2.6, 9.6.3, 9.6.4, 11.3.7
Architect's Representations
9.4.2, 9.5.1, 9.10.1
Architect's Site Visits
3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.5
Asbestos
10.3.1
Attorneys' Fees
3.18.1, 9.10.2, 10.3.3
Award of Separate Contracts
6.1.1, 6.1.2
Award of Subcontracts and Other Contracts for Portions of the Work
5.2
Basic Definitions
1.1
Bidding Requirements
1.1.1, 5.2.1, 11.4.1
Binding Dispute Resolution
9.7, 11.3.9, 11.3.10, 13.1, 15.2.5, 15.2.6.1, 15.3.1, 15.3.2, 15.4.1
Boiler and Machinery Insurance
11.3.2
Bonds, Lien
7.3.7.4, 9.10.2, 9.10.3
Bonds, Performance, and Payment
7.3.7.4, 9.6.7, 9.10.3, 11.3.9, **11.4**

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Building Permit
3.7.1
Capitalization
1.3
Certificate of Substantial Completion
9.8.3, 9.8.4, 9.8.5
Certificates for Payment
4.2.1, 4.2.5, 4.2.9, 9.3.3, **9.4**, 9.5, 9.6.1, 9.6.6, 9.7, 9.10.1, 9.10.3, 14.1.1.3, 14.2.4, 15.1.3
Certificates of Inspection, Testing or Approval
13.5.4
Certificates of Insurance
9.10.2, 11.1.3
Change Orders
1.1.1, 2.4, 3.4.2, 3.7.4, 3.8.2.3, 3.11, 3.12.8, 4.2.8, 5.2.3, 7.1.2, 7.1.3, **7.2**, 7.3.2, 7.3.6, 7.3.9, 7.3.10, 8.3.1, 9.3.1.1, 9.10.3, 10.3.2, 11.3.1.2, 11.3.4, 11.3.9, 12.1.2, 15.1.3
Change Orders, Definition of
7.2.1
CHANGES IN THE WORK
2.2.1, 3.11, 4.2.8, **7**, 7.2.1, 7.3.1, 7.4, 8.3.1, 9.3.1.1, 11.3.9
Claims, Definition of
15.1.1
CLAIMS AND DISPUTES
3.2.4, 6.1.1, 6.3, 7.3.9, 9.3.3, 9.10.4, 10.3.3, **15**, 15.4
Claims and Timely Assertion of Claims
15.4.1
Claims for Additional Cost
3.2.4, 3.7.4, 6.1.1, 7.3.9, 10.3.2, **15.1.4**
Claims for Additional Time
3.2.4, 3.7.4, 6.1.1, 8.3.2, 10.3.2, **15.1.5**
Concealed or Unknown Conditions, Claims for
3.7.4
Claims for Damages
3.2.4, 3.18, 6.1.1, 8.3.3, 9.5.1, 9.6.7, 10.3.3, 11.1.1, 11.3.5, 11.3.7, 14.1.3, 14.2.4, 15.1.6
Claims Subject to Arbitration
15.3.1, 15.4.1
Cleaning Up
3.15, 6.3
Commencement of the Work, Conditions Relating to
2.2.1, 3.2.2, 3.4.1, 3.7.1, 3.10.1, 3.12.6, 5.2.1, 5.2.3, 6.2.2, 8.1.2, 8.2.2, 8.3.1, 11.1, 11.3.1, 11.3.6, 11.4.1, 15.1.4
Commencement of the Work, Definition of
8.1.2
Communications Facilitating Contract Administration
3.9.1, **4.2.4**
Completion, Conditions Relating to
3.4.1, 3.11, 3.15, 4.2.2, 4.2.9, 8.2, 9.4.2, 9.8, 9.9.1, 9.10, 12.2, 13.7, 14.1.2
COMPLETION, PAYMENTS AND
9
Completion, Substantial
4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, 9.8, 9.9.1, 9.10.3, 12.2, 13.7
Compliance with Laws
1.6, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 4.1.1, 9.6.4, 10.2.2, 11.1, 11.3, 13.1, 13.4, 13.5.1, 13.5.2, 13.6, 14.1.1, 14.2.1.3, 15.2.8, 15.4.2, 15.4.3
Concealed or Unknown Conditions
3.7.4, 4.2.8, 8.3.1, 10.3
Conditions of the Contract
1.1.1, 6.1.1, 6.1.4
Consent, Written
3.4.2, 3.7.4, 3.12.8, 3.14.2, 4.1.2, 9.3.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3, 11.3.1, 13.2, 13.4.2, 15.4.4.2
Consolidation or Joinder
15.4.4
CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS
1.1.4, **6**
Construction Change Directive, Definition of
7.3.1
Construction Change Directives
1.1.1, 3.4.2, 3.12.8, 4.2.8, 7.1.1, 7.1.2, 7.1.3, **7.3**, 9.3.1.1
Construction Schedules, Contractor's
3.10, 3.12.1, 3.12.2, 6.1.3, 15.1.5.2
Contingent Assignment of Subcontracts
5.4, 14.2.2.2
Continuing Contract Performance
15.1.3
Contract, Definition of
1.1.2
CONTRACT, TERMINATION OR SUSPENSION OF THE
5.4.1.1, 11.3.9, **14**
Contract Administration
3.1.3, 4, 9.4, 9.5
Contract Award and Execution, Conditions Relating to
3.7.1, 3.10, 5.2, 6.1, 11.1.3, 11.3.6, 11.4.1
Contract Documents, Copies Furnished and Use of
1.5.2, 2.2.5, 5.3
Contract Documents, Definition of
1.1.1
Contract Sum
3.7.4, 3.8, 5.2.3, 7.2, 7.3, 7.4, **9.1**, 9.4.2, 9.5.1.4, 9.6.7, 9.7, 10.3.2, 11.3.1, 14.2.4, 14.3.2, 15.1.4, 15.2.5
Contract Sum, Definition of
9.1
Contract Time
3.7.4, 3.7.5, 3.10.2, 5.2.3, 7.2.1.3, 7.3.1, 7.3.5, 7.4, 8.1.1, 8.2.1, 8.3.1, 9.5.1, 9.7, 10.3.2, 12.1.1, 14.3.2, 15.1.5.1, 15.2.5
Contract Time, Definition of
8.1.1

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CONTRACTOR
3
Contractor, Definition of
3.1, 6.1.2
Contractor's Construction Schedules
3.10, 3.12.1, 3.12.2, 6.1.3, 15.1.5.2
Contractor's Employees
3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2, 10.3, 11.1.1, 11.3.7, 14.1, 14.2.1.1
Contractor's Liability Insurance
11.1
Contractor's Relationship with Separate Contractors and Owner's Forces
3.12.5, 3.14.2, 4.2.4, 6, 11.3.7, 12.1.2, 12.2.4
Contractor's Relationship with Subcontractors
1.2.2, 3.3.2, 3.18.1, 3.18.2, 5, 9.6.2, 9.6.7, 9.10.2, 11.3.1.2, 11.3.7, 11.3.8
Contractor's Relationship with the Architect
1.1.2, 1.5, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2, 3.5, 3.7.4, 3.10, 3.11, 3.12, 3.16, 3.18, 4.1.3, 4.2, 5.2, 6.2.2, 7, 8.3.1, 9.2, 9.3, 9.4, 9.5, 9.7, 9.8, 9.9, 10.2.6, 10.3, 11.3.7, 12, 13.5, 15.1.2, 15.2.1
Contractor's Representations
3.2.1, 3.2.2, 3.5, 3.12.6, 6.2.2, 8.2.1, 9.3.3, 9.8.2
Contractor's Responsibility for Those Performing the Work
3.3.2, 3.18, 5.3, 6.1.3, 6.2, 9.5.1, 10.2.8
Contractor's Review of Contract Documents
3.2
Contractor's Right to Stop the Work
9.7
Contractor's Right to Terminate the Contract
14.1, 15.1.6
Contractor's Submittals
3.10, 3.11, 3.12.4, 4.2.7, 5.2.1, 5.2.3, 9.2, 9.3, 9.8.2, 9.8.3, 9.9.1, 9.10.2, 9.10.3, 11.1.3, 11.4.2
Contractor's Superintendent
3.9, 10.2.6
Contractor's Supervision and Construction Procedures
1.2.2, 3.3, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3, 7.3.5, 7.3.7, 8.2, 10, 12, 14, 15.1.3
Contractual Liability Insurance
11.1.1.8, 11.2
Coordination and Correlation
1.2, 3.2.1, 3.3.1, 3.10, 3.12.6, 6.1.3, 6.2.1
Copies Furnished of Drawings and Specifications
1.5, 2.2.5, 3.11
Copyrights
1.5, **3.17**
Correction of Work
2.3, 2.4, 3.7.3, 9.4.2, 9.8.2, 9.8.3, 9.9.1, 12.1.2, **12.2**
Correlation and Intent of the Contract Documents
1.2
Cost, Definition of
7.3.7
Costs
2.4, 3.2.4, 3.7.3, 3.8.2, 3.15.2, 5.4.2, 6.1.1, 6.2.3, 7.3.3.3, 7.3.7, 7.3.8, 7.3.9, 9.10.2, 10.3.2, 10.3.6, 11.3, 12.1.2, 12.2.1, 12.2.4, 13.5, 14
Cutting and Patching
3.14, 6.2.5
Damage to Construction of Owner or Separate Contractors
3.14.2, 6.2.4, 10.2.1.2, 10.2.5, 10.4, 11.1.1, 11.3, 12.2.4
Damage to the Work
3.14.2, 9.9.1, 10.2.1.2, 10.2.5, 10.4, 11.3.1, 12.2.4
Damages, Claims for
3.2.4, 3.18, 6.1.1, 8.3.3, 9.5.1, 9.6.7, 10.3.3, 11.1.1, 11.3.5, 11.3.7, 14.1.3, 14.2.4, 15.1.6
Damages for Delay
6.1.1, 8.3.3, 9.5.1.6, 9.7, 10.3.2
Date of Commencement of the Work, Definition of
8.1.2
Date of Substantial Completion, Definition of
8.1.3
Day, Definition of
8.1.4
Decisions of the Architect
3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 15.2, 6.3, 7.3.7, 7.3.9, 8.1.3, 8.3.1, 9.2, 9.4, 9.5.1, 9.8.4, 9.9.1, 13.5.2, 14.2.2, 14.2.4, 15.1, 15.2
Decisions to Withhold Certification
9.4.1, **9.5**, 9.7, 14.1.1.3
Defective or Nonconforming Work, Acceptance, Rejection and Correction of
2.3, 2.4, 3.5, 4.2.6, 6.2.5, 9.5.1, 9.5.2, 9.6.6, 9.8.2, 9.9.3, 9.10.4, 12.2.1
Definitions
1.1, 2.1.1, 3.1.1, 3.5, 3.12.1, 3.12.2, 3.12.3, 4.1.1, 15.1.1, 5.1, 6.1.2, 7.2.1, 7.3.1, 8.1, 9.1, 9.8.1
Delays and Extensions of Time
3.2, 3.7.4, 5.2.3, 7.2.1, 7.3.1, 7.4, **8.3**, 9.5.1, 9.7, 10.3.2, 10.4, 14.3.2, 15.1.5, 15.2.5
Disputes
6.3, 7.3.9, 15.1, 15.2
Documents and Samples at the Site
3.11
Drawings, Definition of
1.1.5
Drawings and Specifications, Use and Ownership of
3.11
Effective Date of Insurance
8.2.2, 11.1.2
Emergencies
10.4, 14.1.1.2, 15.1.4
Employees, Contractor's
3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2, 10.3.3, 11.1.1, 11.3.7, 14.1, 14.2.1.1

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Equipment, Labor, Materials or
1.1.3, 1.1.6, 3.4, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1, 4.2.6, 4.2.7, 5.2.1, 6.2.1, 7.3.7, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1, 10.2.4, 14.2.1.1, 14.2.1.2
Execution and Progress of the Work
1.1.3, 1.2.1, 1.2.2, 2.2.3, 2.2.5, 3.1, 3.3.1, 3.4.1, 3.5, 3.7.1, 3.10.1, 3.12, 3.14, 4.2, 6.2.2, 7.1.3, 7.3.5, 8.2, 9.5.1, 9.9.1, 10.2, 10.3, 12.2, 14.2, 14.3.1, 15.1.3
Extensions of Time
3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3, 7.4, 9.5.1, 9.7, 10.3.2, 10.4, 14.3, 15.1.5, 15.2.5
Failure of Payment
9.5.1.3, **9.7**, 9.10.2, 13.6, 14.1.1.3, 14.2.1.2
Faulty Work
(See Defective or Nonconforming Work)
Final Completion and Final Payment
4.2.1, 4.2.9, 9.8.2, **9.10**, 11.1.2, 11.1.3, 11.3.1, 11.3.5, 12.3, 14.2.4, 14.4.3
Financial Arrangements, Owner's
2.2.1, 13.2.2, 14.1.1.4
Fire and Extended Coverage Insurance
11.3.1.1
GENERAL PROVISIONS
1
Governing Law
13.1
Guarantees (See Warranty)
Hazardous Materials
10.2.4, **10.3**
Identification of Subcontractors and Suppliers
5.2.1
Indemnification
3.17, **3.18**, 9.10.2, 10.3.3, 10.3.5, 10.3.6, 11.3.1.2, 11.3.7
Information and Services Required of the Owner
2.1.2, **2.2**, 3.2.2, 3.12.4, 3.12.10, 6.1.3, 6.1.4, 6.2.5, 9.6.1, 9.6.4, 9.9.2, 9.10.3, 10.3.3, 11.2, 11.4, 13.5.1, 13.5.2, 14.1.1.4, 14.1.4, 15.1.3
Initial Decision
15.2
Initial Decision Maker, Definition of
1.1.8
Initial Decision Maker, Decisions
14.2.2, 14.2.4, 15.2.1, 15.2.2, 15.2.3, 15.2.4, 15.2.5
Initial Decision Maker, Extent of Authority
14.2.2, 14.2.4, 15.1.3, 15.2.1, 15.2.2, 15.2.3, 15.2.4, 15.2.5
Injury or Damage to Person or Property
10.2.8, 10.4
Inspections
3.1.3, 3.3.3, 3.7.1, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 12.2.1, 13.5
Instructions to Bidders
1.1.1
Instructions to the Contractor
3.2.4, 3.3.1, 3.8.1, 5.2.1, 7, 8.2.2, 12, 13.5.2
Instruments of Service, Definition of
1.1.7
Insurance
3.18.1, 6.1.1, 7.3.7, 9.3.2, 9.8.4, 9.9.1, 9.10.2, **11**
Insurance, Boiler and Machinery
11.3.2
Insurance, Contractor's Liability
11.1
Insurance, Effective Date of
8.2.2, 11.1.2
Insurance, Loss of Use
11.3.3
Insurance, Owner's Liability
11.2
Insurance, Property
10.2.5, **11.3**
Insurance, Stored Materials
9.3.2
INSURANCE AND BONDS
11
Insurance Companies, Consent to Partial Occupancy
9.9.1
Intent of the Contract Documents
1.2.1, 4.2.7, 4.2.12, 4.2.13, 7.4
Interest
13.6
Interpretation
1.2.3, **1.4**, 4.1.1, 5.1, 6.1.2, 15.1.1
Interpretations, Written
4.2.11, 4.2.12, 15.1.4
Judgment on Final Award
15.4.2
Labor and Materials, Equipment
1.1.3, 1.1.6, **3.4**, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1, 4.2.6, 4.2.7, 5.2.1, 6.2.1, 7.3.7, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1, 10.2.4, 14.2.1.1, 14.2.1.2
Labor Disputes
8.3.1
Laws and Regulations
1.5, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 4.1.1, 9.6.4, 9.9.1, 10.2.2, 11.1.1, 11.3, 13.1, 13.4, 13.5.1, 13.5.2, 13.6, 14, 15.2.8, 15.4
Liens
2.1.2, 9.3.3, 9.10.2, 9.10.4, 15.2.8
Limitations, Statutes of
12.2.5, 13.7, 15.4.1.1
Limitations of Liability
2.3, 3.2.2, 3.5, 3.12.10, 3.17, 3.18.1, 4.2.6, 4.2.7, 4.2.12, 6.2.2, 9.4.2, 9.6.4, 9.6.7, 10.2.5, 10.3.3, 11.1.2, 11.2, 11.3.7, 12.2.5, 13.4.2
Limitations of Time
2.1.2, 2.2, 2.4, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2.7, 5.2, 5.3, 5.4.1, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3, 9.4.1, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 11.1.3, 11.3.1.5, 11.3.6, 11.3.10, 12.2, 13.5, 13.7, 14, 15
Loss of Use Insurance
11.3.3

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Material Suppliers
1.5, 3.12.1, 4.2.4, 4.2.6, 5.2.1, 9.3, 9.4.2, 9.6, 9.10.5
Materials, Hazardous
10.2.4, **10.3**
Materials, Labor, Equipment and
1.1.3, 1.1.6, 1.5.1, 3.4.1, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1, 4.2.6, 4.2.7, 5.2.1, 6.2.1, 7.3.7, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1.2, 10.2.4, 14.2.1.1, 14.2.1.2
Means, Methods, Techniques, Sequences and Procedures of Construction
3.3.1, 3.12.10, 4.2.2, 4.2.7, 9.4.2
Mechanic's Lien
2.1.2, 15.2.8
Mediation
8.3.1, 10.3.5, 10.3.6, 15.2.1, 15.2.5, 15.2.6, **15.3**, 15.4.1
Minor Changes in the Work
1.1.1, 3.12.8, 4.2.8, 7.1, **7.4**
MISCELLANEOUS PROVISIONS
13
Modifications, Definition of
1.1.1
Modifications to the Contract
1.1.1, 1.1.2, 3.11, 4.1.2, 4.2.1, 5.2.3, 7, 8.3.1, 9.7, 10.3.2, 11.3.1
Mutual Responsibility
6.2
Nonconforming Work, Acceptance of
9.6.6, 9.9.3, **12.3**
Nonconforming Work, Rejection and Correction of
2.3, 2.4, 3.5, 4.2.6, 6.2.4, 9.5.1, 9.8.2, 9.9.3, 9.10.4, 12.2.1
Notice
2.2.1, 2.3, 2.4, 3.2.4, 3.3.1, 3.7.2, 3.12.9, 5.2.1, 9.7, 9.10, 10.2.2, 11.1.3, 12.2.2.1, 13.3, 13.5.1, 13.5.2, 14.1, 14.2, 15.2.8, 15.4.1
Notice, Written
2.3, 2.4, 3.3.1, 3.9.2, 3.12.9, 3.12.10, 5.2.1, 9.7, 9.10, 10.2.2, 10.3, 11.1.3, 11.3.6, 12.2.2.1, **13.3**, 14, 15.2.8, 15.4.1
Notice of Claims
3.7.4, 10.2.8, **15.1.2**, 15.4
Notice of Testing and Inspections
13.5.1, 13.5.2
Observations, Contractor's
3.2, 3.7.4
Occupancy
2.2.2, 9.6.6, 9.8, 11.3.1.5
Orders, Written
1.1.1, 2.3, 3.9.2, 7, 8.2.2, 11.3.9, 12.1, 12.2.2.1, 13.5.2, 14.3.1
OWNER
2
Owner, Definition of
2.1.1
Owner, Information and Services Required of the
2.1.2, **2.2**, 3.2.2, 3.12.10, 6.1.3, 6.1.4, 6.2.5, 9.3.2, 9.6.1, 9.6.4, 9.9.2, 9.10.3, 10.3.3, 11.2, 11.3, 13.5.1, 13.5.2, 14.1.1.4, 14.1.4, 15.1.3
Owner's Authority
1.5, 2.1.1, 2.3, 2.4, 3.4.2, 3.8.1, 3.12.10, 3.14.2, 4.1.2, 4.1.3, 4.2.4, 4.2.9, 5.2.1, 5.2.4, 5.4.1, 6.1, 6.3, 7.2.1, 7.3.1, 8.2.2, 8.3.1, 9.3.1, 9.3.2, 9.5.1, 9.6.4, 9.9.1, 9.10.2, 10.3.2, 11.1.3, 11.3.3, 11.3.10, 12.2.2, 12.3, 13.2.2, 14.3, 14.4, 15.2.7
Owner's Financial Capability
2.2.1, 13.2.2, 14.1.1.4
Owner's Liability Insurance
11.2
Owner's Relationship with Subcontractors
1.1.2, 5.2, 5.3, 5.4, 9.6.4, 9.10.2, 14.2.2
Owner's Right to Carry Out the Work
2.4, 14.2.2
Owner's Right to Clean Up
6.3
Owner's Right to Perform Construction and to Award Separate Contracts
6.1
Owner's Right to Stop the Work
2.3
Owner's Right to Suspend the Work
14.3
Owner's Right to Terminate the Contract
14.2
Ownership and Use of Drawings, Specifications and Other Instruments of Service
1.1.1, 1.1.6, 1.1.7, **1.5**, 2.2.5, 3.2.2, 3.11, 3.17, 4.2.12, 5.3
Partial Occupancy or Use
9.6.6, **9.9**, 11.3.1.5
Patching, Cutting and
3.14, 6.2.5
Patents
3.17
Payment, Applications for
4.2.5, 7.3.9, 9.2, **9.3**, 9.4, 9.5, 9.6.3, 9.7, 9.8.5, 9.10.1, 14.2.3, 14.2.4, 14.4.3
Payment, Certificates for
4.2.5, 4.2.9, 9.3.3, **9.4**, 9.5, 9.6.1, 9.6.6, 9.7, 9.10.1, 9.10.3, 13.7, 14.1.1.3, 14.2.4
Payment, Failure of
9.5.1.3, **9.7**, 9.10.2, 13.6, 14.1.1.3, 14.2.1.2
Payment, Final
4.2.1, 4.2.9, 9.8.2, 9.10, 11.1.2, 11.1.3, 11.4.1, 12.3, 13.7, 14.2.4, 14.4.3
Payment Bond, Performance Bond and
7.3.7.4, 9.6.7, 9.10.3, **11.4**
Payments, Progress
9.3, **9.6**, 9.8.5, 9.10.3, 13.6, 14.2.3, 15.1.3
PAYMENTS AND COMPLETION
9

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Payments to Subcontractors
5.4.2, 9.5.1.3, 9.6.2, 9.6.3, 9.6.4, 9.6.7, 14.2.1.2
PCB
10.3.1
Performance Bond and Payment Bond
7.3.7.4, 9.6.7, 9.10.3, **11.4**
Permits, Fees, Notices and Compliance with Laws
2.2.2, **3.7**, 3.13, 7.3.7.4, 10.2.2
PERSONS AND PROPERTY, PROTECTION OF
10
Polychlorinated Biphenyl
10.3.1
Product Data, Definition of
3.12.2
Product Data and Samples, Shop Drawings
3.11, **3.12**, 4.2.7
Progress and Completion
4.2.2, **8.2**, 9.8, 9.9.1, 14.1.4, 15.1.3
Progress Payments
9.3, **9.6**, 9.8.5, 9.10.3, 13.6, 14.2.3, 15.1.3
Project, Definition of
1.1.4
Project Representatives
4.2.10
Property Insurance
10.2.5, **11.3**
PROTECTION OF PERSONS AND PROPERTY
10
Regulations and Laws
1.5, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 4.1.1, 9.6.4, 9.9.1, 10.2.2, 11.1, 11.4, 13.1, 13.4, 13.5.1, 13.5.2, 13.6, 14, 15.2.8, 15.4
Rejection of Work
3.5, 4.2.6, 12.2.1
Releases and Waivers of Liens
9.10.2
Representations
3.2.1, 3.5, 3.12.6, 6.2.2, 8.2.1, 9.3.3, 9.4.2, 9.5.1, 9.8.2, 9.10.1
Representatives
2.1.1, 3.1.1, 3.9, 4.1.1, 4.2.1, 4.2.2, 4.2.10, 5.1.1, 5.1.2, 13.2.1
Responsibility for Those Performing the Work
3.3.2, 3.18, 4.2.3, 5.3, 6.1.3, 6.2, 6.3, 9.5.1, 10
Retainage
9.3.1, 9.6.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3
Review of Contract Documents and Field Conditions by Contractor
3.2, 3.12.7, 6.1.3
Review of Contractor's Submittals by Owner and Architect
3.10.1, 3.10.2, 3.11, 3.12, 4.2, 5.2, 6.1.3, 9.2, 9.8.2
Review of Shop Drawings, Product Data and Samples by Contractor
3.12
Rights and Remedies
1.1.2, 2.3, 2.4, 3.5, 3.7.4, 3.15.2, 4.2.6, 5.3, 5.4, 6.1, 6.3, 7.3.1, 8.3, 9.5.1, 9.7, 10.2.5, 10.3, 12.2.2, 12.2.4, **13.4**, 14, 15.4
Royalties, Patents and Copyrights
3.17
Rules and Notices for Arbitration
15.4.1
Safety of Persons and Property
10.2, 10.4
Safety Precautions and Programs
3.3.1, 4.2.2, 4.2.7, 5.3, **10.1**, 10.2, 10.4
Samples, Definition of
3.12.3
Samples, Shop Drawings, Product Data and
3.11, **3.12**, 4.2.7
Samples at the Site, Documents and
3.11
Schedule of Values
9.2, 9.3.1
Schedules, Construction
3.10, 3.12.1, 3.12.2, 6.1.3, 15.1.5.2
Separate Contracts and Contractors
1.1.4, 3.12.5, 3.14.2, 4.2.4, 4.2.7, 6, 8.3.1, 12.1.2
Shop Drawings, Definition of
3.12.1
Shop Drawings, Product Data and Samples
3.11, **3.12**, 4.2.7
Site, Use of
3.13, 6.1.1, 6.2.1
Site Inspections
3.2.2, 3.3.3, 3.7.1, 3.7.4, 4.2, 9.4.2, 9.10.1, 13.5
Site Visits, Architect's
3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.5
Special Inspections and Testing
4.2.6, 12.2.1, 13.5
Specifications, Definition of
1.1.6
Specifications
1.1.1, **1.1.6**, 1.2.2, 1.5, 3.11, 3.12.10, 3.17, 4.2.14
Statute of Limitations
13.7, 15.4.1.1
Stopping the Work
2.3, 9.7, 10.3, 14.1
Stored Materials
6.2.1, 9.3.2, 10.2.1.2, 10.2.4
Subcontractor, Definition of
5.1.1
SUBCONTRACTORS
5
Subcontractors, Work by
1.2.2, 3.3.2, 3.12.1, 4.2.3, 5.2.3, 5.3, 5.4, 9.3.1.2, 9.6.7
Subcontractual Relations
5.3, 5.4, 9.3.1.2, 9.6, 9.10, 10.2.1, 14.1, 14.2.1

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Submittals
3.10, 3.11, 3.12, 4.2.7, 5.2.1, 5.2.3, 7.3.7, 9.2, 9.3, 9.8, 9.9.1, 9.10.2, 9.10.3, 11.1.3
Submittal Schedule
3.10.2, 3.12.5, 4.2.7
Subrogation, Waivers of
6.1.1, **11.3.7**
Substantial Completion
4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, **9.8**, 9.9.1, 9.10.3, 12.2, 13.7
Substantial Completion, Definition of
9.8.1
Substitution of Subcontractors
5.2.3, 5.2.4
Substitution of Architect
4.1.3
Substitutions of Materials
3.4.2, 3.5, 7.3.8
Sub-subcontractor, Definition of
5.1.2
Subsurface Conditions
3.7.4
Successors and Assigns
13.2
Superintendent
3.9, 10.2.6
Supervision and Construction Procedures
1.2.2, **3.3**, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3, 7.3.7, 8.2, 8.3.1, 9.4.2, 10, 12, 14, 15.1.3
Surety
5.4.1.2, 9.8.5, 9.10.2, 9.10.3, 14.2.2, 15.2.7
Surety, Consent of
9.10.2, 9.10.3
Surveys
2.2.3
Suspension by the Owner for Convenience
14.3
Suspension of the Work
5.4.2, 14.3
Suspension or Termination of the Contract
5.4.1.1, 14
Taxes
3.6, 3.8.2.1, 7.3.7.4
Termination by the Contractor
14.1, 15.1.6
Termination by the Owner for Cause
5.4.1.1, **14.2,** 15.1.6
Termination by the Owner for Convenience
14.4
Termination of the Architect
4.1.3
Termination of the Contractor
14.2.2
TERMINATION OR SUSPENSION OF THE CONTRACT
14
Tests and Inspections
3.1.3, 3.3.3, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 10.3.2, 11.4.1, 12.2.1, **13.5**
TIME
8
Time, Delays and Extensions of
3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3.1, 7.4, **8.3**, 9.5.1, 9.7, 10.3.2, 10.4, 14.3.2, 15.1.5, 15.2.5
Time Limits
2.1.2, 2.2, 2.4, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2, 5.2, 5.3, 5.4, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3, 9.4.1, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 11.1.3, 12.2, 13.5, 13.7, 14, 15.1.2, 15.4
Time Limits on Claims
3.7.4, 10.2.8, **13.7**, 15.1.2
Title to Work
9.3.2, 9.3.3
Transmission of Data in Digital Form
1.6
UNCOVERING AND CORRECTION OF WORK
12
Uncovering of Work
12.1
Unforeseen Conditions, Concealed or Unknown
3.7.4, 8.3.1, 10.3
Unit Prices
7.3.3.2, 7.3.4
Use of Documents
1.1.1, 1.5, 2.2.5, 3.12.6, 5.3
Use of Site
3.13, 6.1.1, 6.2.1
Values, Schedule of
9.2, 9.3.1
Waiver of Claims by the Architect
13.4.2
Waiver of Claims by the Contractor
9.10.5, 13.4.2, 15.1.6
Waiver of Claims by the Owner
9.9.3, 9.10.3, 9.10.4, 12.2.2.1, 13.4.2, 14.2.4, 15.1.6
Waiver of Consequential Damages
14.2.4, 15.1.6
Waiver of Liens
9.10.2, 9.10.4
Waivers of Subrogation
6.1.1, **11.3.7**
Warranty
3.5, 4.2.9, 9.3.3, 9.8.4, 9.9.1, 9.10.4, 12.2.2, 13.7
Weather Delays
15.1.5.2
Work, Definition of
1.1.3
Written Consent
1.5.2, 3.4.2, 3.7.4, 3.12.8, 3.14.2, 4.1.2, 9.3.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3, 11.4.1, 13.2, 13.4.2, 15.4.4.2
Written Interpretations
4.2.11, 4.2.12

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Written Notice
2.3, 2.4, 3.3.1, 3.9, 3.12.9, 3.12.10, 5.2.1, 8.2.2, 9.7, 9.10, 10.2.2, 10.3, 11.1.3, 12.2.2, 12.2.4, **13.3**, 14, 15.4.1

Written Orders
1.1.1, 2.3, 3.9, 7, 8.2.2, 12.1, 12.2, 13.5.2, 14.3.1, 15.1.2

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to 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. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding requirements.

§ 1.1.2 THE CONTRACT

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

§ 1.1.3 THE WORK

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

§ 1.1.4 THE PROJECT

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

§ 1.1.5 THE DRAWINGS

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams.

§ 1.1.6 THE SPECIFICATIONS

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

§ 1.1.7 INSTRUMENTS OF SERVICE

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

§ 1.1.8 INITIAL DECISION MAKER

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

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

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

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

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

§ 1.3 CAPITALIZATION

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

§ 1.4 INTERPRETATION

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

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

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

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

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

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

ARTICLE 2 OWNER

§ 2.1 GENERAL

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

§ 2.1.2 The Owner shall furnish to the Contractor within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or

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the portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

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

§ 2.2.3 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.2.4 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.2.5 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

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

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

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

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

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§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering 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.

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

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall make Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

§ 3.3.2 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.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 LABOR AND MATERIALS

§ 3.4.1 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

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facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

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

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

§ 3.5 WARRANTY

The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.6 TAXES

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

§ 3.7 PERMITS, FEES, NOTICES AND COMPLIANCE WITH LAWS

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies 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.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor 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.

§ 3.7.4 Concealed or Unknown Conditions. If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume

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the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 ALLOWANCES

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

.1 Allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;

.2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and

.3 Whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 SUPERINTENDENT

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

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

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

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

§ 3.10.2 The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect's approval. The Architect's approval shall not unreasonably be delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

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§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

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

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

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

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

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such written notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be

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required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 3.13 USE OF SITE

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 CUTTING AND PATCHING

§ 3.14.1 The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting and patching shall be restored to the condition existing prior to the cutting, fitting and patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

§ 3.15 CLEANING UP

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

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

§ 3.16 ACCESS TO WORK

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

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

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

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§ 3.18 INDEMNIFICATION

§ 3.18.1 To the fullest extent permitted by law the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, 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, 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 that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

§ 4.1.1 The Owner shall retain an architect lawfully licensed to practice architecture or an entity lawfully practicing architecture in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

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

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

§ 4.2 ADMINISTRATION OF THE CONTRACT

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

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully 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 Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

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§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

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

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions rendered in good faith.

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

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§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.

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

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

§ 5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Owner or Architect to reply within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 SUBCONTRACTUAL RELATIONS

By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by these Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may

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be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

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

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

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

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

§ 5.4.3 Upon such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

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

§ 6.2 MUTUAL RESPONSIBILITY

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

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that

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the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

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

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

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

§ 6.3 OWNER'S RIGHT TO CLEAN UP

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

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 GENERAL

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

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

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work.

§ 7.2 CHANGE ORDERS

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor and Architect stating their agreement upon all of the following:

.1 The change in the Work;
.2 The amount of the adjustment, if any, in the Contract Sum; and
.3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
.2 Unit prices stated in the Contract Documents or subsequently agreed upon;
.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or

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.4 As provided in Section 7.3.7.

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

§ 7.3.5 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

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

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:

.1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;

.2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and

.5 Additional costs of supervision and field office personnel directly attributable to the change.

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

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

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

§ 7.4 MINOR CHANGES IN THE WORK

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

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ARTICLE 8 TIME

§ 8.1 DEFINITIONS

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

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

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

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

§ 8.2 PROGRESS AND COMPLETION

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

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 DELAYS AND EXTENSIONS OF TIME

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner pending mediation and arbitration; or by other causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.2 SCHEDULE OF VALUES

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

§ 9.3 APPLICATIONS FOR PAYMENT

§ 9.3.1 At least ten 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 9.2, for completed portions of the Work. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents.

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§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or material supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

§ 9.4 CERTIFICATES FOR PAYMENT

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Section 9.5.1.

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

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

.1 defective Work not remedied;

.2 third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;

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.3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;

.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;

.5 damage to the Owner or a separate contractor;

.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or

.7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.3 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Architect will reflect such payment on the next Certificate for Payment.

§ 9.6 PROGRESS PAYMENTS

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

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

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law.

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

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

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors and suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.7 FAILURE OF PAYMENT

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' written notice to the Owner and Architect,

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stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 SUBSTANTIAL COMPLETION

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

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

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

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

§ 9.9 PARTIAL OCCUPANCY OR USE

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

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

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

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

§ 9.10.1 Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the

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Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

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

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- .1 liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents; or
- .3 terms of special warranties required by the Contract Documents.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS

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

§ 10.2 SAFETY OF PERSONS AND PROPERTY

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

- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

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§ 10.2.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

§ 10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

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

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

§ 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY

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

§ 10.3 HAZARDOUS MATERIALS

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing.

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up.

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§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

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

§ 10.4 EMERGENCIES

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

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 CONTRACTOR'S LIABILITY INSURANCE

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

- .1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;
- .2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- .3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- .4 Claims for damages insured by usual personal injury liability coverage;
- .5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- .6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
- .7 Claims for bodily injury or property damage arising out of completed operations; and
- .8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

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

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of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

§ 11.2 OWNER'S LIABILITY INSURANCE

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

§ 11.3 PROPERTY INSURANCE

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

§ 11.3.1.1 Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss.

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

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

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

§ 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or

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otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

§ 11.3.2 BOILER AND MACHINERY INSURANCE

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

§ 11.3.3 LOSS OF USE INSURANCE

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

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

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

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

§ 11.3.7 WAIVERS OF SUBROGATION

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

§ 11.3.8 A loss insured under the Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

§ 11.3.9 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the

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Owner shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

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

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND

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

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

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 UNCOVERING OF WORK

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

§ 12.2 CORRECTION OF WORK

§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

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

§ 12.2.2 AFTER SUBSTANTIAL COMPLETION

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, 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 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.4.

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

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 ACCEPTANCE OF NONCONFORMING WORK

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 GOVERNING LAW

The Contract shall be governed by the law of the place where the Project is located except that, if the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 SUCCESSORS AND ASSIGNS

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

§ 13.3 WRITTEN NOTICE

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

§ 13.4 RIGHTS AND REMEDIES

§ 13.4.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

§ 13.4.2 No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach there under, except as may be specifically agreed in writing.

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§ 13.5 TESTS AND INSPECTIONS

§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.2 If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner's expense.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense.

§ 13.5.4 Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.5.5 If the Architect is to observe tests, inspections or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

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

§ 13.6 INTEREST

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

§ 13.7 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 13.7.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 TERMINATION BY THE CONTRACTOR

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

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

.2 An act of government, such as a declaration of national emergency that requires all Work to be stopped;

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.3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or

.4 The Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by Section 2.2.1.

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

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

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

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

.1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

.2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;

.3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or

.4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the above reasons exist, the Owner, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

.2 Accept assignment of subcontracts pursuant to Section 5.4; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

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

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the 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 Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.

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§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay or interruption as described in Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

.1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or

.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall

.1 cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 CLAIMS

§ 15.1.1 DEFINITION

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim.

§ 15.1.2 NOTICE OF CLAIMS

Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3 CONTINUING CONTRACT PERFORMANCE

Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Initial Decision Maker.

§ 15.1.4 CLAIMS FOR ADDITIONAL COST

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

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

§ 15.1.5.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.5.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

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§ 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

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

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

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

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

§ 15.2 INITIAL DECISION

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

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

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

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

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

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

§ 15.2.6.1 Either party may, within 30 days from the date of an initial decision, demand in writing that the other party file for mediation within 60 days of the initial decision. If such a demand is made and the party receiving the demand fails to file for mediation within the time required, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

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

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

§ 15.3 MEDIATION

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

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

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

§ 15.4 ARBITRATION

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

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

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

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

§ 15.4.4 CONSOLIDATION OR JOINDER

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

§ 15.4.4.2 Either party, at its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an

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additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

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

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DOCUMENT 00811 - SUPPLEMENTARY GENERAL CONDITIONS

INTRODUCTION

The following supplements are additional general conditions of the contract and may modify, change, delete from or add to the "General Conditions of the Contract for Construction" AIA Document A201, 2007 Edition. Where any Article of the General Conditions is modified or deleted by these supplements, the unaltered provisions of that Article, Paragraph, Subparagraph or clause shall remain in effect.

The decimal numbering system is intended to coincide with like articles in the General Conditions to provide cross-reference thereto. Any discrepancies or contradictions between the General Conditions and Supplementary General Conditions shall be brought to the attention of the Architect. See Paragraph 1.2.5. herein.

The terms used in these Supplementary Conditions which are defined in the General Conditions of the Contract for Construction (AIA Document A201, 1997 Edition) have the meanings assigned to them in the General Conditions.

ARTICLE 1 - THE CONTRACT DOCUMENTS

1.1.1 Modify paragraph 1.1.1 of the general Conditions to state that the Contract Documents shall include any advertisement and / or invitation to Bid, Notice to Bidders, Form of Proposal, Instructions to Bidders, Bid Bond, and Contract Bonds.

1.2.2 Add the following sentence: The submission of a proposal is evidence that such an examination has been made and later claims for labor, equipment, material, or services required or for difficulties encountered that could have been foreseen if an examination had been made, will not be recognized.

1.2.5 In case of disagreement, discrepancies, or contradiction between any parts of the Contract Documents or within any part of the Contract Documents, only the Architect may interpret the intent and requirements of the documents and his decision shall be final and no additional cost will be allowed on this account if the matter is brought to the Architect's attention before seven (7) days prior to receipt of bids. If brought to the Architect's attention before seven (7) days prior to receipt of bids, the matter will be clarified by Bulletin or Addenda.

1.2.6 The Drawings and Specifications, as a part of the Contract Documents, are for the purpose of illustrating and describing the general character and extent of the Work; and they are intended to agree and be mutually explanatory. Further, it is the intention that these instruments of the Contract shall be complete in their meaning, and shall represent completeness in design as well as any fragments thereof. It is the intent and purpose of the Specifications and the accompanying Drawings to cover and include each item of materials, machinery, apparatus, equipment, labor, and services necessary to properly install, equip, adjust, and put into perfect operation the respective portions of the installations specified, and to so interconnect the various items or sections of the Work as to form a complete and operating whole, and deliver the Work in the specified time. Any apparatus, machinery, material, equipment, labor and services not hereinafter specifically mentioned which may be found necessary to complete or perfect any portion of the construction in a substantial manner, and in compliance with the requirements stated, implied or intended in these specifications, shall be furnished without extra cost to the Owner. This shall include all materials, devices, or methods peculiar to the type of construction furnished and installed by this Contractor.

1.2.7 If the Contractor, in the course of the Work, finds any discrepancies between the plans and the physical conditions of the locality, or any errors, in plans or in the layout as given by the point and instructions, it shall be his duty to immediately inform the Architect in writing and the Architect, with reasonable promptness, shall verify the same. Any Work done after such discovery, until authorized, shall be done at the Contractor's risk.

1.2.8 Drawings may show work fully drawn out or only a portion thereof, the remainder being in outline. The drawn out portion must be understood as applying to other like or similar places. Ornament, materials, details, or other similar items, where indicated on the Drawings by a starting only of the detail, shall be considered as being repeated or continued throughout the areas, courses or parts in which they apply. When a profile or other finished condition is shown on the Drawings, framing, furring, blocking, or other methods of obtaining such finished surface shall be provided.

1.3.2 Architect will issue sets of Contract Drawings and Specifications to the General Contractor at no cost, after the Contract has been awarded, as follows:

Prime/General Contractor - 4 sets of Drawings and 2 sets of Specifications

Additional sets or copies, if required, will available at printing costs.

ARTICLE 2 - OWNER

2.2.3 Add the following: The Owner will furnish all land and right-of-way necessary for the carrying out of the Agreement and the completion of the Work therein contemplated.

ARTICLE 3 - CONTRACTOR

3.2.2 Each Prime Contractor and / or subcontractor, before submitting his proposal, shall carefully examine all other prime contract Plans and Specifications and shall carry on his work in such manner as not to interfere with or delay the work of other Prime Contractors.

3.3.5 The General Contractor shall employ a competent Registered Surveyor to determine all building lines, grades and levels, locate all footings, levels, etc., and to verify same from time to time during construction. He shall establish and maintain bench marks for the use of all trades within the building areas in permanent positions. This engineer shall certify over his seal that the buildings are located properly in relation to the property lines. Each Subcontractor shall provide competent engineering services to lay out his own work according to lines, grades, and levels established by the General Contractor.

3.3.6 All drawing dimensions and measurements shall be checked and verified by each Prime Contractor at the site of the project. He shall also, in all cases, check the drawings with existing conditions and with work in place. Variations, if any shall be immediately reported to the Architect in writing for adjustments as the Contractor shall be held responsible for the true fit of all work. No extras will be allowed for differences between actual measurements and dimensions shown.

3.3.7 The schedule of any work affecting existing installations or facilities shall be coordinated with the Owner and the Architect. Shutdown of utilities or equipment affecting existing operations will not be permitted except as scheduled with the Owner and provided below.

3.3.8 Any premium time or additional cost to comply with these requirements shall be at the expense of the Prime Contractor and considered to be included in his bid.

3.4.1 Is amended by adding: The Contractor shall not deviate, except with the Architect's written approval, from any specified kind, quality, size, design, performance, brand or manufacture.

3.4.1.2 Any material specified by reference to the number, symbol, or title of a specific standard, such as Commercial Standard, a Federal Specification, a trade association standard or other similar standard, shall comply with the requirements in the latest revision thereof, any amendment or supplement thereto in effect on the date of submission of the Proposal, except as limited to type, class, or grade, or modified in such reference. The standards referred to, except as modified in the Specifications, shall have full force and effect as though printed in full in the Specifications.

3.4.1.3 The specific mention of a manufacturer's name, brand of material, equipment, etc. shall be considered as indicating a standard of quality, grade, or type desired. Materials of manufacturers other than those mentioned throughout these specifications may be accepted if they are equal in quality and performance to those specified and approval is given by the Architect as outlined hereinafter.

3.4.1.4 Substitutions

3.4.1.4.1 The intent of this Specification is to encourage and permit competition on qualified products by all reputations and performances warrant approval for the conditions, intent of design and performance considerations

3.4.1.4.2 Whenever any product is specified or shown by describing proprietary items, model numbers, catalog numbers, manufacturer, trade name or similar reference, the bidder obligates himself to submit proposals and accept award of contract based on the use of such products. Use of such reference is intended to establish the measure of quality which the Architect or Engineer has determined as requisite and necessary for the project. Where two (2) or more products are shown or specified, the bidder has the option of which to use, provided the product meets all requirements of the specification and design criteria.

3.4.1.4.3 If any Contractor wishes to substitute equipment or materials, which he believes to be equal to those specified, he shall make a request, in writing, to the Architect for approval of such substitute equipment or materials at least ten (10) days prior to the date for receiving, opening and reading proposals, following the rules specified hereinafter. If the Architect shall approve of such substitute equipment or materials, a bulletin or addendum evidencing such approval will be promulgated by the Architect to all prospective prime bidders of who the Architect shall have a record.

3.4.1.4.4 Any requests for substitution must be accompanied by manufacturer's literature, specifications, drawings, cuts, performance data, list of work completed in the project area, or other references or information necessary to completely describe the item. Requests not meeting all of these requirements may be rejected without evaluation. If, in the opinion of the Architect, insufficient information and data accompanied the request, or for any other reason, the Architect may approve a manufacturer only as a source of supply reserving evaluation of the product or material until after the award of contract. If during subsequent evaluation the Architect finds the proposed substitute product or material not equal to or exceeding the specifications, the Contractor shall not use the material or product and such action shall not be cause to change the contract price.

3.4.1.4.5 Manufacturers or their representatives or dealers shall not direct or make requests to the Architect for substitute equipment or materials. All requests must originate from the prime bidder.

3.4.1.4.6 Contractor shall give due consideration to the fact that the use of the substituted items might affect the work of other Subcontractors and may cause additional work not covered by their respective specifications. The Contractor for the substituted equipment or work shall be responsible for all additional work or costs to other Contractors or Subcontractors, if any, resulting from the use of the substituted items.

3.4.1.4.7 Substitutions will not be considered if for their implementation they require a substantial revision of the Contract Documents in order to accommodate their use.

3.4.1.5 Mention of a product by specific name shall imply application of the manufacturer's specifications, except as more stringently specified. If requested by the Architect, a copy of the manufacturer's specifications which apply shall be maintained at the job site. The Contractor shall furnish to the Architect, upon request, a signed Certificate from the manufacturer or producer that items specified by ASTM or Federal Specification Numbers or Designations comply with said Specifications.

3.4.3 The equipment or procedure used on any portion of the work shall be such that no injury to adjacent property, roads, or highways will result from its use. No work of any kind may be installed or stored in a manner which may endanger the structure of the building.

3.4.4 Each Prime Contractor shall furnish and erect all necessary hoisting equipment required to raise and lower materials required to perform his work. Hoists must be operated by qualified and experienced operators. All hoisting equipment, guard gates, shaftways, etc., shall conform with applicable regulations of the Department of Labor and Industry of the Commonwealth of Pennsylvania. Temporary landing platforms, railings, ramps, guard gates, hoist shaftways, etc. shall be provided as required to construct the work in this Contract. All such temporary work shall be furnished and erected by the Contractor and shall be removed by him when no longer needed.

3.4.5 Any work necessary to be performed after regular working hours, on Sundays, or Legal Holidays, shall be performed without additional expense to the Owner (see Article 3.3.7 in this Supplementary General Conditions).

3.4.6 No person shall be employed to do work under such contract except competent and first-class workers and mechanics. No workers shall be regarded as competent and first class, within the meaning of this act, except those who are duly skilled and appropriately licensed in their respective branches of labor.

3.10.1 Is amended by changing the words "promptly after being awarded the Contract" to read not later than ten (10) days after being awarded the Contract."

3.10.2 The schedule shall be in the form of a progress chart of suitable scale so as to appropriately indicate the percentage of work completed at any time. The General Contractor shall enter the actual progress biweekly and shall deliver three (3) copies to the Architect, when requested. When, in the opinion of the Architect, the approved Progress Schedule no longer represents a realistic progress of the Work, a revised Progress Schedule must be submitted.

3.12.11 Under no circumstances shall the Architect's review of any shop drawings be construed as an approval of extra cost to the Owner for any work shown thereon. Any claim for extra cost must be made as specified before the time of submitting shop drawings.

3.12.12 Each Prime Contractor shall assist in transporting, packing, collecting, etc. of samples of materials or equipment, whether samples be delivered to the project site, to the Architect, or to the Laboratory. Certain approved materials, such as hardware, valves, fittings, fire alarms signals, in good condition and not subject to destructive tests, may be used in the work by particular kind to be incorporated into the building, and may not be removed from the Architect's office until just previous to its use. Any material delivered to the job will be compared with the approved sample on file in the Architect's office and, if necessary, an additional test shall be made on this material.

3.13.1 Is amended by adding: Each Contractor shall minimize interference with normal operations. If connections between the Work and existing facilities require closing off or shutting down any facilities, services, or areas, the connections shall be made at such times and in such manner as the Architect or Owner directs. If requested by Owner, Contractor shall move materials from one temporary location on Owner's land to another, at the sole expense of the Contractor, except that the expense shall be borne by the Owner when the Owner requires that materials be moved from a location on Owner's land previously assigned to Contractor by Owner.

No advertising signs of any nature shall be placed at or near the site, without the written consent of the Owner. Owner may make use of any portions of the Work for which a Certificate of Substantial Completion has been accepted in writing by Owner and Contractor.

3.13.3.1 During the progress of the work, the General Contractor shall provide lights, fences, and barriers, danger, warning, and detour signs and take such other precautions as may be necessary to protect life and property.

3.13.3.2 Each Prime Contractor shall protect the Owner's property, all surrounding public and private properties, all his work in place, and all work of other contractors in place against damage, injury, or loss arising in connection with the work of this Contract. He shall make good any such damage, injury, or loss, except such as may be directly due to or caused by agents or employees of the Owner.

3.13.3.3 Each Prime Contractor shall provide and maintain proper protection at all times for all exposed floors, walls, ceilings, fittings, fixtures, pipe, glass, duct work, equipment, and all other finished and / or unfinished parts of the structure of construction work that may be subject to damage or theft or injury of any kind during the progress of the work. Any items damaged or injured shall be replaced or repaired by the Contractor at his own expense, and in a manner entirely satisfactory to the Architect.

3.13.3.4 Each Prime Contractor shall at all times provide substantial and adequate protection against all kinds of weather so as to maintain all work, apparatus, and fixtures, free from injury or damage. At the end of each day's work, all new work subject to damage shall be completely covered.

3.13.3.5 Each Prime Contractor shall maintain and enforce regulations covering all fire hazards, including smoking. The General Contractor shall provide approved fire extinguishers at proper locations.

3.13.3.6 Each Prime Contractor shall provide and maintain all passageways, guard fences, lights, and other facilities for protection required by public authority of local conditions.

3.13.3.7 All temporary shoring, bracing, etc. necessary for the installation of new work shall be included in the General Contract without further cost to the Owner, and must be done in accordance with good practice. The General Contractor must assume all responsibility for this work and make good any damage caused by improper supports or failure of shoring in any respect. He shall remove same at completion and be responsible for all damage.

3.13.3.8 Each Prime Contractor must replace, to the satisfaction of the Architect and Owner any damage resulting to curbs, sidewalks, lawns, drain pipes, catch basins, etc. as a result of this building operation, even though they be outside the limits of this Contract as shown on the Drawings. Any facilities that have been marred or disturbed by the construction in any way shall be restored to new condition to the satisfaction of the Owner and the Architect.

3.13.3.9 Employees of the construction contractors shall not park their automobiles and vehicles on Owner's property except at locations directed by the Owner.

3.15.3 Each Prime Contractor shall be responsible for daily cleaning up of the building and premises. He shall supervise and direct his personnel to promptly remove their waste material and rubbish as it collects from their work operations.

ARTICLE 4 - ADMINISTRATION OF THE CONTRACT

4.5.1 Demand for arbitration shall be filed in the Philadelphia Office of the American Arbitration Association.

4.7.1 No official of the Owner who is authorized in such capacity and on behalf of the Owner to negotiate, make, accept, or approve, or to take part in negotiating, making, accepting, or approving any architectural, engineering, inspection, construction, or material supply contracts, or any subcontract in connection with the construction of the Project, shall become directly or indirectly interested personally in the Agreement or in any part thereof. No officer, employee, architect, attorney, engineer, or inspector of or for the Owner who is authorized in such capacity and in behalf of the Owner to exercise any legislative, executive, supervisory or other similar functions in connection with the construction of the project shall become directly or indirectly interested personally in the Agreement or in any part thereof, any material supply contract, subcontract, insurance contract, or any other contract pertaining to the Project.

ARTICLE 5 - SUBCONTRACTORS

5.3.2 In all cases, subcontractors shall take their own measurements at the site and verify same with the Contractor and the Drawings, as they shall be held responsible for the true fit of all their work.

ARTICLE 6 - CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

6.1.5 Wherever work being done by other contractors or forces is contiguous to work covered by the Agreement, the respective rights of the various interests involved shall be established by the Owner to secure the completion of the various portions of the work in general harmony.

6.2.7 Work shown diagrammatically on drawings shall be agreed upon for exact location before being installed. Where work of various trades is in close proximity, each Prime Contractor shall confer

with the other Contractors concerned before making his installation. Work installed in an arbitrary manner without regard for work of other Prime Contractors will be rejected in any cases where an undesirable condition or unfair hardship for others results.

ARTICLE 7 - CHANGES IN THE WORK

7.3.7.1 In sub-paragraph 7.3.1, the term "overhead" is defined to include, but not necessarily be limited to, costs of all items listed below:

a. Salaries or other compensations of the Contractor's officers, executives, general managers, field superintendents, field timekeepers, estimators, auditors, accountants, purchasing and contracting agents, and other employees at the Contractor's principal office and branch offices, except employees of the Contractor when engaged at shops or on the road in expediting the production or transportation of materials or equipment for the Work.

b. Expenses of the Contractor's Principal and Branch Offices other than the Field Office.

c. Any part of the Contractor's capital expenses, including interest on the Contractor's capital employed for the Work.

d. General expenses of any kind, except as may be expressly included reasonable expenses and savings as here to before defined.

e. The cost of any item not specifically and expressly included in the items defined as reasonable expenses and savings.

f. Minor expenses, such as telegrams, long distance telephone calls, telephone service at the site, expressage, or similar petty cash items in connection with the Work.

7.3.7.2 As referred to in sub-paragraph 7.3.7, the allowance for Overhead and Profit shall be figured as follows:

a. For cost of Work performed by the Contractor's own forces:
5% Overhead and 3% Profit.

b. For cost of work performed as a sub-contract or subcontract to the Contractor or Subcontractor:
5% Overhead and 3% Profit.

c. To General Contractor for subcontractor's work:
3% markup over subcontractor's work.

Overhead shall be calculated against the cost of the work. Profit shall be calculated against the sum of the cost of the work and overhead.

7.3.3 In Sub-paragraph 7.3.3.2, the term "unit prices" is defined, but not necessarily limited to the following:

a. The unit prices submitted by a Contractor in his proposal for this project are subject to approval and acceptance by the Owner. The Owner reserves the right to reject any unit price which is unreasonable or unbalanced, as compared with prevailing costs, or as compared with the unit prices submitted by other Bidders for this project, and the Owner reserves the right to ask for a revised unit price before or after the Contracts are signed.

b. Approved unit prices, when accepted by the Architect and Owner, shall be used where they apply to determine an equitable adjustment of the Contract Sum in connection with extra work or changes ordered under the Contract. Approved unit prices shall apply to both additions to and/or deductions from the Contract Sum.

c. Unit prices submitted by a Contractor in his Proposal for this project shall include all profit, overhead, insurances, taxes, labor, materials, plant, equipment, and tools necessary and required to fully complete the work item, as specified in detail for the work item under the Project Specifications.

7.4.2 The Owner reserves the right to change the location of any piece of apparatus or equipment within five (5) feet of location shown, up to the time of roughing-in without additional expense to Owner.

ARTICLE 8 - TIME

8.2.4 The work shall be substantially completed within the number of calendar days stated in the Contract Documents, subject to conditions stated therein, from the date of Notice to Proceed including authorized extensions of time. The Notice to Proceed shall be given to the contractors on all branches of work concurrently and all contractors shall be prepared to undertake their work at such times as the progress of the work permits them to do so. All contractors shall cooperate with each other and shall coordinate their activities and work so that the entire program of construction can be substantially completed on or before the completion date.

8.3.4 No extension of the time of completion will be granted by the Owner if the act or occurrence constituting the basis of the request or claim shall be for non-delivery of materials due to any act or negligence of the Contractor, or the failure of the Contractor to employ, furnish, or obtain, as necessary for the timely prosecution of work, sufficient labor, materials, or equipment, or other matters which shall be within the control of the Contractor. The Owner shall consider any delay which shall result because of any of the foregoing causes to be the sole responsibility of the Contractor.

8.3.5 No extension of time of completion which shall be granted by the Owner shall be or shall be deemed to be a waiver by the Owner of any rights accruing to it under the General Conditions bound herewith; and no extension of the time of completion which shall be granted by the Owner shall relieve or shall be deemed to relieve the Contractor from full responsibility for performance of his obligations under this contract.

8.3.6 The Owner shall not be liable to the Contractor for any expenses, damages, loss of profits (anticipated or otherwise) or charges of any nature whatsoever which shall result because of any extensions of the time of completion which shall be granted by the Owner to the Contractor or to any other contractor employed by the Owner to perform any other branch of work, or which shall result because of any delay or hindrance of any nature whatsoever in the progress of the work, whether such delay or hindrance shall be avoidable or unavoidable.

8.3.7 The Owner reserves the right to assess liquidated damages upon each Prime Contractor in the amount of stated under Supplementary General Terms and Conditions in the event that "Substantial Completion" has not been achieved by the agreed upon date as indicated on the Bid Form Document – 00411. "Substantial Completion" shall be determined by the Architect.

ARTICLE 9 - PAYMENTS AND COMPLETION

9.3.1 The wording "ten days" shall be changed to "fifteen days".

9.3.3 Is amended by changing the words "will pass" to "will have passed or will pass" and by adding "and Contractor will defend and indemnify the Owner and save Owner harmless against all loss, damage, liability and expense by reason of any liens or alleged liens.

9.3.4 All material and work incorporated in the work covered by partial payments made shall thereupon become the sole property of the Owner, but this provision shall not be construed as relieving the

Contractor from the sole responsibility for the care and protection of materials and work upon which payments have been made or the restoration of any damaged work, or as a waiver of the right of the Owner to require the fulfillment of all terms of the Contract.

Materials delivered and stored are the responsibility of the Contractor, and he shall be solely responsible for their safe keeping and usability at the time they are to be incorporated in the structure or Project, and shall, at his own expense, care for and protect the same, employ watchmen, if he so desires, and take out insurance against theft, loss from other causes, damage, destruction and / or other risks as may be involved which would render the aforesaid materials unfit or unsuitable for the use in the Project.

Materials shall not be delivered earlier than reasonably necessary for proper progress of the work unless prior approval is granted by the Owner.

9.4.1 Modify paragraph 9.4.1 to state that the "Architect will issue a Certificate for Payment to the Owner at least five (5) days prior to payment date".

9.6.7 Based on the 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 in the Conditions of the Contract as follows: monthly, ninety percent (90%) of the proportion of the Contract Sum properly allocable to labor, materials, and equipment incorporated in the Work, and ninety percent (90%) of the portion of the Contract Sum properly allocable to materials and equipment suitably stored at the site or at some other location agreed upon in writing by the parties, up to a selected day of the month as established by the Architect, less the aggregate of previous payments in each case; and upon substantial completion of the entire work, a sum sufficient to increase the total payments to ninety percent (90%) of the Contract Sum, less such retainages as the Architect shall determine for all incomplete work and unsettled claims. Support this application with such data (including releases of liens or receipts in full from subcontractors and suppliers) substantiating the Contractor's right to payment as the Owner or the Architect may require.

9.6.8 In making progress payments, there shall be retained ten percent (10%) on estimated amounts until final payment and acceptance of the Work; provided, however, that the Architect may at any time after fifty percent (50%) of the work has been completed, if he finds that satisfactory progress is being made and with written consent of Surety (if any) recommend that any of the remaining partial payments be made in full, or retainage be reduced to five percent (5%); provided, also, that the Contractor agrees to pay his subcontractors under the same conditions. The full contract retainage may be reinstated if the manner of completion of the work and its progress does not remain satisfactory to the Architect, or if the Surety (if any) withholds his consent, or for other good and sufficient reasons.

9.7.1 Delete paragraph 9.7.1 from the General Conditions and substitute the following:

9.7.1 See Article 15 - Liens and Affidavits for additional requirements.

ARTICLE 10 - PROTECTION OF PERSONS AND PROPERTY

10.2.3.1 Special attention is drawn to the regulations of the Commonwealth of Pennsylvania, Department of Labor and Industry Standards and the Federal government, Department of Labor, Bureau of Labor Standards,

Safety and Health Regulations for construction, safety, and other regulations of which the Contractor shall be fully informed and with which he shall fully comply.

ARTICLE 11 - INSURANCE

11.1.1.8 Liability insurance shall include all major divisions of coverage and be on a comprehensive basis including:

a. Premises - Operations (including X-C-U and Blasting).

b. Independent Contractor's Protection.

c. Products and Completed Operations.

d. Contractual - including Hold Harmless Provisions under Paragraph 4.18 of the General Conditions.

e. Owner, non-owned and hired motor vehicles

f. Broad form coverage for property damage.

g. Excess (Umbrella) Liability.

11.1.2 Add the following minimum requirements for insurance limits:

a. 1. Workman's Compensation - Statutory.
2. Employer's Liability - $500,000.

b. Comprehensive General Liability

1. Bodily injury - $1,000,000.00 each occurrence; $1,000,000.00 each aggregate.
2. Personal Injury - $1,000,000.00 each occurrence; $1,000,000.00 each aggregate.
3. Property Damage - $1,000,000.00 each occurrence; $1,000,000.00 each aggregate.

c. Automobile Liability

1. Bodily Injury - $500,000.00 each person; $1,000,000.00 each occurrence.
2. Property Damage - $1,000,000.00 each occurrence; $1,000,000.00 each aggregate.

d. Independent Contractor's - Same limits as above.

e. Products and Completed Operations - Same Limits as above for two (2) years commencing with issuance of Final Certificate for Payment.

f. Contractual Liability - Same limits as above.

g. Excess (Umbrella) Liability Form: $5,000,000.00 each occurrence; $10,000,000.00 aggregate.

11.1.3.1 Furnish three (3) copies of certificates herein required; specifically setting forth evidence of all coverage required. The form of the certificate shall be approved by the Architect or Owner. Furnish copies of any endorsements that are subsequently issued amending coverage of limits.

11.1.4 All policies shall be issued by insurance companies authorized to conduct such business under the laws of the Commonwealth of Pennsylvania. Policies expiring at a fixed date before final acceptance of the work must be renewed and refiled before such date.

11.3.1 Is amended by deleting: "on a replacement cost basis without voluntary deductibles" and substituting: "with such deductibles as the owner at Owner's option may elect even to the extent that the Owner is substantially self-insured with respect to the work".

11.3.1.1 If by the terms of this insurance any deductibles are required, the Contractor shall be responsible for payment of such mandatory deductibles in the event of a paid claim. The Contractor may, at his option, protect his interests with respect to payment of deductibles by purchase of proper insurance.

11.3.1.4 Is nullified and shall not have any force or effect.

ARTICLE 13 - MISCELLANEOUS PROVISIONS

13.1.2 The Contractor at all times shall observe and comply with all Federal and State Laws and local ordinances and regulations in any manner affecting the conduct of the work and all such orders or decrees as exist at present and those which may be enacted later by bodies or tribunals having jurisdiction or authority over the work and shall indemnify and save harmless the Owner and all his officers, agents, and servants against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by himself or his employees.

13.1.3 Each and every provision of law and clause required by law to be inserted in this Contract shall be deemed to be inserted herein and the Contract shall be read and enforced as though it were included herein, and if through mistake or otherwise such provision is not inserted, or is not correctly inserted, then upon the application of either party, the Contract shall forthwith be physically amended to make such insertion.

ARTICLE 15 - LIENS AND AFFIDAVITS

15.1 Upon request by the Owner, the Contractor shall provide and execute a Waiver of Liens, Release of Liens, Contractor's Affidavit of Release of Liens, and / or Contractor's Affidavit of Payment of Debts and Claims, in the form prescribed by the Owner or Architect.

Waiver of Liens must be done before any work is started upon the grounds, structures, or utilities. Neither final payment nor any part of the retained percentage shall become due until the Contractor, if required, delivers to the Owner a complete release of all liens. Individually signed forms of

release will be acceptable arising out of this Contract, or receipts in full in lieu thereof, and if required in either case, an affidavit that so far as he has knowledge or information the releases and receipts include all labor and material for which a lien could be filed; but the Contractor may, if any subcontractor refuses to furnish a release or receipt in full, furnish a Bond satisfactory to the Owner, to indemnify, him against any lien. If any lien remains unsatisfied after all payments are made, the Contractor shall refund to the Owner all moneys that the latter may be compelled to pay in discharging such lien, including all costs and a reasonable attorney's fee.

END OF DOCUMENT 00811

SECTION 01040 - COORDINATION AND MEETINGS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Coordination.

B. Field Engineering.

C. Preconstruction meeting.

D. Progress meetings.

1.2 COORDINATION

A. Coordinate scheduling, submittals and Work of the various sections of the Project Manual to assure efficient and orderly sequence of installation of interdependent construction elements. The General contractor shall conduct weekly (minimum) coordination meetings with all sub-contractors (especially ductwork) to avoid change orders.

B. Verify utility requirements and characteristics of operating equipment are compatible with building utilities and temporary utilities as required. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

C. Coordinate space requirements and installation of mechanical and electrical work which are indicated on the drawings diagrammatically on the drawings. Follow routing shown for pipes, ducts, and conduit as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance and for repairs. The General contractor shall conduct weekly (minimum) coordination meetings with all sub-contractors (especially ductwork) to avoid change orders.

D. Conceal pipes, ducts, conduit, and wiring within construction in finished areas, except as otherwise indicated. Coordinate locations of fixtures, outlets, and switches with finish elements.

E. Coordinate the completion and clean up of Work in separate areas and section of the project in preparation for Substantial Completion of the work.

F. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with the Contract Documents, to minimize disruption of Owner's activities.

1.3 FIELD ENGINEERING

A. Employ a land surveyor registered in the State of Connecticut.

B. The contractor shall locate and protect survey control and reference points. A permanent benchmark elevation 4'-0" above the finished floor shall be established on all erected steel columns.

C. Verify control data, set backs, right of ways, and easements, confirm drawing dimensions and elevations.

D. Provided field engineering services. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.

1.4 PRECONSTRUCTION MEETING

A. The Owner will schedule a preconstruction meeting after the Notice to Proceed is given. Attendance will be required by qualified representatives of the Owner, Architect and Contractor.

B. Agenda:

1. Submission of executed bonds, and insurance certificates.

2. Distribution of Construction Documents.

3. Submission of schedule of values and progress schedule

4. Designation of personnel representing the parties in the Contract.

5. Review of procedures for processing of field decisions, submittals, applications for payment, proposal requests, Change Orders, and Contract close-out procedures.

6. Scheduling progress meetings.

C. The Architect will record minutes and distribute copies within three days after meeting to the Owner's representative, the Architect's representative, other meeting participants and those affected by any decisions made.

1.5 PROGRESS MEETINGS

A. Progress meetings will be scheduled at the Preconstruction Meeting for a maximum biweekly interval.

B. The General Contractor will prepare any agenda required and preside at meetings.

C. Attendance will be required by the job superintendent, any subcontractors and major suppliers, the Owner's representative, the Architect's representative and other participants as appropriate to agenda topics for each meeting.

D. Agenda:

1. Review minutes of previous meeting.
2. Review of work progress.
3. Field observations, problems, and decisions.
4. Identification of problems which impede planned progress and the schedule.
5. Review of the submittals schedule and the status of submittals.
6. Review of any off-site fabrication and delivery schedules.
7. Maintenance of progress schedule and any corrective measures required to regain projected schedules.
8. Coordination of projected progress.
9. Maintenance of quality and work standards.
10. Other business related to work.

E. The General Contractor will record minutes and distribute copies within three days after the meeting to the Owner's representative, the Architect's representative, other meeting participants and those affected by any decisions made.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 EXAMINATION

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

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

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

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

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

3.3 CUTTING AND PATCHING

A. Employ skilled and experience installer to perform cutting and patching. Each individual trade will perform its own cutting and patching. Coordinate with store planning documents.

B. Submit written request in advance of cutting or altering elements which affects:

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.

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 which will 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 surfaces. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.

J. Identify any hazardous substance or condition exposed during the work and refer to Owner and Architect for decision or course of action.

3.4 ALTERATION PROJECT PROCEDURES

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

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

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

D. Remove, cut, and patch work in a manner to minimize damage and to provide a means of restoring products and finishes to original or specified condition.

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

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

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

H. Where a change of plane of ¼ inch or more occurs, request instructions from Architect.

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

J. Finish surfaces as specified in individual Product sections.

END OF SECTION 01040

SECTION 01045 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Supplementary General Terms and Conditions and other Technical Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for cutting and Patching.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Refer to other Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

a. Requirements of this Section apply to mechanical, plumbing, and electrical installations. Refer to Division 15 and 16 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

1.3 SUBMITTALS

A. Cutting and Patching Proposal: Each trade is responsible for their own cutting and patching. Submit a proposal describing coordination of work well in advance of the time cutting and patching will be performed. The Owner requires approval of these procedures before proceeding. Request approval to proceed. Include the following information, as applicable, in the proposal:

1. Describe the extent of cutting and patching required. Show how it will be performed and indicate why it cannot be avoided.

2. Describe anticipated results in terms of changes to existing construction. Include changes to structural elements and operating components as well as changes in the building's appearance and other significant visual elements.

3. List products to be used and firms or entities that will perform Work.

4. Indicate dates when cutting and patching will be performed.

5. Utilities: List utilities that cutting and patching procedures will disturb or affect. List utilities that will be relocated and those that will be temporarily out of service. Indicate how long service will be disrupted.

6. Where cutting and patching involves adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with the original structure.

7. Approval by the Architect to proceed with cutting and patching does not waive the Architect's right to later require complete removal and replacement of unsatisfactory work.

1.4 QUALITY ASSURANCE

A. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would change their load-carrying capacity or load-deflection ratio.

1. Obtain approval of the cutting and patching proposal before cutting and patching the following structural elements:

a. Foundation construction.

b. Bearing and retaining walls.

c. Structural concrete.

d. Structural steel.

e. Lintels.

f. Structural decking.

g. Stair systems.

h. Miscellaneous structural metals.

i. Exterior curtain-wall construction.

j. Equipment supports.

k. Piping, ductwork, vessels, and equipment.

l. Structural systems of special construction in Division 13 Sections.

B. Operational Limitations: Do not cut and patch operating elements or related components in a manner that would result in reducing their capacity to perform as intended. Do not cut and patch operating elements or related components in a manner that would result in increased maintenance or decreased operational life or safety.

1. Obtain approval of the cutting and patching proposal before cutting and patching the following operating elements or safety related systems;

a. Primary operational systems and equipment.

b. Air or smoke barriers.

c. Water, moisture or vapor barriers.

d. Membranes or flashings.

e. Fire protection systems.

f. Noise and vibration control elements and systems.

g. Control systems.

h. Communication systems.

i. Conveying systems.

j. Electrical wiring systems.

k. Operating systems of special construction in Division 13 Sections.

C. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in the Architect's opinion, reduce the building's aesthetic qualities. Do not cut and patch construction in a manner that would result in visual evidence of cutting and patching. Remove and replace construction cut and patched in a visually unsatisfactory manner.

1.5 WARRANTY

A. Existing Warranties: Replace, patch, and repair material and surfaces cut or damaged by methods and with materials in such a manner as not to void any warranties required or existing.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible is identical materials are unavailable or cannot be used. Use materials whose installed performance will equal or surpass that of existing materials.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed before cutting. If unsafe or unsatisfactory conditions are encountered, take corrective action before proceeding.

1. Before proceeding, meet at the Project Site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

3.2 PREPARATION

A. Temporary support: Provide temporary support of work to be cut.

B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the project that might be exposed during cutting and patching operations.

C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Avoid cutting existing pipe, conduit, or ductwork serving the building but scheduled to be removed or relocated until provisions have been made to bypass them.

3.3 PERFORMANCE

A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.

1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.

B. Cutting: Cut existing construction using methods least likely to damage elements remaining or adjoining construction. Where possible, review proposed procedures with the original Installer; comply with the original Installer's recommendations.

1. In general, where cutting, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.

3. Cut through concrete and masonry using a cutting machine, such as a Carborundum saw or diamond-core drill.

4. Comply with requirements of applicable Division 2 Sections where cutting and patching

requires excavating and backfilling.

5. Where services are required to be removed, relocated, or abandoned, by-pass utility services, such as pipe or conduit, before cutting. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.

C. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.

1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.

2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

3. When removing walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

a. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken surface containing the patch after the area has received primer and second coat.

4. Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

3.4 CLEANING

A. Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar items. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.

END OF SECTION 01045

01095 - REFERENCE STANDARDS AND DEFINITIONS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Definitions of terms frequently used in specifications and drawings.

B. Reference standards and abbreviations used in the specifications and drawings.

1.2 DEFINITIONS

A. Basic contract definitions are included in the Conditions of the Contract.

B. "Indicated": Refers to graphic representations, notes or schedules on the Drawings, or other paragraphs or schedules in the Specifications, and similar requirements in the Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the reader locate the reference. Location is not limited.

C. "Directed": Terms such as "directed, " "requested," "authorized," "selected," " approved," "required," " and permitted" mean directed by the Architect, requested by the Architect, and similar phrases.

D. "Approved": The term "approved," when used in conjunction with the Architect's action on the Contractor's submittals, applications, and requests, is limited to the Architect's duties and responsibilities as stated in the Conditions of the Contract.

E. "Regulations": The term "regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": The term "furnish" means supply and deliver to the Project Site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": The term "install" describes operations at the Project Site including the actual unloading, unpacking, assembly, erecting, placing, anchoring, supplying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": The term "provide" means to furnish and install, complete and ready for intended use.

I. "Installer": An installer is the Contractor or another entity engaged by the Contractor, either as employee, subcontractor, or contractor of lower tier, to perform a particular construction activity, including installation, erection, application, or similar operations. Installers are required to be experienced in the operations they are engaged to perform.

1. Trades: Terms such as "Carpentry" do not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter". It also does not imply that requirements specified apply exclusively to tradespersons of the corresponding generic name.

J. "Project Site" is the space available to the Contractor for performing construction activities, either exclusively or in conjunction with others performing other work as part of the Project. The extent of the Project Site is shown on the Drawings and may or may not be identical with the description of the land on which the project is to be built.

K. "Testing Agencies": A testing agency is an independent entity engaged to perform specific inspections or tests, either at the Project Site or elsewhere, and to report on, and if required, to interpret results of those inspections or tests.

1.3 SPECIFICATION FORMAT AND CONTENT EXPLANATION

A. Specification Format: These specifications are organized into Divisions and Sections based on the Construction Specifications Institute's (CSI) 16-Division format and numbering system.

B. These specifications use certain conventions regarding style of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:

1. Abbreviated language: Some language used in Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be interpolated as the sense requires. Singular words will be interpreted as plural and plural words interpreted as singular where applicable as the context of the Contract Documents indicates. Some articles of speech such as "a," "an," "the," "but," "and," etc. are omitted for the sake of brevity.

2. Streamlined language: The specifications generally use the imperative mood and streamlined language. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the Text, subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor or by others when so noted.

1.4 INDUSTRY STANDARDS

A. Applicability of standards: Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced.

B. Publication dates: Comply with the standards in effect as of the date of the Contract Documents.

C. Conflicting requirements: Where compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer to the Architect before proceeding for a

decision on requirements that are different but apparently equal, and where it is uncertain which requirement is the most stringent.

1. Minimum quantity or quality levels: The quantity or quality level shown or specified shall be the minimum acceptable. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to the Architect for a decision before proceeding.

D. Copies of standards: Each entity engaged in construction on the Project is required to be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, the Contractor shall obtain copies directly from the publication source.

E. Abbreviations and names: Trade association names and titles of general standards are frequently abbreviated. The following acronyms or abbreviations, as referenced in the Contract Documents, are defined to mean the associated names. Names and addresses are subject to change and are believed, but are not assured, to be accurate and up-to-date as of the date of the Contract Documents.

AA	Aluminum Association 900 19th Street, NW, Suite 300 Washington, DC 20006	(212) 862-5104
AABC	Associated Air Balance Council 1518 K Street, NW Washington, DC	(202) 737-0202
AAMA	American Architectural Manufacturers Association 1540 E. Dundee Road, Suite 310 Palatine, IL 60067	(708) 202-1350
ACI	American Concrete Institute P.O. Box 19150 Detroit, MI 48219	(313) 532-2600
ACIL	American Council of Independent Laboratories 1629 K Street, NW Washington, DC 20006	(202) 887-5872
ACPA	American Concrete Pipe Association 8300 Boone Blvd., Suite 400 Vienna, VA 22182	(703) 821-1990
ADC	Air Diffusion Council One Illinois Center, Suite 200 111 East Wacker Drive Chicago, IL 60601-4298	(312) 616-0800

AGA	American Gas Association 1515 Wilson Blvd. Arlington, VA 22209	(703) 841-8400
AHA	American Hardboard Association 1210 W. Northwest Highway Palatine, IL 60067	(708) 934-8800
AIA	The American Institute of Architects 1735 New York Ave., NW Washington, DC 20006	(202) 626-7300
AISC	American Institute of Steel Construction One East Wacker Drive, Suite 3100 Chicago, IL 60601-2001	(312) 670-2400
AISI	American Iron and Steel Institute 1101 17th Street, NW Washington, DC 20036-4700	(202) 452-7100
ALSC	American Lumber Standards Committee P.O. Box 210 Germantown, MD 20875	(301) 972-1700
AMCA	Air Movement and Control Association 30 West University Drive Arlington Heights, IL 60004-1893	(708) 394- 0150
ANSI	American National Standards Institute 11 West 42nd Street, 13th Floor New York, NY 10036	(212) 642-4900
APA	American Plywood Association P.O. Box 11700 Tacoma, WA 98411	(206) 565-6600
ARI	Air-Conditioning and Refrigeration Institute 43021 Fairfax Drive, Suite 425 Arlington, VA 22203	(703) 524-8800
ASA	Acoustical Society of America 500 Sunnyside Blvd. Woodbury, NY 11797	(516) 576-2360
ASC	Adhesive and Sealant Council 1627 K Street, NW, Suite 1000 Washington, DC 20006-1707	(202) 452-1500
ASHRAE	American Society of Heating, Refrigerating	

	and Air-Conditioning Engineers 1791 Tullie Circle, NE Atlanta, GA 30329	(404) 636-8400
ASME	American Society of Mechanical Engineers 345 East 47th Street New York, NY 10017	(212) 705-7722
ASPE	American Society of Plumbing Engineers 3617 Thousand Oaks Blvd., Suite 210 Westlake, CA 91362	(805) 495-7120
ASSE	American Society of Sanitary Engineering P.O. Box 40362 Bay Village, OH 44140	(216) 835-3040
ASTM	American Society for Testing and Materials 1916 Race Street Philadelphia, PA 19103-1187	(215) 299-5400
AWI	American Woodwork Institute P.O. Box 1550 13924 Braddock Road, No. 100 Centerville, VA 22020	(703) 222-1100
AWPA	American Wood Preservers' Association P.O. Box 286 Woodstock, MD 21163-0286	(410) 465-3169
AWS	American Welding Society 550 LeJune Road, NW Miami, FL 33126	(305) 443-9353
AWWA	American Water Works Association 6666 West Quincy Ave. Denver, CO 80235	(303) 794- 7711
BHMA	Builder's Hardware Manufacturers Association 355 Lexington Ave., 17th Floor New York, NY 10017	(212) 661-4261
CBM	Certified Ballast Manufacturers Association 1422 Euclid Ave., Suite 402 Cleveland, OH 44115-2851	(216) 241-0711
CDA	Copper Development Association, Inc. 260 Madison Ave., 16th Floor New York, NY 10016	(212) 251-7200
CISCA	Ceiling and Interior Systems Construction Association 579 W. North Ave., Suite 301	

	Elmhurst, IL 60126	(708) 833-1919
CISPI	Cast Iron Soil Pipe Institute 5959 Shallowford Road, Suite 419 Chattanooga, TN 37421	(615) 892-0137
CRSI	Concrete Reinforcing Steel Institute 933 N. Plum Grove Road Schaumburg, IL 60173	(708) 517-1200
CTI	Ceramic Tile Institute of America 12061 West Jefferson Blvd. Culver City, CA 90230	(310) 574-7800
DHI	Door and Hardware Institute 14170 Newbrook Drive Chantilly, VA 22021-2223	(703) 222-2010
EIMA	EIFS Industry Manufacturers Association 2759 State Road 580, Suite 112 Clearwater, FL 34621	(813) 726-6477
EJMA	Expansion Joint Manufacturers Association 25 North Broadway Tarrytown, NY 10591	(914) 332-0040
FCIB	Floor Covering Institute Board 310 Holiday Ave. Dalton, GA 30720	(706) 226-5488
FGMA	Flat Glass Marketing Association White Lakes Professional Building 3310 S.W. Harrison Street Topeka, KS 66611-2279	(913) 266-7013
FM	Factory Mutual Systems 1151 Boston-Providence Turnpike P.O. Box 9102 Norwood, MA 02062	(617) 762-4300
GA	Gypsum Association 810 First Street, NE, Suite 510 Washington, DC 20002	(202) 289- 5440
HEI	Heat Exchange Institute c/o Thomas Associates, Inc. 1300 Sumner Ave. Cleveland, OH 44115- 2851	(216) 241-7333
HI	Hydronics Institute	

	P.O. Box 218 35 Russo Place Berkley Heights, NJ 07922	(908) 464-8200
HI	Hydraulic Institute 9 Sylvan Way Parsippany, NJ 07054-3802	(201) 267-9700
HMA	Hardwood Manufacturers Association 400 Penn Center Blvd. Pittsburgh, PA 15235	(412) 829-0770
HPVA	Hardwood Plywood and Veneer Association 1825 Michael Farraday Drive P.O. Box 2789 Reston, VA 22090	(703) 435-2900
ICEA	Insulated Cable Engineers Association, Inc. P.O. Box 440 South Yarmouth, MA 02664	(508) 394-4424
IEEE	Institute of Electrical and Electronic Engineers 435 East 47th Street New York, NY 10017	(212) 705-7913
IESNA	Illuminating Engineering Society of North America 345 East 47th Street New York, NY 10017	(212) 705-7913
MCAA	Mechanical Contractors Association of America 1385 Piccard Drive Rockville, MD 20850-4329	(301) 869-5800
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry 127 Park Street, NE Vienna, VA 22180	(703) 281-6613
NAAMM	National Association of Architectural Metal Manufacturers 600 South Federal Street, Suite 400 Chicago, IL 60605	(312) 922-6222
NAIMA	North American Insulation Manufacturers Association 44 Canal Center Plaza, Suite 310 Alexandria, VA 22314	(703) 684-0084
NCMA	National Concrete Masonry Association 2302 Horse Pen Road Herndon, VA 22071-3406	(703) 713-1900

NCPI	National Clay Pipe Institute P.O. Box 759 253-80 Center Street Lake Geneva, WI 53147	(414) 248-9094
NCSPA	National Corrugated Steel Pipe Association 1255 23rd Street, NW, Suite 850 Washington, DC 20037	(202) 452-1700
NECA	National Electrical Contractors Association 3 Bethesda Metro Center, Suite 1100 Bethesda, MD 20814	(301) 657-3110
NEII	National Elevator Industry, Inc. 185 Bridge Plaza, North Fort Lee, NJ 07024	(201) 944-3211
NEMA	National Electrical Manufacturers Association 2101 L Street, NW, Suite 300 Washington, DC 20037	(202) 457-8400
NETA	International Electrical Testing Association P.O. Box 687 Morrison, CO 80465	(303) 697-8441
NFPA	National Fire Protection Association One Batterymarch Park P.O. Box 9101 Quincy, MA 02269-9101	(617) 770-3000 (800) 344-3555
NHLA	National Hardwood Lumber Association P.O. Box 34518 Memphis, TN 38184-0518	(901) 377-1818
NLGA	National Lumber Grades Authority 4400 Dominion Street, Suite 103 Burnaby, BC V5G 4G3	(604) 451-7323
NPA	National Particleboard Association 18928 Premiere Court Gaithersburg, MD 20879	(301) 670-0604
NPCA	National Paint and Coatings Association 1500 Rhode Island Ave., NW Washington, DC 20005	(202) 462-6272
NRCA	National Roofing Contractors Association 10255 W. Higgins Road, Suite 600 Rosemont, IL 60018-5607	(708) 299-9070

NSF	National Sanitation Foundation 3475 Plymouth Road P.O. Box 130140 Ann Arbor, MI 48113-0140	(313) 769-8010
PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 60077	(708) 966-6200
PDI	Plumbing and Drainage Institute c/o Sol Baker 1106 West 77th Street, South Drive Indianapolis, IN 46260	(317) 251-6970
RFCI	Resilient Floor Covering Institute 966 Hungerford Drive, Suite 12-B Rockville, MD 20805	(301) 340-8580
SDI	Steel Deck Institute P.O. Box 9506 Canton, OH 44711	(216) 493-7886
SDI	Steel Door Institute 30200 Detroit Road Cleveland, OH 44145	(216) 889-0010
SGCC	Safety Glazing Certification Council c/o ETL Testing Laboratories Route 11, Industrial Park Cortland, NY 13045	(607) 753-6711
SIGMA	Sealed Insulating Glass Manufacturers Association 401 North Michigan Ave. Chicago, IL 60611	(213) 644-6610
SJI	Steel Joist Institute 1205 48th Avenue North, Suite A Myrtle Beach, SC 29577	(803) 449-0487
SMACNA	Sheet Metal and Air Conditioning Contractors National Association 4201 Lafayette Center Drive Chantilly, VA 22021	(703) 803-2980
SPRI	Single Ply Roofing Institute 20 Walnut Street Wellesley Hills, MA 02181	(617) 237-7879

SSPC	Steel Structures Painting Council 4516 Henry Street Pittsburgh, PA 15213	(412) 687-1113
SSPMA	Sump and Sewage Pump Manufacturers Association P.O. Box 647 Northbrook, IL 60065-0647	(708) 559-9233
STI	Steel Tank Institute 570 Oakwood Road Lake Zurich, IL 60047	(708) 438-8265
SWPA	Submersible Wastewater Pump Association 600 South Federal Street, Suite 400 Chicago, IL 60605	(312) 922-6222
TCA	Tile Council of America P.O. Box 326 Princeton, NJ 08542-0326	(609) 921-7050
UL	Underwriters Laboratories 333 Pfingsten Road Northbrook, IL 60062	(708) 272-8800
UNI	Uni-Bel PVC Pipe Association 2655 Villa Creek Drive, Suite 155 Dallas, TX 75234	(214) 243-3902
WRI	Wire Reinforcement Institute 1101 Connecticut Ave., NW, Suite 700 Washington, DC 20036-4303	(202) 429-5125
WSC	Water Systems Council 600 South Federal Street, Suite 400 Chicago, IL 60605	(312) 922- 6222

F. Federal Government Agencies: Names and titles of federal government standard- or specification-producing agencies are often abbreviated. The following acronyms or abbreviations, as referenced in the Contract Documents indicate names of standard- or specification-producing agencies of the federal government. Names and addresses are subject to change and are believed, but are not assured, to be accurate and up-to-date as of the date of the Contract Documents.

CE	Corps of Engineers (U.S. Department of the Army) Chief of Engineers - Referral Washington, DC 20314	(202) 272-0660
CFR	Code of Federal Regulations N. Capitol Street, NW Washington, DC 20402	(202) 783-3238

CPSC	Consumer Product Safety Commission 5401 Westbard Ave. Bethesda, MD 20207	(800) 638-2772
CS	Commercial Standard (U.S. Department of Commerce) Government Printing Office Washington, DC 20402	(202) 783-3238
DOC	Department of Commerce 14th Street and Constitution Ave., NW Washington, DC 20230	(202) 482-2000
DOT	Department of Transportation 400 Seventh Ave., SW Washington, DC 20590	(202) 366-4000
EPA	Environmental Protection Agency 401 M Street, SW Washington, DC 20460	(202) 382-2090
FS	Federal Specification (from GSA) Specifications Unit (WFSIS) 7th and D Streets, SW Washington, DC 20407	(202) 708-9205
GSA	General Services Administration F and 18th Streets, NW Washington, DC 20405	(202) 708-5082
NIST	National Institute of Standards and Technology (U.S. Department of Commerce) Gaithersburg, MD 20899	(301) 975-2000
OSHA	Occupational Safety and Health Administration (U.S. Department of Labor) 200 Constitution Ave., NW Washington, DC 20210	(202) 219-6091
PS	Product Standard of NBS (U.S. Department of Commerce) Government Printing Office Washington, DC 20402	(202) 783-3238

1.5 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Permits, licenses, and certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices receipts for fee payments, judgments, correspondence, records, and similar documents, established in conjunction with compliance with standards and regulations bearing upon performance of the Work.

END OF SECTION 01095

SECTION 01100 - SUMMARY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Contract description.

B. Work by Owner.

C. Owner supplied products.

D. Contractor's use of site and premises.

E. Future work.

F. Work sequence.

G. Owner occupancy.

1.2 CONTRACT DESCRIPTION

A. Work of the Project includes the complete renovation construction of each prime contract for renovations and all associated site and utility construction identified for this project.

B. Work of the Contract is identified in the Project Specifications and on Drawings.

1.3 WORK BY OWNER

A. The Owner will supply and the General Contractor will install the following items:
1. One (1) handicap lift equal to "Patriot Portable Lift", Model No. F-12PPL-HD, as manufactured by "Aqua Creek Products", Missoula, MT 59808. Local Representative Tom Hall (610)-518-5130. Submit Product Data Sheet(s).

2. One (1) portable steps equal to "Aquatrek" meeting ADA standards as manufactured by "Rehab Systems, LLC", Fargo, ND 58102. Local Representative: "If It's Water, Inc.", (610)-269-2062. Submit Product Data Sheet(s).

B. Items noted NIC (Not in Contract), movable cabinets, furnishings, equipment, will be furnished and installed by Owner.

1.4 OWNER SUPPLIED PRODUCTS

A. Owner's Responsibilities:
1. Arrange for and deliver Owner-reviewed Shop Drawings, Product Data, and Samples, to Contractor.
2. Arrange and pay for delivery to site.
3. On delivery, inspect products jointly with Contractor.
4. Submit claims for transportation damage and replace damaged, defective, or deficient

items.

5. Arrange for manufacturers' warranties, inspections, and service.

B. Contractor's Responsibilities:
   1. Review Owner-reviewed Shop Drawings, Product Data, and Samples.
   2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
   3. Handle, store, install and finish products.
   4. Repair or replace items damaged after receipt.

C. Products furnished to site and installed by Owner:
   1. Room Furnishings

1.5 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.

1.6 WORK SEQUENCE

A. Construct Work to accommodate schedule requirements during the construction period, coordinate construction schedule and operations with Owner, Architect/Engineer and associated Prime Contractors.

1.7 OWNER OCCUPANCY

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

B. Schedule the Work to accommodate Owner occupancy.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION 01100

SECTION 01200 - PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cash allowances.

B. Contingency allowances.

C. Testing and inspection allowances.

D. Schedule of values.

E. Applications for payment.

F. Change procedures.

G. Defect assessment.

H. Unit prices.

I. Alternates.

1.2 CASH ALLOWANCES

A. Costs Included in Cash Allowances: Cost of product to Contractor or Subcontractor, less applicable trade discounts.

B. Costs Not Included in Cash Allowances But Included in Contract Sum/Price: Product handling at site, including unloading, uncrating, and storage; protection of products from elements and from damage and labor for installation and finishing.

C. Architect/Engineer Responsibilities:
1. Consult with Contractor for consideration and selection of products.
2. Select products in consultation with Owner and transmit decision to Contractor.
3. Prepare Change Order.

D. Contractor Responsibilities:
1. Assist Architect/Engineer in selection of products, suppliers and installers.
2. Obtain proposals from suppliers and installers and offer recommendations.
3. On notification of selection by Architect/Engineer, execute purchase agreement with designated supplier and installer.
4. Arrange for and process shop drawings, product data, and samples. Arrange for delivery.
5. Promptly inspect products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.

E. Differences in costs will be adjusted by Change Order.

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 will be considered.

B. Submit Schedule of Values in duplicate within 15 days after date established in Notice to Proceed.

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.

D. Include in each line item, amount of Allowances specified in this section. For unit cost Allowances, identify quantities taken from Contract Documents multiplied by unit cost to achieve total for each item.

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

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

1.4 APPLICATIONS FOR PAYMENT

A. Submit three copies at 25%, 50%, 75%, 100%, and Final Retainage for payments on AIA Form G702 - Application and Certificate for Payment and AIA G703 - Continuation Sheet for G702.

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

C. Submit updated construction schedule with each Application for Payment.

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

E. Submit with transmittal letter as specified for Submittals in Section 01330.

F. Substantiating Data: When Architect/Engineer requires substantiating information, submit data justifying dollar amounts in question. Include the following with Application for Payment:
1. Partial release of liens from major subcontractors and vendors.
2. Record documents as specified in Section 01700, for review by Owner which will be returned to Contractor.
3. Affidavits attesting to off-site stored products.
4. Construction progress schedules, revised and current as specified in Section 01330.

1.5 CHANGE PROCEDURES

A. Submittals: Submit name of individual authorized to receive change documents, and be responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.

B. 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 on AIA Form G710. Or as part of a regularly scheduled construction progress meeting.

C. The Architect/Engineer may issue a Proposal Request including a detailed description of proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change with stipulation of overtime work required and the period

of time during which the requested price will be considered valid. Contractor will prepare and submit estimate within 7 days.

D. 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. Document requested substitutions in accordance with Section 01600.

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

F. 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.

G. 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.

H. 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.

I. 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.

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

K. Change Order Forms: AIA G701Change Order.

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

M. 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.

C. The defective Work may remain, but unit sum/price will be adjusted to new sum/price reduced percent at discretion of Architect/Engineer or Owner.

D. 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 Architect/Engineer.

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

F. Authority of Architect/Engineer to assess defects and identify payment adjustments is final.

G. 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 UNIT PRICES

A. Authority: Measurement methods are delineated in individual specification sections.

B. Measurement methods delineated in individual specification sections complement criteria of this section. In event of conflict, requirements of individual specification section govern.

C. Take measurements and compute quantities. Architect/Engineer or Owner will verify measurements and quantities.

D. Unit Quantities: Quantities and measurements indicated in Bid Form are for contract purposes only. Actual quantities provided shall determine payment.
1. When actual Work requires more or fewer quantities than those quantities indicated, provide required quantities at unit sum/prices contracted.

E. Payment Includes: Full compensation for required labor, products, tools, equipment, plant and facilities, transportation, services and incidentals; erection, application or installation of item of the Work; overhead and profit.

F. Final payment for Work governed by unit prices will be made on basis of actual measurements and quantities accepted by Architect/Engineer multiplied by unit sum/price for Work incorporated in or made necessary by the Work.

G. Measurement Of Quantities:
1. Weigh Scales: Inspected, tested and certified by applicable state Weights and Measures department within past year.
2. Platform Scales: Of sufficient size and capacity to accommodate conveying vehicle.
3. Metering Devices: Inspected, tested and certified by applicable State and utility department within past year.

4. Measurement by Weight: Concrete reinforcing steel, rolled or formed steel or other metal shapes will be measured by handbook weights. Welded assemblies will be

measured by handbook or scale weight.

5. Measurement by Volume: Measured by cubic dimension using mean length, width and height or thickness.
6. Measurement by Area: Measured by square dimension using mean length and width or radius.
7. Linear Measurement: Measured by linear dimension, at item centerline or mean chord.
8. Stipulated Sum/Price Measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as completed item or unit of the Work.

1.8 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.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION 01200

SECTION 01300 - ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Coordination and project conditions.

B. Field engineering.

C. Preconstruction meeting.

D. Site mobilization meeting.

E. Progress meetings.

F. Preinstallation meetings.

G. Equipment electrical characteristics and components.

H. Cutting and patching.

I. Special procedures.

1.2 COORDINATION AND PROJECT CONDITIONS

A. The General Contractor shall be in administrative charge of the project. 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. Each Prime Contractor shall diligently coordinate their work with the overall project schedule maintained by the General Contractor.

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 and for portions of Work designated for Owner's partial occupancy.

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 FIELD ENGINEERING

A. The General Contractor shall employ Land Surveyor registered at Project location and acceptable to Architect/Engineer to provide any required benchmarks or control datum for the project.

B. The General Contractor will locate and protect survey control and reference points. Promptly notify Architect/Engineer of discrepancies discovered.

C. Control datum for survey is that established by General Contractor provided survey.

D. Verify set-backs and easements; confirm drawing dimensions and elevations.

E. Provide field engineering services. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.

F. Submit copy of site drawing signed by Land Surveyor certifying elevations and locations of the Work are in conformance with Contract Documents.

G. Maintain complete and accurate log of control and survey work as Work progresses.

H. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

I. Promptly report to Architect/Engineer loss or destruction of reference point or relocation required because of changes in grades or other reasons.

J. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect/Engineer.

1.4 PRECONSTRUCTION MEETING

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

B. Attendance Required: Owner, Architect/Engineer, General Contractor, and Prime Contractor(s).

C. Architect may, at his/her discretion combine the Preconstruction Meeting and the Site Mobilization Meeting into one session

D. 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. Use of premises by Owner and Contractor.
9. Owner's requirements and partial occupancy.
10. Construction facilities and controls provided by Owner.
11. Temporary utilities provided by Owner.
12. Survey and building layout.

13. Security and housekeeping procedures.
14. Schedules.
15. Application for payment procedures.
16. Procedures for testing.
17. Procedures for maintaining record documents.
18. Requirements for start-up of equipment.
19. Inspection and acceptance of equipment put into service during construction period.
20. Confidentiality and site conduct.

E. The General Contractor shall record minutes and distribute copies within three days after meeting to participants, with copies to Architect/Engineer, Owner, and those affected by decisions made.

1.5 PROGRESS MEETINGS

A. The General Contractor shall schedule and administer meetings throughout progress of the Work at maximum bi-weekly 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.

E. The General Contractor shall record minutes and distribute copies within three days after meeting to participants, with copies to Architect/Engineer, Owner, and those affected by decisions made.

1.6 PREINSTALLATION MEETING

A. When required in individual specification sections, each Prime Contractor shall conduct a preinstallation meeting 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. Each Prime Contractor shall record minutes and distribute copies within three days after meeting to participants, with copies to Architect/Engineer, Owner, and those affected by decisions made.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION 01300

SECTION 01330 - 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.

L. Erection drawings.

1.2 SUBMITTAL PROCEDURES

A. The General Contractor shall transmit each submittal with Architect/Engineer accepted form.

B. Identify Project, Contractor, subcontractor and supplier; pertinent drawing and detail number, and specification section number, appropriate to submittal.

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

D. Schedule submittals to expedite Project, and deliver to Architect/Engineer at business address. Coordinate submission of related items.

E. For each submittal for review, allow 15 days excluding delivery time to and from Contractor.

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

G. Allow space on submittals for Contractor and Architect/Engineer review stamps.

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

I. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.

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

1.3 CONSTRUCTION PROGRESS SCHEDULES

A. The General Contractor shall submit initial schedules within 15 days after date established in Notice to Proceed. After review, resubmit required revised data within ten days.

B. Submit revised Progress Schedules with every second 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. Submit computer generated horizontal bar chart with separate line for each major portion of Work or operation, identifying first work day of each week.

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. Indicate delivery dates for Owner furnished products and products identified under Allowances.

I. 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 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. Provide copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents purposes described in Section 01700.

B. Submit number of copies Contractor requires, plus two copies Architect/Engineer will retain.

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

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

E. After review distribute in accordance with Submittal Procedures article above and provide copies for record documents described in Section 01700.

1.5 SHOP DRAWINGS

A. Shop Drawings: Each Prime Contractor shall submit to Architect/Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents. Produce copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents purposes described in Section 01700.

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

C. Submit number of opaque reproductions Contractor requires, plus two copies Architect/Engineer will retain.

1.6 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. Produce duplicates and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents purposes described in Section 01700.

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, textures, and patterns for Architect/Engineer selection, unless a custom color is specified requiring samples of color specified.
3. After review, produce duplicates and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents purposes described in Section 01700.

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 one sample.

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

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

1.7 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.

1.8 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.

1.9 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.

1.10 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.

1.11 MANUFACTURER'S FIELD REPORTS

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

B. Submit report in duplicate within 15 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.

1.12 ERECTION DRAWINGS

A. Submit drawings for Architect/Engineer's benefit 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.

C. Data indicating inappropriate or unacceptable Work may be subject to action by Architect/Engineer or Owner.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION 01330

SECTION 01400 - QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Quality control and control of installation.

B. Tolerances

C. References.

D. Mock-up requirements.

E. Testing and inspection services.

F. Manufacturers' field services.

G. Examination.

H. Preparation.

1.2 QUALITY CONTROL AND CONTROL OF INSTALLATION

A. The General Contractor shall 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 MOCK-UP REQUIREMENTS

A. Tests will be performed under provisions identified in this section and identified in respective product specification sections.

B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

C. Accepted mock-ups shall be comparison standard for remaining Work.

D. Where mock-up has been accepted by Architect/Engineer and is specified in product specification sections to be removed; remove mock-up and clear area when directed to do so by Architect/Engineer.

1.6 TESTING AND INSPECTION SERVICES

A. The General Contractor will employ services of an independent firm to perform testing and inspection.

B. The independent firm will perform tests, inspections and other services specified in individual specification sections and as required by Architect/Engineer.
1. Laboratory: Authorized to operate at Project location.
2. Laboratory Staff: Maintain full time registered Engineer on staff to review services.
3. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to National Bureau of Standards or accepted values of natural physical constants.

C. Testing, inspections and source quality control may occur on or off project site.

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

E. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
1. Notify Architect/Engineer and independent firm 24 hours prior to expected time for operations requiring services.
2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.

F. Testing and employment of testing agency or laboratory shall not relieve Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

G. Re-testing or re-inspection required because of non-conformance to specified requirements shall be performed by same independent firm on instructions by Architect/Engineer. Payment for re-testing or re-inspection will be charged to Contractor by deducting testing charges from Contract Sum/Price.

H. Agency Responsibilities:
1. Test samples of mixes submitted by Contractor.
2. Provide qualified personnel at site. Cooperate with Architect/Engineer and Contractor in performance of services.
3. Perform specified sampling and testing of products in accordance with specified standards.
4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
5. Promptly notify Architect/Engineer and Contractor of observed irregularities or non-conformance of Work or products.
6. Perform additional tests required by Architect/Engineer.
7. Attend preconstruction meetings and progress meetings.

I. Agency Reports: After each test, promptly submit copies of report to Architect/Engineer and to Contractor. When requested by Architect/Engineer, provide interpretation of test results. Include the following:
1. Date issued.
2. Project title and number.
3. Name of inspector.
4. Date and time of sampling or inspection.
5. Identification of product and specifications section.
6. Location in Project.
7. Type of inspection or test.
8. Date of test.
9. Results of tests.
10. Conformance with Contract Documents.

J. Limits On Testing Authority:
1. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Agency or laboratory may not approve or accept any portion of the Work.
3. Agency or laboratory may not assume duties of Contractor.
4. Agency or laboratory has no authority to stop the Work.

1.7 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 15 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.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION 01400

SECTION 01500 - TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Temporary Utilities:
1. Temporary electricity.
2. Temporary lighting for construction purposes.
3. Temporary heating.
4. Temporary cooling.
5. Temporary ventilation.
6. Telephone service.
7. Facsimile service.
8. Temporary water service.
9. Temporary sanitary facilities.

B. Construction Facilities:
1. Field offices and sheds.
2. Vehicular access.
3. Parking.
4. Progress cleaning and waste removal.
5. Project identification.
6. Traffic regulation.

C. Temporary Controls:
1. Barriers.
2. Enclosures and fencing.
3. Protection of the Work.
4. Security and confidentiality.
5. Water control.
6. Dust control.
7. Erosion and sediment control.
8. Noise control.
9. Pest control.
10. Pollution control.
11. Rodent control.

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.
1. Contractor shall supply separate temporary power supply for all welding operations. The Owner will not supply nor pay for energy used for any welding operations.

B. The Electrical Contractor shall provide temporary electric feeder from existing buildings electrical service at location as directed by Owner. Do not disrupt Owner's use of service.

C. Complement existing power service capacity and characteristics as required for construction operations.

D. Provide power outlets, with branch wiring and distribution boxes located as required for construction operations. Provide flexible power cords as required for portable construction tools and equipment.

E. Provide main service disconnect and over-current protection at convenient location.

F. Permanent convenience receptacles may be utilized during construction.

G. Provide distribution equipment, wiring, and outlets to provide single phase branch circuits for power and lighting.
   1. Provide 20 ampere duplex outlets, single phase circuits for power tools as required.
   2. Provide 20 ampere, single phase branch circuits for lighting.

1.3 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

A. The Electrical contractor shall provide and maintain incandescent lighting for construction operations to achieve minimum lighting level of 2 watt/sq ft.

B. Provide and maintain 1 watt/sq ft lighting to exterior staging and storage areas entire construction site after dark for security purposes.

C. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps for specified lighting levels.

D. Maintain lighting and provide routine repairs.

E. Permanent building lighting may be utilized during construction.

1.4 TEMPORARY HEATING

A. Existing facilities may not be used.

B. The General Contractor will pay cost of temporary heat. Exercise measures to conserve energy. Utilize Owner's permanent heat plant, extend and supplement with temporary heat devices as needed to maintain specified conditions for construction operations.

C. Enclose building prior to activating temporary heat in accordance with Enclosures article in this section.

D. Prior to operation of permanent equipment for temporary heating purposes, verify installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.

E. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress, unless indicated otherwise in product sections.

1.5 TEMPORARY COOLING

A. Existing facilities may be used.

B. Owner will pay cost of permanent cooling. Exercise measures to conserve energy. Utilize Owner's cooling plant. Maintain specified conditions for construction operations.

C. Enclose building prior to activating cooling in accordance with Enclosures article in this section.

D. Prior to operation of permanent equipment for cooling purposes, verify installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.

E. Maintain maximum ambient temperature of 80 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.

1.6 TEMPORARY VENTILATION

A. Each Prime Contractor shall be responsible to ventilate enclosed areas to achieve curing of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

1.7 TELEPHONE SERVICE

A. Each Prime Contractor shall provide, maintain, and pay for telephone service to field at time of project mobilization.

1.8 FACSIMILE SERVICE

A. Each Prime Contractor shall provide, maintain and pay for facsimile service and dedicated telephone line to field office at time of project mobilization.

1.9 TEMPORARY WATER SERVICE

A. Owner will pay cost of water. Exercise measures to conserve energy. Utilize Owner's existing water system. The Plumbing Contractor shall extend and supplement with temporary devices as needed to maintain specified conditions for construction operations.

B. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing.

1.10 TEMPORARY SANITARY FACILITIES

A. The General Contractor shall maintain required facilities and enclosures. Existing facility use is permitted, however, all facilities must be maintained in clean condition for public use.

1.11 FIELD OFFICES AND SHEDS

A. Office: Weather tight, with lighting, electrical outlets, heating, cooling and ventilating equipment, and equipped with sturdy furniture drawing rack, and drawing display table. On site space is extremely limited, utilize existing building where possible with Owner's consent.

B. Permanent facilities may be used for field offices or for storage. Location to be by Owner.

C. Construction: Portable or mobile buildings, or buildings constructed with floors raised above ground, securely fixed to foundations with steps and landings at entrance doors.
   1. Construction: Structurally sound, secure, weather tight enclosures for office and storage spaces. Maintain during progress of Work; remove when no longer needed.

2. Temperature Transmission Resistance of Floors, Walls, and Ceilings: Compatible with occupancy and storage requirements.
3. Exterior Materials: Weather resistant, finished in one color acceptable to Architect/Engineer.
4. Interior Materials in Offices: Sheet type materials for walls and ceilings, pre-finished or painted; resilient floors and bases.
5. Lighting for Offices: 50 ft C at desk top height, exterior lighting at entrance doors.
6. Fire Extinguishers: Appropriate type fire extinguisher at each office and each storage area.
7. Interior Materials in Storage Sheds: As required to provide specified conditions for storage of products.

D. Environmental Control:
1. Heating, Cooling, and Ventilating for Offices: Automatic equipment to maintain comfort conditions. 68 degrees F heating and 76 degrees F cooling.
   a. Storage Spaces: Heating and ventilation as needed to maintain products in accordance with Contract Documents; lighting for maintenance and inspection of products.

E. Storage Areas And Sheds: Size to storage requirements for products of individual Sections, allowing for access and orderly provision for maintenance and for inspection of products to requirements of Section 01600.

F. Installation:
1. Install office spaces ready for occupancy 15 days after date fixed in Notice to Proceed.

G. Maintenance And Cleaning:
1. Weekly janitorial services for offices; periodic cleaning and maintenance for office and storage areas.
2. Maintain buildings and approach walks free of mud, water, and snow.

H. Removal: At completion of Work remove buildings, foundations, utility services, and debris. Restore areas.

1.12 VEHICULAR ACCESS

A. Utilize existing access roads from public thoroughfares to serve construction area.

B. Extend and relocate vehicular access as Work progress requires, provide detours as necessary for unimpeded traffic flow.

C. Location as directed by Owner.

D. Provide unimpeded access for emergency vehicles. Maintain 20 foot wide driveways with turning space between and around combustible materials.

E. Provide and maintain access to fire hydrants control valves free of obstructions.

F. Tracking of mud or debris onto streets or walks is prohibited.

1.13 PARKING

A. Coordinate temporary parking areas to accommodate construction personnel.

B. Locate as directed by Owner.

C. When site space is not adequate, provide additional off-site parking as directed by Owner.

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

E. Use of designated areas of existing parking facilities used by construction personnel is not permitted.

F. Do not allow heavy vehicles or construction equipment in parking areas.

G. Permanent Pavements And Parking Facilities:
1. Prior to Substantial Completion, bases for permanent roads and parking areas may be used for construction traffic.
2. Avoid traffic loading beyond paving design capacity. Tracked vehicles not allowed.

H. Maintenance:
1. Maintain traffic and parking areas in sound condition free of excavated material, construction equipment, products, mud, snow, and ice.
2. Maintain existing and permanent paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.

I. Removal, Repair:
1. Remove temporary materials and construction before at Substantial Completion.
2. Remove underground work and compacted materials to depth of 2 feet; fill and grade site as specified.
3. Repair existing facilities damaged by use, to original condition.

J. Mud from Site Vehicles: Provide means of removing mud from vehicle wheels before entering streets. All mud will be removed from streets, driveways, etc. daily.

1.14 PROGRESS CLEANING AND WASTE REMOVAL

A. All Prime Contractors shall maintain areas free of waste materials, debris, and rubbish. Maintain site in clean and orderly condition. Each Prime Contractor shall deliver debris from construction activities to the on-site dumpster provided by the General Contractor.

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

C. The General Contractor shall broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. The General Contractor shall remove waste materials, debris, and rubbish from site periodically and dispose off-site.

E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.15 TRAFFIC REGULATION

A. Signs, Signals, and Devices:
   1. Post Mounted and Wall Mounted Traffic Control and Informational Signs: As approved by authority having jurisdiction.
   2. Traffic Cones and Drums, Flares and Lights: As approved by authority having jurisdiction.
   3. Flag person Equipment: As required by authority having jurisdiction.

B. Flag Persons: Provide trained and equipped flag persons to regulate traffic when construction operations or traffic encroach on public traffic lanes.

C. Flares and Lights: Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.

D. Traffic Signs and Signals:
   1. Provide signs at approaches to site and on site, at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.
   2. Relocate as Work progresses, to maintain effective traffic control.

E. Removal:
   1. Remove equipment and devices when no longer required.
   2. Repair damage caused by installation.
   3. Remove post settings to depth of 2 feet.

1.16 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas to allow for Owner's use of site, and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

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

C. Provide protection for plants designated to remain. Replace damaged plants.

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

1.17 ENCLOSURES AND FENCING

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

B. Interior Enclosures:
   1. Provide temporary partitions as required to separate work areas from Owner occupied areas, to prevent penetration of dust and moisture into Owner occupied areas, and to prevent damage to existing materials and equipment.
   2. Construction: Framing and plywood sheet materials with closed joints and sealed edges at intersections with existing surfaces:
      a. Insulated to R 10.

b. STC rating of 35 in accordance with ASTM E90.

3. Paint surfaces exposed to view from Owner occupied areas. Two (2) coats Antique White latex.

1.18 SECURITY AND CONFIDENTIALITY

A. Security Program:

1. Protect Work existing premises and Owner's operations from theft, vandalism, and unauthorized entry.
2. Initiate program in coordination with Owner's existing security system at project mobilization.
3. Maintain program throughout construction period until Owner acceptance precludes need for Contractor security.

1.19 WATER CONTROL

A. The General Contractor shall maintain excavations free of water. Provide, operate, and maintain pumping equipment.

B. Protect site from puddling or running water. Provide water barriers as required to protect building enclosure.

1.20 DUST CONTROL

A. Each Prime Contractor shall execute Work by methods to minimize raising dust from construction operations.

B. Provide positive means to prevent air-borne dust from dispersing into atmosphere.

1.21 EROSION AND SEDIMENT CONTROL

A. Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.

B. Minimize surface area of bare soil exposed at one time.

C. Provide temporary measures including berms, dikes, and drains, and other devices to prevent water flow.

D. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.

E. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

1.22 NOISE CONTROL

A. Each Prime Contractor shall provide methods, means, and facilities to minimize noise produced by construction operations.

1.23 PEST CONTROL

A. The General Contractor shall provide methods, means, and facilities to prevent pests and insects from damaging the Work and entering facilities.

1.24 POLLUTION CONTROL

A. Each Prime Contractor shall provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.

B. Comply with pollution and environmental control requirements of authorities having jurisdiction.

1.25 RODENT CONTROL

A. The General contractor shall provide methods, means, and facilities to prevent rodents from accessing or invading premises.

1.26 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Each Prime contractor shall remove temporary utilities, equipment, facilities, materials, prior to Final Application for Payment 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 and permanent 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 01500

SECTION 01600 - 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.

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 Provision for Substitutions: Submit request for substitution for any manufacturer not named in accordance with the following article.

1.6 PRODUCT SUBSTITUTION PROCEDURES

A. Architect/Engineer will consider requests for Substitutions only within 30 days after date established in Notice to Proceed.

B. Substitutions may 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 Contractor:
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 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.

F. Substitution Submittal Procedure:

1. Submit three copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
2. Submit Shop Drawings, Product Data, and certified test results attesting to proposed product equivalence. Burden of proof is on proposer.
3. Architect/Engineer will notify Contractor in writing of decision to accept or reject request.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION 01600

SECTION 01700 - EXECUTION 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. Protecting installed construction.

G. Project record documents.

H. Operation and maintenance data.

I. Manual for materials and finishes.

J. Manual for equipment and systems.

K. Spare parts and maintenance products.

L. Product warranties and product bonds.

M. Maintenance service.

1.2 CLOSEOUT PROCEDURES

A. Submit written notification to the Architect that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Architect/Engineer's review.

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

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

D. Owner will occupy portions of buildings as specified in Section 01100.

1.3 FINAL CLEANING

A. The General Contractor shall execute final cleaning prior to final project assessment.

B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

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

D. Replace filters of operating equipment.

E. Clean debris from roofs, gutters, downspouts, and drainage systems.

F. Clean site; sweep paved areas, rake clean landscaped surfaces.

G. 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 and Owner 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 Contractors' 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 01300 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 prior to date of final inspection.

B. Demonstrate Project equipment and instructed by qualified 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. The General Contractor shall employ, and pay for services of independent firm acceptable to the Architect/Engineer to perform testing, adjusting, and balancing.

B. 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 PROTECTING INSTALLED CONSTRUCTION

A. The General Contractor shall protect installed Work and provide special protection where specified in individual specification sections.

B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

E. Prohibit traffic or storage upon waterproofed or roofed surfaces. When traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

F. Prohibit traffic from landscaped areas.

1.8 PROJECT RECORD DOCUMENTS

A. The General Contractor shall 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: Legibly mark each item to record actual construction including:
   1. Measured depths of foundations in relation to finish main 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.

1.9 OPERATION AND MAINTENANCE DATA

A. Submit data bound in 8-1/2 x 11 inch 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.

1.10 MANUAL FOR MATERIALS AND FINISHES

A. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect/Engineer will review draft and return one copy with comments.

B. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within ten days after acceptance.

C. Submit two copies of completed volumes 15 days prior to final inspection.

D. 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.

E. 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.

F. 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.

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

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

1.11 MANUAL FOR EQUIPMENT AND SYSTEMS

A. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within ten days after acceptance.

B. Submit two sets of revised final volumes in final form within 10 days after final inspection.

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 01400.

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.

1.12 SPARE PARTS AND MAINTENANCE PRODUCTS

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

B. Deliver to Project site and place in location as directed by Owner; obtain receipt prior to final payment.

1.13 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, submit documents within ten days after acceptance.
2. Make other submittals within ten days after Date of Substantial Completion, prior to final Application for Payment.
3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing date of acceptance as beginning of warranty or bond period.

1.14 MAINTENANCE SERVICE

A. Furnish service and maintenance of components indicated in specification sections during warranty period.

B. Examine system components at frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

C. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by manufacturer of original component.

D. Do not assign or transfer maintenance service to agent or Subcontractor without prior written consent of Owner.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION 01700

SECTION 01710 - FINAL CLEANING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for final cleaning at Substantial Completion.

1. Special cleaning requirements for specific elements of the Work are included in appropriate Sections Divisions-2 through -16.

B. General Project closeout requirements are included in Section "Contract Closeout".

C. General cleanup and waste removal requirements are included in Section "Construction Facilities and Temporary Controls".

D. Environmental Requirements: Conduct cleaning and waste disposal operations in compliance with local laws and ordinances. Comply fully with federal and local environmental and anti-pollution regulations.

1. Do not dispose of volatile wastes such as mineral spirits, oil or paint thinner in storm or sanitary drains.

2. Burning or burying of debris, rubbish or other waste material on the premises will not be permitted.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by the manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property, or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Provide final cleaning operations when indicated. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit of Work to the condition expected from a commercial building cleaning and maintenance program. Comply with manufacturer's instructions.

B. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion for the entire Project or a portion of the Project.

1. Clean the Project site, yard and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste materials, litter and foreign substances. Sweep paved areas broom clean. Remove petro-chemical spills, stains and other foreign deposits. Rake grounds that are neither planted nor paved, to a smooth even-textured surface.

2. Remove tools, construction equipment, machinery and surplus material from the site. Remove all debris, packing materials from the roof.

3. Remove snow and ice to provide safe access to the building.

4. Clean exposed interior and exterior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

5. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics and similar spaces.

6. Broom clean floors in unoccupied spaces.

7. Vacuum clean carpet and similar soft surfaces, removing debris and excess nap. Shampoo if required.

8. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.

9. Remove labels that are not permanent labels.

10. Touch-up and otherwise repair and restore marred exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored, or that show evidence of repair or restoration. Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

11. Wipe surfaces of mechanical and electrical equipment, elevator equipment and similar equipment. Remove excess lubrication, paint and mortar droppings and other foreign substances.

12. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.

13. Replace air disposable filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers and grills. Clean ducts, blowers and coils if units were operated without filters during construction.

14. Clean food service equipment to a sanitary condition, ready and acceptable for its intended use.

15. Clean light fixtures, lamps, globes and reflectors to function with full efficiency. Replace burned out bulbs and defective and noisy starters in fluorescent and mercury vapor fixtures.

16. Leave the Project clean and ready for occupancy.

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

D. Compliances: Comply with governing regulations and safety standards for cleaning operations. Remove waste materials from the site and dispose of in a lawful manner.

1. Where extra materials of value remain after completion of associated construction and have become the Owner's property, place and store these as directed.

END OF SECTION 01710

SECTION 01720 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for Project Record Documents.

B. Project Record Documents include:

1. Marked-up copies of Contract Documents.
2. Marked-up copies of Shop Drawings.
3. Newly prepared Drawings.
4. Marked-up copies of Specifications, addenda and Change Orders.
5. Marked-up Product Data submittals.
6. Record Samples.
7. Field records for variable and concealed conditions.
8. Record information on Work that is recorded only schematically.

C. Specific record copy requirements that expand requirements of this Section are included in the individual Sections of Divisions-2 through-16.

D. General project closeout requirements are included in Section "Contract Closeout".

E. General requirements for submittal of Project Record Documents are included in Section "Submittals".

F. Maintenance of Documents and Samples: Store record documents and Samples in the field office apart from Contract Documents used for construction. Do not permit Project Record Documents to be used for construction purposes. Maintain record documents in good order, and in a clean, dry, legible condition. Make documents and Samples Available at all times for inspection by the Architect.

1.3 RECORD DRAWINGS

A. Mark-up Procedure: During the construction period, maintain a set of blue- or black-line white-prints of Contract Drawings and Shop Drawings for Project Record Document purposes.

1. Mark these drawings to indicate actual installation where the installation varies appreciably from the installation shown originally. Give particular attention to information on concealed elements which would be difficult to identify or measure and record later. Items required to be marked include but are not limited to :

a. Dimensional changes to the Drawings.

b. Revisions to details shown on the Drawings.

c. Depths of foundations below the first floor.

d. Locations and depths of underground utilities.

e. Revisions to routing of piping and conduits.

f. Revisions to electrical circuitry.

g. Actual equipment locations.

h. Duct size and routing.

i. Locations of concealed internal utilities.

j. Changes made by Change Order.

k. Details not on original Contract Drawings.

2. Mark completely and accurately record prints of Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions. Where Shop Drawings are marked, show cross-reference on Contract Drawings location.

3. Mark record sets with red erasable colored pencil; use other colors to distinguish between changes for different categories of the Work at the same location.

4. Mark important additional information which was either shown schematically or omitted from original Drawings.

5. Note construction change directive numbers, alternate numbers, Change Order numbers and similar identification.

6. Responsibility for Markup: Where feasible, the individual or entity who obtained record data, whether the individual or entity is the installer, subcontractor, or similar entity, is required to prepare the mark-up on Record Drawings.

a. Accurately record information in an understandable Drawing technique.

b. Record data as soon as possible after it has been obtained. In the case of concealed installations, record and check the mark-up prior to concealment.

7. At time of Substantial Completion, submit record Drawings to Architect for Owner's records. Organize into sets, bind and label sets for Owner's continued use.

B. Preparation of Transparencies: Immediately prior to inspection for Certification of Substantial Completion, review completed marked-up record Drawings with the Architect. When authorized, prepare a full set of corrected transparencies of Contract Drawings and Shop Drawings.

1. Incorporate changes and additional information previously marked on print sets. Erase, redraw and add details and notations where applicable. Identify and date each Drawing; include the printed designation "PROJECT RECORD DRAWINGS" in a prominent location on each Drawing.

2. Refer instances of uncertainty to the Architect for resolution.

3. One set of transparencies of original Contract Drawings will be furnished to the Contractor by the Owner for use in recording changed and additional information. Other printing as required is the Contractor's responsibility.

4. The Contractor is responsible for printing original Contract Drawings and other Drawings as required to produce transparencies. The Architect will make original Contract Drawings available to the Contractor's print shop.

5. Review of Transparencies: Before copying and distributing, submit corrected transparencies and the original marked-up prints to the Architect for review. When acceptable, the Architect will initial and date each transparency, indicating acceptance of general scope of changes and additional information recorded, and of the quality of drafting.

a. Transparencies and the original marked-up prints will be returned to Contractor for organizing into sets, printing, binding and final submittal.

C. Copies and Distribution: After completing the preparation of transparency record drawings, print 3 blue-line or black-line prints of each Drawing, whether or not changes and additional information were recorded. Organize the copies into manageable sets. Bind each set with durable paper cover sheets, with appropriate identification, including titles, dates and other information on cover sheets.

1. Organize and bind original marked-up set of prints that were maintained during the construction period in the same manner.

2. Organize record transparencies into sets matching the print sets. Place these sets in durable tube-type Drawing containers with end caps. Mark the end cap of each container with suitable identification.

3. Submit the marked-up record set, transparencies, and 3 copy sets to the Architect for Owner's records; the Architect will retain one copy set.

D. Newly Prepared Record Drawings: Prepare new Drawings instead of following procedures specified for preparation of record Drawings where new Drawings are required by a Change Order issued as a result of acceptance of and alternate, substitution, or other modification, and the Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show the actual installation.

1. Consult with the Architect for the proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. When completed and accepted, integrate newly prepared Drawings with procedures specified for organizing, copying, binding and submittal of record Drawings.

2. Each prime Contractor has same responsibility for newly prepared record Drawings as specified for mark-up of prints and preparation of transparencies.

1.4 RECORD SPECIFICATIONS

A. During the construction period, maintain one copy of the Project Specifications, including addenda and modifications issued, for Project Record Document purposes.

1. Mark the Specifications to indicate the actual installation where the installation varies substantially from that indicated in Specifications and modifications issued. Note related Project Record Drawing information, where applicable. Give particular attention to substitutions, selection of product options, and information on concealed installations that would be difficult to identify or measure and record later.

a. In each Specification Section where products, materials or units of equipment are specified or scheduled, mark the copy with the proprietary name and model number of the product furnished.

b. Record the name of the manufacturer, supplier and installer, and other information necessary to document coordination with record Product Data submittals and maintenance manuals.

c. Note related record Product Data, where applicable. For each principal product specified, indicate whether record Product Data has been submitted in maintenance manual instead of submitted as record Product Data.

2. Upon completion of mark-up, submit record Specifications to the Architect for Owner's records.

1.5 RECORD PRODUCT DATA

A. During the construction period, maintain one copy of each Product Data submittal for Project Record Document purposes.

1. Mark Product Data to indicate the actual product installation where the installation varies substantially from that indicated in Product Data submitted. Include significant changed in the Product delivered to the site, and changes in manufacturer's instructions and recommendations for installation.

2. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

3. Note related Change Orders and mark-up of record Drawings, where applicable.

4. Upon completion of mark-up, submit a complete set of record Product Data to the Architect for the Owner's records.

5. Where record Product Data is required as a part of maintenance manuals, submit marked-up Product Data as an insert in the manual, instead of submittal as record Product Data.

6. Each prime Contractor is responsible for mark-up and submittal of record Product Data for its own Work.

1.6 RECORD SAMPLE SUBMITTAL

A. Immediately prior to date of Substantial Completion, the Contractor shall meet with the Architect and, if desired, the Owner's personnel at the site to determine which of the Samples maintained during the construction period shall be transmitted to Owner for record purposes. Comply with the Architect's instructions for packaging, identification marking, and delivery to Owner's Sample storage space. Dispose of other Samples in manner specified for disposal of surplus and waste materials.

1.7 MAINTENANCE MANUAL SUBMITTAL

A. When each construction activity that requires submittal of maintenance manuals is nominally complete, but before Substantial Completion, submit maintenance manuals specified.

1. Organize operating and maintenance manuals into suitable sets of manageable size.

2. Bind data into individual binders from each manual, properly identified on front and spine. For large manuals, provide an index sheet and thumb tabs for separate information categories.

3. Provide heavy-duty 3-ring vinyl-covered binders 1" to 2" high as required to contain information, sized for 8-1/2" x 11" paper with inside pockets or pocket folders for folded sheets.

4. In each maintenance manual include information specified in individual Specifications Sections and the following:

a. Emergency instructions.

b. Spare parts list.

c. Copies of specific warranties.

d. Wiring diagrams.

e. Recommended maintenance procedures and turn-around times.

f. Inspection and system-test procedures.

g. Copies of applicable Shop Drawings and Product Data.

h. Listing of required maintenance materials and services.

i. Names and addresses of sources of maintenance.

j. Maintenance Drawings and diagrams.

k. Precautions against improper maintenance and exposure.

1.8 MISCELLANEOUS RECORD SUBMITTALS

A. Refer to other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Immediately prior to Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for use and reference. Submit to the Architect for the Owner's records.

1. Categories of requirements resulting in miscellaneous records include, but are not limited to, the following:

a. Field records on excavations and foundations.

b. Field records on underground construction and similar Work.

c. Survey showing locations and elevations of underground lines.

d. Invert elevations of drainage piping.

e. Surveys establishing building lines and elevations.

f. Records of plant treatment.

g. Ambient and substrate condition tests.

h. Certifications received in lieu of labels on bulk products.

i. Batch mixing and bulk delivery records.

j. Testing and qualification of tradesmen.

k. Documented qualification of installation firms.

l. Load and performance testing.

m. Inspections and certifications by governing authorities.

n. Leakage and water-penetration tests.

o. Fire resistance and flame spread test results.

p. Final inspection and correction procedures.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.1 RECORDING

A. Post changes and modifications to the Documents as they occur. Do not wait until the end of the Project. The Architect will periodically review record documents to assure compliance with this requirement.

END OF SECTION 01720

SECTION 01730 - OPERATING AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for operating and maintenance manuals including the following:

1. Preparation and submittal for building operating and maintenance manuals for building operating systems or equipment.

2. Preparation and submittal of instruction manuals covering the care, preservation and maintenance of architectural products and finishes.

3. Instruction of the Owner's operating personnel in operation and maintenance of building systems and equipment.

B. Special operating and maintenance data requirements for specific pieces of equipment or building operating systems are included in the appropriate Sections of Divisions-2 through -16.

C. Preparation of Shop Drawings and Product Data are included in Section "Submittals".

D. General closeout requirements are included in Section "Contract Closeout."

E. General requirements for submittal of Project Record Documents are included in Section "Contract Closeout".

1.3 QUALITY ASSURANCE

A. Maintenance Manual Preparation: In preparation of Maintenance Manuals, use personnel thoroughly trained and experienced in operation and maintenance of the equipment or system involved.

1. Where written instructions are required, use personnel skilled in technical writing to the extent necessary for communication of essential data.

2. Where Drawings or diagrams are required, use draftsmen capable of preparing Drawings clearly in an understandable format.

B. Instructions for the Owner's Personnel: For instruction of the Owner's operating and maintenance personnel, use experienced instructors thoroughly trained and experienced in the operation and maintenance of the building equipment or system involved

1.4 SUBMITTALS

A. Submittal Schedule: Comply with the following schedule for submittal of operating and maintenance manuals.

1. Before Substantial Completion, when each installation that requires submittal of operating and maintenance manuals is nominally complete, submit two draft copies of each manual to the Architect for review. Include a complete index or table of contents of each manual.

a. The Architect will return one copy of the draft with comments within 15 days of receipt.

2. Submit one copy in final form at least 15 days before final inspection. The copy will be returned within 15 days after final inspection, with comments.

3. After final inspection make corrections or modifications to comply with the Architect's comments. Submit the specified number of copies of each approved manual to the Architect within 15 days of receipt of the Architect's comments.

B. Form of Submittal: Prepare operating and maintenance manuals in the form of an instructional manual for use by the Owner's operating personnel. Organize into suitable sets of manageable size. Where possible, assemble instructions for similar equipment into a single binder.

1. Binders: For each manual, provide heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, in thickness necessary to accommodate contents, sized to receive 8-1/2" x 11" paper. Provide a clear plastic sleeve on the spine, to hold labels describing the contents. Provide pockets in the covers to receive folded sheets.

a. Where two or more binders are necessary to accommodate data, correlate data in each binder into related groupings in accordance with the Project Manual table of contents. Cross-reference other binders when necessary to provide essential information for proper operation or maintenance of the piece of equipment or system.

b. Identify each binder on the front and spine, with the typed or printed title "OPERATION AND MAINTENANCE MANUAL", Project title or name, and subject matter covered. Indicate the volume number for multiple volume sets of manuals.

2. Dividers: Provide heavy paper dividers with celluloid covered tabs for each separate Section. Mark each tab to indicate contents. Provide a typed description the product and major parts of equipment included in the Section on each divider.

3. Protective Plastic Jackets: Provide protective transparent jackets designed to enclose diagnostic software for computerized electronic equipment.

4. Text Material: Where written material is required as a part of the manual use the manufacturer's standard printed material, or if it is not available, specially prepared data, neatly typewritten, on 8-1/2" by 11", 20 pound white bond paper.

5. Drawings: Where drawings or diagrams are required as part of the manual, provide reinforced punched binder tabs on the drawings and bind in with the text.

   a. Where oversized drawings are necessary, fold the drawings to the same size as the text pages and use as a fold-out.

   b. If drawings are too large to be used practically as a fold-out, place the drawing, neatly folded, in the front or rear pocket of the binder. Insert a typewritten page indicating the drawing title, description of contents and drawing location at the appropriate location in the manual.

1.5 MANUAL CONTENT

A. In each manual include information specified in the individual Specification Section, and the following information for each major component of building equipment and its controls.

1. General system or equipment description.

2. Design factors and assumptions.

3. Copies of applicable Shop Drawings and Product Data.

4. System or equipment identification, including:

   a. Name of manufacturer.

   b. Model number.

   c. Serial number of each component.

5. Operating instructions.

6. Emergency instructions.

7. Wiring diagrams.

8. Inspections and test procedures.

9. Maintenance procedures and schedules.

10. Precautions against improper use and maintenance.

11. Copies of warranties.

12. Repair instructions including spare parts listing.

13. Sources of required maintenance materials and related services.

14. Manual index.

B. Organize each manual into separate Sections for each piece of related equipment. As a minimum each manual shall contain a title page, a table of contents, copies of Product Data, supplemented by drawings and written text, and copies of each warranty, bond and service Contract issued.

1. Title Page: Provide a title page in a transparent plastic envelope as the first sheet of each manual. Provide the following information.

a. Subject matter covered by the manual.

b. Name and address of the Project.

c. Date of submittal.

d. Name, address, and telephone number of the Contractor.

e. Name and address of the Architect.

f. Cross reference to related systems in other operating and maintenance manuals.

2. Table of Contents: After the Title Page, include a typewritten table of contents for each volume, arranged systematically according to the Project Manual format. Include a list of each product included, identified by product name or other appropriate identifying symbol and indexed to the content of the volume.

a. Where more than one volume is required to accommodate data for a particular system, provide a comprehensive table of contents for all volumes in each volume of the set.

3. General Information: Provide a general information Section immediately following the Table of Contents, listing each product included in the manual, identified by product name. Under each product, list the name, address, and telephone number of the Subcontractor or installer, and the maintenance contractor. Clearly delineate the extent of responsibility of each of these entities. In addition, list a local source for replacement parts and equipment.

4. Product Data: Where manufacturer's standard printed data is included in the manuals, include only sheets that are pertinent to the part or product installed. Mark each sheet to identify each part or product included in the installation. Where more than one item in a tabular format is included, identify each item, using appropriate references from the Contract Documents. Identify data that is applicable to the installation and delete references to information that is not applicable.

5. Written Text: Where manufacturer's standard printed data is not available, and information is necessary for proper operation and maintenance of equipment or systems, or it is necessary to provide additional information to supplement data included in the manual, prepare written text to provide necessary information. Organize the text in a consistent format under separate headings for different procedures. Where necessary, provide a logical sequence of instruction for each operating or maintenance procedure.

6. Drawings: Provide specially prepared drawings where necessary to supplement manufacturer's printed data to illustrate the relationship of component parts of equipment or systems, or to

7. Provide control or flow diagrams. Coordinate these drawings with information contained in Project Record Drawings to assure correct illustration of the completed installation.

8. Do not use original Project Record Documents as part of the Operating and Maintenance Manuals.

9. Warranties, Bonds and Service Contracts: Provide a copy of each warranty, bond or service contract in the appropriate manual for the information of the Owner's operating personnel. Provide written data outlining procedures to be followed in the event of product failure. List circumstances and conditions that would affect validity of the warranty or bond.

1.6 MATERIAL AND FINISHES MAINTENANCE MANUAL

A. Submit three copies of each manual, in final form, on material and finishes to the Architect for distribution. Provide one section for architectural products, including applied materials and finishes, and a second for products designed for moisture-protection and products exposed to the weather.

1. Refer to individual Specification Sections for additional requirements on care and maintenance of materials and finishes.

B. Architectural Products: Provide manufacturer's data and instructions on care and maintenance of architectural products, including applied materials and finishes.

1. Manufacturer's Data: Provide complete information on architectural products, including the following, as applicable:

a. Manufacturer's catalog number.

b. Size.

c. Material composition.

d. Color.

e. Texture.

f. Reordering information for specially manufactured products.

2. Care and Maintenance Instructions: Provide information on care and maintenance, including manufacturer's recommendations for types of cleaning agents to be used and methods that could prove detrimental to the product. Include manufacturer's recommended schedule for cleaning and maintenance.

C. Moisture-Protection and Weather-Exposed Products: Provide complete manufacturer's data with instructions on inspection, maintenance and repair of products exposed to the weather or designed for moisture-protection purposes.

1. Manufacturer's Data: Provide manufacturer's data giving detailed information, including the following, as applicable:

a. Applicable standards.

b. Chemical composition.

c. Installation details.

d. Inspection procedures.

e. Maintenance information.

f. Repair procedures.

D. Schedule: Provide complete information in the materials and finishes manual on products specified in individual Sections of these Specifications.

1. Refer to Specifications Sections for complete information on products.

1.7 EQUIPMENT AND SYSTEMS MAINTENANCE MANUAL

A. Submit 6 copies of each completed manual on equipment and systems, in final form, to the Architect for distribution. Provide separate manuals for each unit of equipment, each operating system, and each electric and electronic system.

1. Refer to Specifications Sections for additional requirements on operating and maintenance of the various pieces of equipment and operating systems.

B. Equipment and Systems: Provide the following information for each piece of equipment, each building operating system, and each electric or electronic system.

1. Description: Provide a complete description of each unit and elated component parts, including the following:

a. Equipment or system function.

b. Operating characteristics.

c. Limiting conditions.

d. Performance curves.

e. Engineering data and tests.

f. Complete nomenclature and number of replacement parts.

2. Manufacturer's Information: For each manufacturer of a component part or piece of equipment provide the following:

   a. Printed operating and maintenance instructions.

   b. Assembly drawings and diagrams required for maintenance.

   c. List of items recommended to be stocked as spare parts.

3. Maintenance Procedures: Provide information on equipment and system operating procedures, including the following:

   a. Start-up procedures.

   b. Equipment or system break-in.

   c. Routine and normal operating instructions.

   d. Regulation and control procedures.

   e. Instructions on stopping.

   f. Shut-down and emergency instructions.

   g. Summer and winter operating instructions.

   h. Required sequences for electric or electronic systems.

   i. Special operating instructions.

4. Servicing Schedule: Provide a schedule of routine servicing and lubrication requirements, including a list of required lubricants for equipment with moving parts.

5. Controls: Provide a description of the sequence of operation and as-installed control diagrams by the control manufacturer for systems requiring controls.

6. Coordination Drawings: Provide each Contractor's Coordination Drawings.

   a. Provide as-installed color-coded piping diagrams, where required for identification.

7. Valve Tags: Provide charts of valve tag numbers, with the location and function of each valve.

8. Circuit Directories: For electric and electronic systems, provide complete circuit directories of panelboards, including the following:

   a. Electric service.

   b. Controls.

c. Communication.

C. Schedule: Provide complete information in the equipment and systems manual on products specified in individual Sections of these Specifications.

1. Refer to Specification Sections for complete information on products.

1.8 INSTRUCTIONS OF THE OWNER'S PERSONNEL

A. Prior to final inspection, instruct the Owner's personnel in operation, adjustment, and maintenance of products, equipment and systems. Provide instruction at mutually agreed upon times.

1. For equipment that requires seasonal operation, provide similar instruction during other seasons.

2. Use operation and maintenance manuals for each piece of equipment or system as the basis for instruction. Review contents in detail to explain all aspects of operation and maintenance.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION 01730

SECTION 01740 - WARRANTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for warranties required by the Contract Documents, including manufacturer's standard warranties on products and special warranties.

1. Refer to the General Conditions for terms of the Contractor's period for correction of the Work.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 1 Section "Submittals" specifies procedures for submitting warranties.

2. Division 1 Section "Contract Closeout" specifies contract closeout procedures.

3. Divisions 2 through 16 Sections for specific requirements for warranties on products and installations specified to be warranted.

4. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.

C. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.3 DEFINITIONS

A. Standard product warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

B. Special warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

1.4 WARRANTY REQUIREMENTS

A. Related Damages and Losses: When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as a result of such failure or must be

removed or replaced to provide access for correction of warranted construction.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of the Contract Documents. The Contractor is responsible for the cost of rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its useful service life.

D. Owner's Recourse: Expressed warranties made to the Owner are in addition to implied warranties and shall not limit the duties, obligations, rights and remedies otherwise available under the law. Expressed warranty periods shall not be interpreted as limitations on the time in which the Owner can enforce such other duties, obligations, rights or remedies.

1. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selection to products with warranties not in conflict with requirements of the Contract Documents.

E. Where the Contract Documents require a special warranty, or similar commitment on the Work or part of the Work, the Owner reserves the right to refuse to accept the Work, until the Contractor presents evidence that entitles required to countersign such commitments are willing to do so.

F. All warranties shall be amended to cover labor and materials or equipment.

1.5 SUBMITTALS

A. Submit written warranties to the Architect prior to the date certified for Substantial Completion. If the Architect's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Architect.

1. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Architect within 15 days of completion of that designated portion of the Work.

B. When the Contract Documents require the Contractor, or the Contractor and a subcontractor, supplier or manufacturer to execute a special warranty, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner, through the Architect, for approval prior to final execution.

1. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Form of Submittal: At Final Completion compile 2 copies of each required warranty properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer.

Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.

D. Bind warranties and bonds in heavy-duty, commercial-quality, durable 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2" by 11" paper.

1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address and telephone number of the Installer.

2. Identify each binder on the front and spine with the typed or printed title, "WARRANTIES", Project title or name, and name of the Contractor.

3. When warranted construction requires operation and maintenance manuals, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION 01740

2

SECTION 02221 – BUILDING DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes demolition of designated structures and slabs-on-grade; disconnecting and demolition of identified utilities; and removing demolished materials from site; protection of items to remain as indicated.

B. Related Sections:

1. Section 02225 – Minor Demolition While Remodeling

1.2 SUBMITTALS

A. Section 01330 – Submittals Procedures: Submittal Procedures

1.3 CLOSEOUT SUBMITTALS

A. Section 01700 – Execution Requirements: Requirements for submittals.

1.4 QUALIFICATIONS

A. Demolition Firm: Company experienced in performing work of this section with minimum three years documented experience, and with service facilities within 50 miles of Project.

1.5 SEQUENCING

A. Section 01100 – Summary: Requirements for sequencing.

B. Sequence activities to demolish the Work in accordance with the project schedule.

1.6 SCHEDULING

A. Section 01300 – Administrative Requirements: Coordination and project conditions.

B. Schedule work to coincide with new construction.

C. Describe demolition removal procedures and schedule.

PART 2 – PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 PREPARATION

A. Provide, erect, and maintain temporary barriers and security devices, including warning signs and

lights, and similar measures, for protection of the public. Owner, Contractor's employees and existing improvements to remain.

B. Protect existing appurtenances and structures, which are not indicated to be demolished.

C. Prevent movement or settlement of adjacent structures. Provide all bracing and shoring as required.

D. Mark location of utilities.

3.2 DEMOLITION REQUIREMENTS

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

B. Cease operations immediately when adjacent structures appear to be in danger. Notify Architect/Engineer. Do not resume operations until directed.

C. Conduct operations with minimum interference to public or private accesses. Maintain protected egress and access from adjacent structures at all times.

D. Obtain written permission from adjacent property owners when demolition equipment will traverse, infringe upon or limit access to their property.

E. Sprinkle Work with water to minimize dust. Provide hoses and water connections required for this purpose.

3.3 DEMOLITION

A. Disconnect, remove, cap and identify designated utilities within demolition areas as shown on construction drawings..

B. Remove concrete slabs on grade as shown on construction drawings.

C. Remove materials to be re-installed or retained in manner to prevent damage as shown on construction drawings. Store and protect in accordance with requirements of Section 01600.

D. Backfill and compact areas excavated to receive new footings.

E. Continuous clean-up and remove demolished materials from site. Do not allow materials to accumulate in building or on the site.

F. Do not burn or bury materials on site. Leave site in clean condition.

3.4 SCHEDULES

Not Used

END OF SECTION

SECTION 02225 – MINOR DEMOLITION WHILE REMODELING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes removal of designated building equipment and fixtures; removal of designated construction; dismantling, cutting and alterations for completion of the Work; disposal of materials storage of removed materials; identification of utilities; salvaged items; and protection of items to remain as indicated.

1.2 SUBMITTALS

Not Used.

1.3 CLOSEOUT SUBMITTALS

A. Section 01700 – Execution Requirements: Requirements for submittals.

B. Project Record Documents: Accurately record actual locations of capped utilities, subsurface obstructions.

C. Operation and Maintenance Data: Submit description of system, inspection data, and parts lists.

1.4 SEQUENCING

A. Section 01100 – Summary: Requirements for sequencing.

1.5 SCHEDULING

A. Section 01300 – Administrative Requirements: Requirements for scheduling.

B. Schedule Work to coincide with new construction.

C. Describe demolition removal procedures and schedule.

1.6 PROJECT CONDITIONS

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

B. Cease operations immediately when 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. Erect, and maintain temporary safeguards, barricades, and similar measures, for protection of the public, Owner, Contractor's employees, and existing improvements to remain.

B. Erect and maintain weatherproof closures for exterior openings.

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

D. Protect existing materials and existing improvements not indicated to be demolished.

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

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

G. Mark location and termination of utilities.

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

3.2 DEMOLITION

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

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

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

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

E. Remove temporary Work.

3.3 SCHEDULES

Not Used

END OF SECTION

5

Thompson Fabricating LLC
An Industry Leader
A Ligon Industries Company

Thompson Fabricating, LLC
1411 Commerce Place
PO Box 170160
Tarrant, AL 35217
205-841-0441

OSHA Guardrail Design Specifications

1. Guardrails and Handrails shall be the product of a company normally engaged in the manufacture of pipe railing. Railing shall be shop assembled in lengths not to exceed 24 feet for field erection.

2. The handrail shall be made of pipes joined together with component fittings. Samples of all components, bases, toeboard and pipe must be submitted for approval at the request of the engineer. Components that are pop-riveted or glued at the joints will not be acceptable. All components must be mechanically fastened with stainless steel hardware. **Handrail and components shall be TUFRAIL, as manufactured by Thompson Fabricating, LLC (Birmingham, Alabama) or an approved equal.**

3. Railings shall be 1 1/2" Schedule 40 aluminum pipe alloy 6105-T5, ASTM-B-429 or ASTM-B-221. Post shall be 1 1/2" Schedule 40 aluminum pipe of the same alloy. Post spacing shall be a maximum of 6'-0".

4. Guardrails and Handrails shall be designed to withstand a 200lb concentrated load applied in any direction and at any point on the top rail

5. Intermediate railings shall be provided such that a 21-inch diameter sphere cannot pass through any opening.

7. The manufacturer shall submit calculations for approval at the request of the Engineer. Testing of base castings or base extrusions by an independent lab or manufacturer's lab (if manufacturer's lab meets the requirements of the Aluminum Association) will be an acceptable substitute for calculations. Calculations will be required for approval of all other design aspects.

8. Posts shall not interrupt the continuation of the top rail at any point along the railing, including corners and end terminations (OSHA 1910.23). The top surface of the top railing shall be smooth and shall not be interrupted by projected fittings.

9. The mid-rail at a corner return shall be able to withstand a 200lb load without loosening. The manufacturer is to determine this dimension for their system and provide physical tests from a laboratory to confirm compliance.

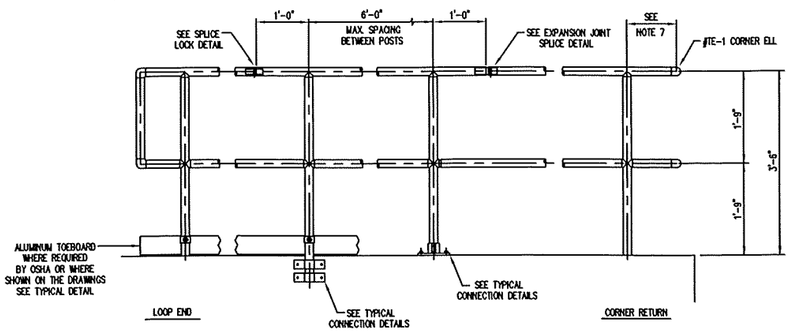
10. Concrete anchors shall be stainless steel type 303 or 304 wedge anchors and shall be furnished by the handrail manufacturer. The anchor design shall include the appropriate reduction factors for spacing and edge distances in accordance with the manufacturers published data.

11. Toeboad shall conform to OSHA standards. Toeboard shall be a minimum of 4" high and shall be an extrusion that attaches to the posts with clamps which will allow for expansion and contraction between posts. Toeboard shall be set 1/4" above the walking surface. Toeboard shall be provided on handrails as required by OSHA and/or as shown on drawings. Toeboard shall be shipped in stock lengths for field installation.

12. A self-closing gate shall guard openings in the railing (OSHA 1910.23). Safety chains shall not be used unless specifically shown on the drawings.

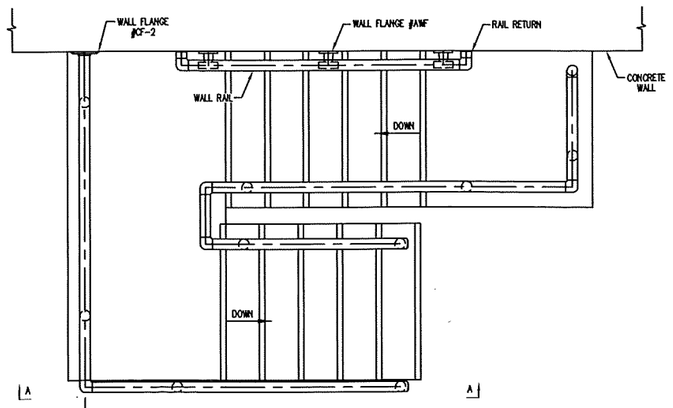
13. Finish shall be Aluminum Association M10-C22-A41 (215-R1). The pipe shall be plastic-wrapped. The plastic wrap is to be removed after erection.

14. Aluminum surfaces in contact with concrete, grout or dissimilar metals will be protected with a coat of bituminous paint, Mylar isolators or other approved material.



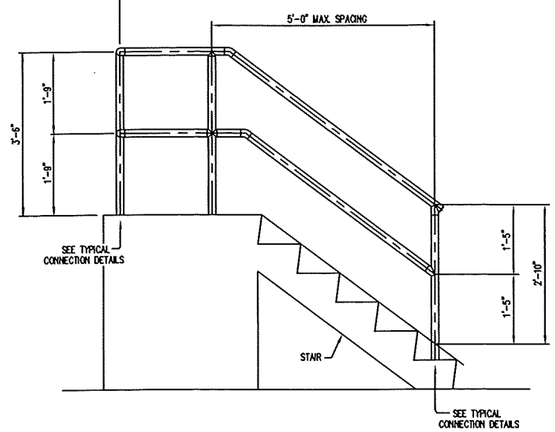
TYPICAL OSHA GUARDRAIL

GUARDRAILS SHALL BE TOP-MOUNTED OR SIDE-MOUNTED, AS SHOWN ON PLANS

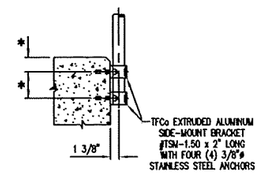


TYPICAL OSHA GUARDRAIL AND HANDRAIL AT STAIRWAYS

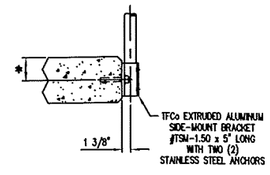
GUARDRAILS SHALL BE TOP-MOUNTED OR SIDE-MOUNTED, AS SHOWN ON PLANS



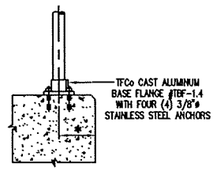
VIEW A-A



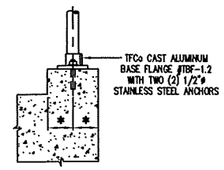
TYPICAL SIDE MOUNT CONNECTION TO CONCRETE WALL



TYPICAL SIDE MOUNT CONNECTION TO CONCRETE SLAB



TYPICAL TOP MOUNT CONNECTION TO CONCRETE WALL



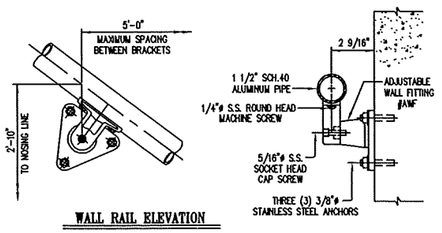
TYPICAL TOP MOUNT CONNECTION TO CONCRETE CURB

OSHA GUARDRAIL

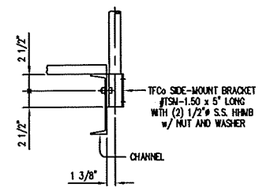
OSHA SUGGESTED DESIGN SPECIFICATIONS

1. Guardrails and Handrails shall be the product of a company normally engaged in the manufacture of pipe railing. Railing shall be shop assembled in lengths not to exceed 24 feet for field erection.
2. The handrail shall be made of pipes joined together with component fittings. Samples of all components, bases, toe plate and pipe shall be submitted for approval at the request of the engineer. Components that are pop-riveted or glued at the joints will not be acceptable. All components must be mechanically fastened with stainless steel hardware. Handrail and components shall be TUFRAIL, as manufactured by Thompson Fabricating, LLC (Birmingham, Alabama) or an approved equal.
3. Railings shall be 1 1/2" Schedule 40 aluminum pipe alloy 6105-T5, ASTM-B-429 or ASTM-B-221. Posts shall be 1 1/2" Schedule 40 aluminum pipe of the same alloy. Post spacing shall be a maximum of 6'-0".
4. Guardrails and Handrails shall be designed to withstand a 200 lb concentrated load applied in any direction and at any point on the top rail.
5. The manufacturer shall submit calculations for approval at the request of the Engineer. Testing of base castings or base extrusions by an independent lab or manufacturer's lab (if manufacturer's lab meets the requirements of the Aluminum Association) will be an acceptable substitute for calculations. Calculations will be required for approval of all other design aspects.
6. Posts shall not interrupt the continuation of the top rail at any point along the railing, including corners and end terminations (OSHA 1910.23). The top surface of the top railing shall be smooth and shall not be interrupted by projected fittings.
7. The mid-rail at a corner return shall be able to withstand a 200 lb load without loosening. The manufacturer is to determine this dimension for their system and provide physical laboratory tests to confirm compliance.
8. Concrete anchors shall be stainless steel type 303 or 304 and shall be furnished by the handrail manufacturer. The anchor design shall include the appropriate reduction factors for spacing and edge distances in accordance with the manufacturer's published data.
9. Toe plate shall conform to OSHA standards. Toe plate shall be a minimum of 4" high and shall be be an extrusion that attaches to the posts with clamps that will allow for expansion and contraction between posts. Toe plates shall be set 1/4" above the walking surface. Toe plates shall be provided on handrails as required by OSHA and/or as shown on drawings. Toe plates shall be shipped loose in stock lengths for field installation.
10. Openings in the railing shall be guarded by a self-closing gate (OSHA 1910.23). Safety chains shall not be used unless specifically shown on the drawings.
11. Finish shall be Aluminum Association M10-C22-A41 (215-R1). The pipe shall be plastic-wrapped. The plastic wrap is to be removed after erection.
12. Aluminum surfaces in contact with concrete, grout or dissimilar metals will be protected with a coat of bituminous paint, mylar isolators or other approved material.

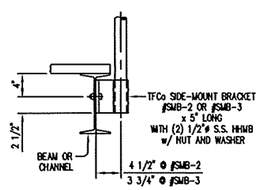
* Concrete anchor diameter, edge distances, embedment, as well as post spacings, to be determined upon anchor selection.



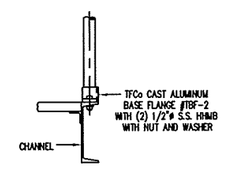
WALL RAIL ELEVATION



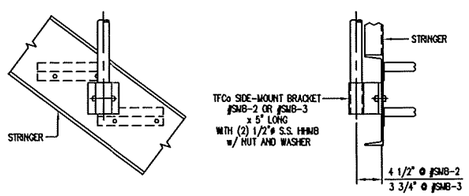
TYPICAL SIDE MOUNT CONNECTION TO CHANNEL



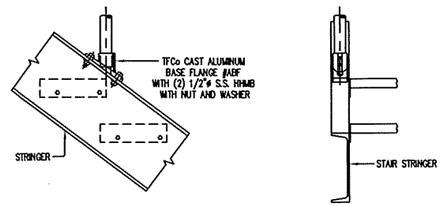
TYPICAL SIDE MOUNT CONNECTION TO BEAM



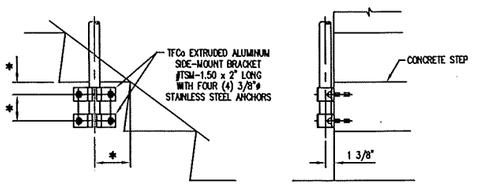
TYPICAL TOP MOUNT CONNECTION TO CHANNEL



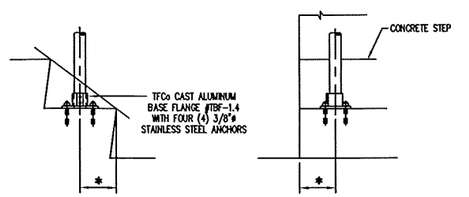
TYPICAL SIDE MOUNT CONNECTION TO STRINGER



TYPICAL TOP MOUNT CONNECTION TO STRINGER



TYPICAL SIDE MOUNT CONNECTION TO CONCRETE STAIR



TYPICAL TOP MOUNT CONNECTION TO CONCRETE STAIR

9

SECTION 09624 – RESILIENT FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

A. Extent of resilient flooring and accessories is shown on drawings and in Material and Room Finish Schedules.

1.3 QUALITY ASSURANCE

A. Manufacturer: Provide each type of resilient flooring and accessories as produced by a single manufacturer, including recommended primers, adhesives, sealants and leveling compounds.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical data for each type of resilient flooring and accessory.

B. Samples for initial Selection Purposes: Submit manufacturer's standard color charts in form of actual sections of resilient flooring, including accessories, showing full range of colors and patterns available, for each type of resilient flooring required.

C. Sample for Verification Purposes: Submit the following samples of each type, color and pattern of resilient flooring required, showing full range of color and pattern variations.

- 12" x 12" sample of sheet flooring, or
- 6" long sample of resilient bases.
- 2 ½" long sample of resilient flooring accessories such as welding rod.
- Other materials, such as stair tread units, etc., as required.

D. Bond and Moisture Tests: Submit location diagrams and results. It is essential that moisture tests be taken on all concrete floors regardless of the age or grade level. Check moisture content does not exceed 2.5% by weight (calcium carbide test method) or moisture emissions do not exceed 3 lbs. Water / 24 hours / 1000 sq. ft. (calcium chloride test method) by conducting moisture tests, around the perimeter of the room, at columns and where moisture may be evident. Calcium chloride tests and / or calcium carbide tests must be done in accordance with ASTM F-1869 and to instructions. It is the responsibility of the owner or his agent to provide adequate moisture testing by an independent agency acceptable to the floor covering manufacturer for products specified within this document.

E. Maintenance Instruction: Submit two copies of manufacturer recommended maintenance practices for each type of resilient flooring and accessory required.

1.5 PROJECT CONDITIONS

A. Maintain minimum temperature as instructed by material manufacturers but not less than 65 deg. F (18 deg. C) in spaces to receive resilient flooring for at least 48 hours prior to installation, during installation and for not less than 48 hours after installation. Store resilient flooring materials in spaces where they will be installed for at least 48 hours before beginning installation. Subsequently, maintain minimum temperature of 55 deg. F (13 deg. C) in areas where work is completed.

B. Install resilient flooring and accessories after other finishing operations, including painting, have been completed. Do not install resilient flooring over concrete slabs until the latter have been cured and are sufficiently dry to achieve bond with adhesive as determined by the resilient flooring manufacturer's recommended bond and moisture test. Do not take tests later than ten days prior to scheduled installation. Notify Architect immediately of unsatisfactory conditions.

PART 2 – PRODUCTS

2.1 MANFACTURER (or equal)

A. LG SPORTS FLOORING
1000 Sylvan Avenue
Englewood, NJ 07632 USA

2.2 DISTRIBUTOR

A. ABACUS SPORTS INSTALLATIONS, LTD.
836 Flory Mill Road
Lancaster, PA 17601 USA
Phone: 1-800-821-4557 or 1-717-560-8050
Fax: 1-717-560-8054
Email: install@abacussports.com

Products are available through contract flooring dealers.

B. Resilient Flooring Color and Patterns: Provide color and patterns as indicated, or if not indicated in Materials Schedule and / or drawings as selected by Architect from manufacturer's standards.

C. Product: LG REXCOURT G-6000 (or equal).

2.3 PRIMARY USE / FUNCTION / ADVANTAGES

A. Used primarily for sports flooring in gymnasiums and activities rooms , LG RexCourt provides a realistic wood visual athletic floor without the maintenance requirements of hardwood and offers superior shock absorption and durability for all sports and recreational activities in vinyl sheet flooring. Wood and solid patterns provide design flexibility.

B. ReCourt is safe for all court sports. Optimal slip coefficient and anti-bacterial properties provide a safe playing surface. Its vertical deformation and stability characteristics provide excellent power return enabling athletes to increase on-court performance and offer superior ball rebound. This sports flooring is exceptionally durable under heavy rolling and static load limits.

C. LG RexCourt is easy to maintain. Its durable surface is polyurethane coated for easy clean-up and resistant to dirt build-up. Wear layer is 100% vinyl. The inner layer is constructed of reinforced woven fiberglass for increased dimensional stability and its closed cell foam backing provides excellent shock-resistance, superior stability and energy return for extended activities.

2.4 VINYL SHEET FLOORING

Quality Test Items/Procedure	Requirements	Results
Description		
Total Thickness:	mm/in	6.5 (0.256")
Roll Width:	m/ft	1.8 (5.91')
Roll Length:	m/ft	15 (49.2')
Weight:	kg/m2 (lbs/sf)	4.2 (.861)
Safety		
Shock Absorption/DIN V18 032-2	min 25%	33%
Sliding Properties / DIN V18 032-2	min 0.4 – max 0.6	0.4 – 0.44
Performance		
Vertical Deformation / DIN V18 032-2	max 3.0mm	0.9mm
Area Deflection / DIN V18 0323-2	max 0%	0%
Ball Rebound / DIN V18 032-2	min 90%	99%
Durability		
Rolling Load V18 032-2	1000N	1000N
Impact Resistance / DIN V18 032-2	min 8Nm	12Nm
Residual Impression / DIN V18 032-2	max 0.5mm	0.17mm
Chemical Resistance / KS M 38002-99	----------excellent----------	
Loss of Heating / KS M 38002-99	<2.5%	0.9
Dimensional Stability by Heating / KS M 38002-99	<0.5% (W)	0.03
Anti-Bacterial		
Evaluation of Microbial action / ASTM G21-96	Class	Class 0
Bacterial Reduction Rate / FC-TM-20-01	%	99.8%
Sound Isolation / Jeonnam Univ	ΔbB	Δ25

2.5 ACCESSORIES

A. Welding Thread: Vinyl thread or rod as produced by the manufacturer of sheet vinyl flooring and intended for heat sealing of joints. Color to match field of sheet vinyl floor covering unless otherwise noted.

B. Adhesives: Use only manufacturer's approved adhesive. Adhesives are available through flooring dealers or Gerbert Ltd. Submit list of manufacturer's approved adhesives to Architect for

approval.

PART 3 - EXECUTION

3.1 INSPECTION:

A. Require installer to inspect sub-floor surfaces to determine that they are satisfactory. A satisfactory subfloor surface is defined as one that is smooth and free from cracks, holes, ridges, or coatings preventing adhesive bond and other defects impairing performance or appearance.

B. Concrete subfloor: Verify that concrete slabs comply with ASTM F710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by flooring manufacturer.

2. DO NOT allow resilient flooring work to proceed until subfloor surfaces are satisfactory.

3.2 PREPARATION

A. Prepare subfloor surface as follows:

1. Inspection of existing sub-floor: A solid, dry, clean, sub-floor is required for the installation of all LG RexCourt materials.

2. Use cementitious leveling and patching compounds as recommended by resilien flooring manufacturer for filling small cracks, holes and depressions and leveling subfloors. This contractor shall be responsible for leveling new or existing floors whose surface varies up to 5/16". Notify Owner, Architect and General Contractor in writing where substrate varies more than above before proceeding with the work. Gypsum based leveling compounds will not be accepted.

3. Use cementitious leveling and patching compounds as recommended by resilient flooring manufacturer for filling small cracks, holes and depression in subfloors.

4. Remove coatings from subfloor surfaces that would prevent adhesive bond, including curing compounds incompatible with resilient flooring adhesives, paints, oils, waxes and sealers.

3.3 INSTALLATION - GENERAL

A. Installer verification:

1. All LG RexCourt materials should be installed by a professional flooring mechanic, preferably one who has attended an installation clinic or a Master Mechanic Training Seminar.

B. Field verification:

1. Field verify, prior to installation, exact layout dimensions of all seams, floor patterns,

grain directions and inserts with Architect. Start of work without Architect approval of field verification is not permitted and unauthorized installations shall be replaced at Contractor's expense.

2. Where moveable partitions are shown, install resilient flooring before partitions are erected.

3. Wooden Sub-Floor: Ensure wooden sub-floor is ventilated and required damp proofing is in place. Fix and replace loose boards.

4. Install flooring using method indicated in strict compliance with manufacturer's printed instructions. Extend flooring into toe spaces, door reveals and into closets and similar openings.

5. Scribe, cut and fit resilient flooring to permanent fixtures built in furniture and cabinets, pipes, outlets and permanent columns, walls and partitions.

6. Maintain reference markers, holes or openings that are in place or plainly marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other non-permanent marking device.

7. Install flooring on covers for telephone and electrical ducts, and other such items as occur within finished floor areas. Maintain overall continuity of color and pattern with pieces of flooring installed on these covers. Tightly cement edges to perimeter of floor around covers and to covers.

8. Tightly adhere flooring to sub-base without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks or other surface imperfections. Hand roll flooring at perimeter of each covered area to assure adhesion.

3.4 INSTALLATION – SHEET FLOORING

A. Terminate flooring at centerline of door openings where adjacent floor finish is dissimilar.

B. Install edge strips at unprotected or exposed edges where flooring terminates.

C. Scribe flooring to walls, columns, cabinets, floor outlets and other apparatus to produce tight joints.

D. Install flooring under movable partitions under open cabinets without interrupting sheet pattern.

E. Roll flooring using a 100 lb. roller.

F. Lay sheet flooring to provide as few seams as possible with economical use of materials. Match edges for color shading and pattern at seams in compliance with manufacturer's recommendations.

G. Adhere sheet flooring to substrates using method approved by flooring manufacturer for type of sheet flooring and substrate condition indicated.

H. Use conventional full spread adhesive method unless otherwise indicated.

I. Prepare seams in vinyl sheet flooring with manufacturer's special routing tool and heat weld with vinyl thread in accordance with manufacturer's instructions.

J. On masonry surfaces or other similar irregular vertical substrates, fill voids between metal top edge strip cove cap and vertical surface with manufacturer's recommended adhesive filler material.

K. On all floor penetrations, cutouts and edge conditions, such as door frames, fill voids between sheet flooring and other surfaces with sealant recommended by sheet flooring manufacturer.

L. Transition section at paving junction: Visedge VR by Howie Green is designed to securely anchor the perimeter of vinyl sheet flooring to prevent the ingress of water at the interface with the screed and to protect the ceramic floor edge profile.

M. Failure to install and maintain LG RexCourt products in accordance with recommended procedures can affect the performance of the products. Information and installation booklets are available from your Distributor.

3.5 INSTALLATION OF ACCESSORIES

A. Apply wall base to walls, columns, pilasters, casework and other permanent fixtures in rooms or areas where base is required. Install base in lengths as long as practicable, with preformed corner units. Tightly bond base to substrate throughout length of each piece, with continuous contact at horizontal and vertical surfaces.

B. On masonry surfaces, or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.

C. Place resilient edge strips tightly butted to flooring and secure with adhesive. Install edging strips at edges of flooring which would otherwise be exposed. Apply resilient accessories to stairs in strict accordance with manufacturer's installation instructions.

3.6 CLEANING AND PROTECTION

A. Perform following operations immediately upon completion of resilient flooring.

B. Sweep or vacuum floor thoroughly. No special maintenance is required. Use an impregnated dust control instrument.

C. DO NOT wash floor until time period recommended by resilient flooring manufacturer has elapsed to allow resilient flooring to become well adhered in adhesive, (minimum of 72 hours).

D. Damp mop floor being careful to remove black marks and excessive soil.

E. Remove any excess adhesive or other surface blemishes, using appropriate cleaner recommended by flooring manufacturers.

F. Protect flooring against damage during construction period to comply with resilient flooring manufacturer's directions.

G. If required by owner, apply protective floor polish to resilient flooring surfaces free soil, excess adhesive or surface blemishes. Use dollies to move stationary equipment or furnishings across floors.

H. Cover resilient flooring with undyed, untreated building paper until inspection for Substantial Completion.

I. Clean resilient flooring not more than four days prior to date scheduled for inspections intended to establish date of Substantial Completion in each area of project. Clean resilient flooring by method recommended by resilient flooring manufacturer.

3.7 EXTRA MATERIALS

A. Furnish extra maintenance materials to Owner. Furnish extra materials from same manufactured lot as materials installed. Deliver to Owner enclosed in protective packaging with appropriate identifying labels.

B. Sheet Flooring: Furnish not less than five linear yards for each type, color and pattern installed.

C. Resilient Accessories: Furnish not less than ten linear feet for each 500 linear feet or fraction thereof, of each type, size, color and pattern installed.

END OF SECTION

15

SECTION 15010 - BASIC REQUIREMENTS – MECHANICAL CONSTRUCTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes general administrative and procedural requirements for MECHANICAL installations. Administrative and procedural requirements are included in this Section and in various Division 1 Sections.

1.3 PERMITS AND FEES

A. Refer to Non-Technical Specifications, General Conditions for information relating to permits and fees.

1.4 PROJECT SCHEDULE

A. Refer applicable Non-technical specification sections for contract completion time and project construction schedule.

1.5 SHOP DRAWINGS AND SUBMITTALS

A. Follow the procedures specified in the Division 01 sections. Also refer to individual sections of the specifications for additional shop drawing and Submittal requirements.

B. It is the responsibility of the contractor to thoroughly review any and all shop drawings prior to submission to the Architect/Engineer. The contractor's review shall include verifying conformance to the project documents. The contractor will also be responsible for verifying the quantities of materials are adequate.

C. All shop drawings shall be submitted with a cover sheet indicating the name of the project, the Architects and Engineers name, the name of the vendor and the contractor. There must be sufficient space on the title sheet to allow the appropriate stamping by both the Architect and the Engineer. Shop drawings and submittals not conforming to the above may be returned without review.

D. All shop drawing submittals will include a listing of any and all exceptions to the requirements indicated in the specifications and on the drawings. Where there are no exceptions, the submittals shall indicate such. Submittals that do not have this listing will not be reviewed.

1.6 COORDINATION DRAWINGS

A. Coordination drawings are required. Refer to applicable Division 01 sections for the work required by this Contractor in preparing Coordination Drawings.

1.7 INSTALLATION ACCESSIBILITY

A. The installation of all equipment and appurtenances shall be completed so that access and clearances meet the requirements of the equipment manufacturer as well as the requirements of all applicable codes.

1.8 ACCEPTABLE MANUFACTURES

A. The design of the mechanical systems is based on the equipment manufacturer indicated on the drawings. Although individual sections of the specifications may list other manufacturers, these manufacturers will be accepted only if the following occurs:

1. Performance, as judged by the engineer, must be equal to the design based equipment.
2. Operating characteristics, as judged by the engineer, must be identical to those of the design based equipment.
3. Physical size of the equipment must be such that it can be installed in the available space, maintaining all required clearances for access/maintenance and meet the architectural requirements of the project such as installed height, length, width and operating weight. The contractor shall be responsible for verifying the equipment meets this requirement.
4. The contractor will be responsible for any additional supports, electrical wiring, piping changes, ductwork changes and/or controls that may be required if equipment other than the design based is used.

1.9 RECORD DOCUMENTS

A. Prepare record documents in accordance with applicable Division 01 sections. In addition to the requirements specified, indicate the following installed conditions:

1. Mains and branches of piping systems, with valves and control devices and numbered, concealed unions located, and with items requiring maintenance located (i.e., traps, strainers, expansion compensators, tanks, etc.). Valve location diagrams, complete with valve tag chart. Indicate actual inverts and horizontal locations of underground piping.
2. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
3. Approved substitutions, Contract Modifications, and actual equipment and materials installed.
4. Contract Modifications, actual equipment and materials installed.
5. Record Documents are to be prepared and/or revised to indicate the room names and numbers to be used by the owner after the projects is complete.

1.10 OPERATING AND MAINTENANCE MANUALS

A. Prepare maintenance manuals in accordance with applicable Division 01 sections.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

B. When materials and products are stored on site, provide protection from weather and temperatures that may cause damage to the items.

1.12 EXTRA MATERIALS

A. Various Sections may indicate extra materials (filters, fan belts etc) that are to be provided with the respective equipment. Where indicated, the contractor shall provide the required extra materials. When directed by the owner's representative, the contractor shall install the extra filters in the respective equipment. If no additional installation is required, the contractor shall forward, to the owner, all extra materials. When forwarding materials obtain a receipt for any materials forwarded.

1.13 WARRANTY

A. All equipment, material and labor provided by the contractor shall be warranted for a minimum period of one year after the date of substantial completion.

PART 2 - PRODUCTS

2.1 Not Applicable.

PART 3 - EXECUTION

3.1 ROUGH-IN

A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

B. Obtain equipment shop drawings for the various items that require rough-in.

3.2 MECHANICAL INSTALLATIONS

A. Sequence, coordinate, and integrate the various elements of mechanical systems, materials, and equipment. Comply with the following requirements:

1. Coordinate mechanical systems, equipment, and materials installation with other building components.
2. Verify all dimensions by field measurements.
3. Coordinate requirements for chases slots, and openings in other building components during the progress of construction, to allow for mechanical installations.
4. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.

5. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
6. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
7. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Engineer.
8. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
9. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location.
10. Install systems, materials, and equipment giving right-of-way priority to the systems required to be installed at a specified slope.
11. Seal all places where piping or ducts pass through walls and floors.

3.3 CUTTING AND PATCHING

A. Perform cutting, fitting, and patching of mechanical equipment and materials required to:

1. Uncover Work to provide for installation of ill-timed Work.
2. Removal and replacement of defective Work.
3. Remove and replace Work not conforming to requirements of the Contract Documents.
4. Remove samples of installed Work as specified for testing.
5. Install equipment and materials in existing structures. (delete in new bldg's)

B. Upon written instructions from the Architect, uncover and restore Work to provide for Architect/Engineer observation of concealed Work.

C. In areas of the building where new finishes are being provided, the patching required on a surface which is to receive a new finish will be to bring the underlying surface up to the finish required to receive the final finish. This contractor shall coordinate subsurface finish requirements with the finish trade contractor(s).

D. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

E. Patch existing finished surfaces and building components using new materials matching existing materials and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.

3.4 CLEANING

A. This contractor shall be required to thoroughly clean all installed equipment, duct work and piping. Cleaning shall be required before substantial completion on any phase of the project. Do not use cleaning materials and agents that are hazardous to health or property or that may damage the finished surfaces.

END OF SECTION 15010

SECTION 15080 – HVAC SYSTEM TESTING, ADJUSTING AND BALANCING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes Testing, Adjusting and Balancing (TAB) of the following air systems:

1. Constant-volume air systems.

1.3 SUBMITTALS

A. Qualification Data: Within 45 days of Contractor's Notice to Proceed, submit documentation that the TAB contractor and this Project's TAB team members meet the qualifications specified herein.

1.4 QUALITY ASSURANCE

A. TAB Contractor Qualifications: Engage a TAB entity certified by NEBB in the testing, adjusting and balancing of both air and water systems. The NEBB certified firm guarantees that all work will be performed in accordance with the applicable NEBB standards and procedures, and evidence of the firm's certification shall be provided for the engineer or designated owner's representative. In addition to the NEBB certified firm's guarantee, the NEBB certified firm shall provide to the engineer or designated owner's representative, a NEBB Certificate of Conformance Certification (issued by the NEBB National office) for work on the project specified. The Certificate of Conformance Certification provides written assurance that the NEBB Certified Firm will perform its contracted services in accordance with the following:

1. Applicable NEBB standards and procedures.

2. Provisions of the NEBB Quality Assurance Program which is described in the NEBB Operational Procedures

B. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."

1.5 PROJECT CONDITIONS

A. Full Owner Occupancy: Owner will occupy the site and portions of the existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's

operations. Review the project's construction phasing plan and provide the necessary number of TAB visits to comply with the phasing plan.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.

B. Refer to the Contract Drawings for notes that relate to balancing of the air and water systems.

C. Examine the approved shop drawing submittals for all HVAC systems and equipment prior to starting the TAB work.

D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.

E. Examine equipment performance data including fan curves.

1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.

F. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

G. Examine test reports specified in individual system and equipment Sections.

H. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.

I. Examine operating safety interlocks and controls on HVAC equipment.

J. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

A. Verify all systems are complete, including controls, before starting the TAB work.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems."

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.

1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
2. After testing and balancing, install test ports and duct access doors where required.
3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish to meet the requirements of the installation.

C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.

B. For variable-air-volume systems, develop a plan to simulate diversity.

C. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.

D. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.

E. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

F. Verify that motor starters are equipped with properly sized thermal protection.

G. Check dampers for proper position to achieve desired airflow path.

H. Check for airflow blockages.

I. Check condensate drains for proper connections and functioning.

J. Check for proper sealing of air-handling-unit components.

3.5 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.

1. Measure total airflow. Measure air flows in main ducts and at terminal outlets and inlets.

2. Measure fan static pressures as follows to determine actual static pressure:

   a. Measure outlet static pressure as far downstream from the fan as practical and upstream from restrictions in ducts such as elbows and transitions.
   b. Measure static pressure directly at the fan outlet or through the flexible connection.
   c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from the flexible connection, and downstream from duct restrictions.
   d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.

3. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and -treating equipment.

   a. Report the cleanliness status of filters and the time static pressures are measured.

4. Measure static pressures entering and leaving other devices, such as sound traps, heat-recovery equipment, and air washers, under final balanced conditions.
5. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
6. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.

B. Adjust volume dampers for main duct, and major branch ducts to indicated airflows within specified tolerances.

1. Measure airflow of branch ducts.

2. Measure static pressure at a point downstream from the balancing damper, and adjust volume dampers until the proper static pressure is achieved.
3. Re-measure each branch duct after all have been adjusted. Continue to adjust branch ducts to indicated airflows within specified tolerances.

C. Measure air outlets and inlets without making adjustments. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.

D. Adjust air outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using branch volume dampers rather than extractors and the dampers at air terminals. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents. Adjust patterns of adjustable outlets for proper distribution without drafts.

3.6 PROCEDURES FOR MOTORS

A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:

1. Manufacturer's name, model number, and serial number.
2. Motor horsepower rating.
3. Motor rpm.
4. Efficiency rating.
5. Nameplate and measured voltage, each phase.
6. Nameplate and measured amperage, each phase.
7. Starter thermal-protection-element rating.

B. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass of the controller to prove proper operation. Record observations including name of controller manufacturer, model number, serial number, and nameplate data.

3.7 PROCEDURES FOR TESTING, ADJUSTING, AND BALANCING EXISTING SYSTEMS

A. Perform a preconstruction inspection of existing equipment that is to remain and be reused.

1. Measure and record the operating speed, airflow, and static pressure of each fan.
2. Measure motor voltage and amperage. Compare the values to motor nameplate information.
3. Check the refrigerant charge.
4. Check the condition of filters.
5. Check the condition of coils.
6. Check the operation of the drain pan and condensate-drain trap.
7. Check bearings and other lubricated parts for proper lubrication.
8. Report on the operating condition of the equipment and the results of the measurements taken. Report deficiencies.

B. Before performing testing and balancing of existing systems, inspect existing equipment that is to remain and be reused to verify that existing equipment has been cleaned and refurbished. Verify the following:

1. New filters are installed.
2. Coils are clean and fins combed.
3. Drain pans are clean.
4. Fans are clean.
5. Bearings and other parts are properly lubricated.
6. Deficiencies noted in the preconstruction report are corrected.

C. Perform testing and balancing of existing systems to the extent that existing systems are affected by the renovation work.

1. Compare the indicated airflow of the renovated work to the measured fan airflows, and determine the new fan speed and the face velocity of filters and coils.
2. Verify that the indicated airflows of the renovated work result in filter and coil face velocities and fan speeds that are within the acceptable limits defined by equipment manufacturer.

3. If calculations increase or decrease the air flow rates and water flow rates by more than 5 percent, make equipment adjustments to achieve the calculated rates. If increase or decrease is 5 percent or less, equipment adjustments are not required.
4. Balance each air outlet.

3.8 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer. Include a list of instruments used for procedures, along with proof of calibration.

B. Final Report Contents: In addition to certified field-report data, include the following:
1. Fan curves.
2. Manufacturers' test data.
3. Field test reports prepared by system and equipment installers.
4. Other information relative to equipment performance; do not include Shop Drawings and product data.

C. General Report Data: In addition to form titles and entries, include the following general data:

1. Title page.
2. Name and address of the TAB contractor.
3. Project name and location.
4. Architect's and Engineer's name and address.
5. Contractor's name and address.
6. Report date.
7. Signature of TAB supervisor who certifies the report.
8. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
9. Summary of contents.
10. Data for terminal units, including manufacturer's name, type, size, and fittings.
11. Notes to explain why certain final data in the body of reports vary from indicated values.
12. Test conditions for fans and pump performance forms.

D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:

1. Quantities of outdoor, supply, return, and exhaust airflows.
2. Duct, outlet, and inlet sizes.
3. Balancing stations.
4. Position of balancing devices.

E. Air-Handling-Unit Test Reports: For air-handling units with coils, include the following:

1. Unit Data:

a. Unit identification.
b. Location.
c. Make and type.

d. Model number and unit size.
e. Manufacturer's serial number.
f. Unit arrangement and class.
g. Discharge arrangement.
h. Sheave make, size in inches (mm), and bore.
i. Center-to-center dimensions of sheave, and amount of adjustments in inches (mm).
j. Number, make, and size of belts.
k. Number, type, and size of filters.

2. Motor Data:

a. Motor make, and frame type and size.
b. Horsepower and rpm.
c. Volts, phase, and hertz.
d. Full-load amperage and service factor.
e. Sheave make, size in inches (mm), and bore.
f. Center-to-center dimensions of sheave, and amount of adjustments in inches (mm).

3. Test Data (Indicated and Actual Values):

a. Total air flow rate in cfm (L/s).
b. Total system static pressure in inches wg (Pa).
c. Fan rpm.
d. Discharge static pressure in inches wg (Pa).
e. Filter static-pressure differential in inches wg (Pa).
f. Preheat-coil static-pressure differential in inches wg (Pa).
g. Cooling-coil static-pressure differential in inches wg (Pa).
h. Heating-coil static-pressure differential in inches wg (Pa).
i. Outdoor airflow in cfm (L/s).
j. Return airflow in cfm (L/s).
k. Outdoor-air damper position.
l. Return-air damper position.

F. Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:

1. Report Data:

a. System and air-handling-unit number.
b. Location and zone.
c. Traverse air temperature in deg F (deg C).
d. Duct static pressure in inches wg (Pa).
e. Duct size in inches (mm).
f. Duct area in sq. ft. (sq. m).
g. Indicated air flow rate in cfm (L/s).
h. Indicated velocity in fpm (m/s).
i. Actual air flow rate in cfm (L/s).
j. Actual average velocity in fpm (m/s).
k. Barometric pressure in psig (Pa).

G. Instrument Calibration Reports:

1. Report Data:

    a. Instrument type and make.
    b. Serial number.
    c. Application.
    d. Dates of use.
    e. Dates of calibration.

3.9 INSPECTIONS

A. Initial Inspection:

1. After testing and balancing is complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.

B. Final Inspection:

1. After initial inspection is complete and documentation by random checks verifies that testing and balancing are complete and accurately documented in the final report, submit the final report for review.
2. The **Owner may** select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
3. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
4. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.

C. TAB Work will be considered defective if it does not pass final inspections. If TAB Work fails, proceed as follows:

1. Recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
2. If the second final inspection also fails, Owner may contract the services of another TAB contractor to complete TAB Work according to the Contract Documents and deduct the cost of the services from the original TAB contractor's final payment.

D. Prepare test and inspection reports.ADDITIONAL TESTS

E. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

F. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 15080

SECTION 15090 - HVAC SYSTEM INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes insulation materials and accessories for insulating HVAC system piping, ductwork, and equipment.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, thickness, and jackets (both factory and field applied, if any).

1.4 QUALITY ASSURANCE

A. Duct insulation, including adhesives, shall have a flame spread index not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E 84 or UL 723, using the procedures of ASTM E2231. Duct coverings shall not flame, glow, smolder or smoke when tested in accordance with ASTM C 411 at the temperature to which they are exposed in service. The test temperature shall not fall below 250 degrees F.

B. All insulation values are to meet the requirements of the applicable edition of the International Energy Conservation Code.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature. Store materials providing protection from the elements.

1.6 COORDINATION

A. Coordinate size and location of supports, hangers, and insulation shields. Coordinate clearance requirements with the duct and piping.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 1136 with factory-applied FSK jacket. Insulation conductivity (k) shall not exceed 0.27 Btu per inch/h – ft2 – deg. F.

1. Products: Subject to compliance with requirements, provide Johns Manville Microlite insulation or equal products manufactured by one of the following:

a. CertainTeed Corp.; Duct Wrap.

b. Knauf Insulation; Duct Wrap.

c. Owens Corning; All-Service Duct Wrap.

B. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. For duct and plenum applications, provide insulation with factory-applied FSK jacket.

1. Subject to compliance with requirements, provide Johns Manville 800 Series insulation or equal products manufactured by one of the following:

a. CertainTeed Corp.; Commercial Board.

b. Knauf Insulation; Insulation Board.

c. Owens Corning; Fiberglas 700 Series.

2.2 FIRE-RATED INSULATION SYSTEMS

A. Fire-Rated Board: Structural-grade, press-molded, xonolite calcium silicate, fireproofing board suitable for operating temperatures up to 1700 deg F (927 deg C). Comply with ASTM C 656, Type II, Grade 6. Tested and certified to provide a **2**-hour fire rating by a NRTL acceptable to authority having jurisdiction.

1. Products: Johns Manville; Super Firetemp M.

B. Fire-Rated Blanket: High-temperature, flexible, blanket insulation with FSK jacket that is tested and certified to provide a **2**-hour fire rating by a NRTL acceptable to authority having jurisdiction.

1. Products: Johns Manville; Firetemp Wrap.

2.3 EXTERIOR DUCT AND PLENUM INSULATION SYSTEM

A. Provide 2" thick rigid fiberboard insulation on the outside of the exterior duct. Comply cover the ductwork and fittings with rubber roofing material, EPDM 45 mill. Complete weathetight installation in accordance with the manufactures recommendations.

2.4 CEMENTS, ADHESIVES AND MASTICS

A. Provide all required types of cements, adhesives, mastics and other accessories required to install all insulation materials and systems. Prepare surfaces as required by the insulation manufacturers. Install cements, adhesives and mastics per manufacturer's recommendations.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes per the manufacturer's instruction with smooth, straight, and even surfaces; free of voids throughout. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment, duct system, and pipe system as specified in insulation system schedules.

B. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

C. Install insulation with longitudinal seams at top and bottom of horizontal runs.

D. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

E. Keep insulation materials dry during application and finishing.

F. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

G. Install insulation with least number of joints practical.

H. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

I. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

J. Install insulation with factory-applied jackets per manufacturer's instructions.

K. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

L. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

M. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

3.2 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations. Seal penetrations with flashing sealant.

B. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

C. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

D. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions. Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches (50 mm).

3.3 MINERAL-FIBER INSULATION INSTALLATION

A. Insulation Installation on Straight Pipes and Tubes per manufacturer's instructions. Where vapor barriers are required, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant. For insulation with factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at 6 inches (150 mm) o.c. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Fittings, Elbows, Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

C. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins, apply adhesives according to manufacturer's recommended coverage rates per unit area.

1. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.

2. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
3. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-(150-mm-) wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches (150 mm) o.c.

D. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins. Apply adhesives according to manufacturer's recommended coverage rates per unit area.

1. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
2. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-(150-mm-) wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches (150 mm) o.c.

3.4 FIRE-RATED INSULATION SYSTEM INSTALLATION

A. Where fire-rated insulation system is indicated, secure system to ducts and duct hangers and supports to maintain a continuous fire rating. Insulate duct access panels and doors to achieve same fire rating as duct. Install firestopping at penetrations through fire-rated assemblies.

3.5 DUCT INSULATION SCHEDULE, GENERAL

A. Plenums and Ducts Requiring Insulation:

1. Indoor, concealed supply, return and outdoor air.
2. Indoor, exposed supply, return and outdoor air.
3. Indoor, exposed and concealed kitchen hood exhaust.
4. Exterior supply and return.

B. Items Not Insulated:

1. Omit insulation on exposed supply and return as noted on the drawings.
2. Factory-insulated flexible ducts.
3. Factory-insulated plenums and casings.
4. Flexible connectors.
5. Factory-insulated access panels and doors.
6. Omit insulation on lined ducts unless otherwise noted.

3.6 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

A. Supply air ducts and plenums located above ceilings, shall be insulated with:

1. Mineral-Fiber Blanket: 1-1/2 inches thick and 1.5-lb/cu. ft. nominal density; "R" value 6.3; with vapor barrier having a maximum permeance of 0.05 perm.

B. Concealed and exposed Kitchen Hood Exhaust Duct and Plenum Insulation: Fire-rated board with a thickness as required to achieve 2-hour fire rating.

C. Double wall SS hood baffle (Refer to section 15200): Fire-rated board with a thickness as required to achieve 2-hour fire rating.

3.7 EXTERIOR DUCT AND PLENUM INSULATION SCHEDULE

A. Provide 2" thick rigid fiberboard insulation on the outside of the exterior duct. Comply cover the ductwork and fittings with rubber roofing material, EPDM 45 mill. Complete weathetight installation in accordance with the manufactures recommendations.

END OF SECTION 15090

SECTION 15091 - PLUMBING SYSTEM INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This section includes insulation materials and accessories for insulating Plumbing piping and equipment.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity and jackets (both factory- and field-applied, if any).

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.

1. Insulation Installed Indoors: Flame-spread rating of 25 or less, and smoke-developed rating of 50 or less.
2. Insulation Installed Outdoors: Flame-spread rating of 75 or less, and smoke-developed rating of 150 or less.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Ship insulation materials in containers marked by manufacturer with appropriate ASTM specification designation, type and grade, and maximum use temperature.

1.6 COORDINATION

A. Coordinate size and location of supports, hangers, and insulation shields. Coordinate clearance requirements with piping Installer for insulation application.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Mineral-Fiber Plumbing Pipe Insulation: Glass fibers bonded with a thermosetting resin complying with the following:

1. Products: Subject to compliance with requirements, provide Johns Manville Micro-Loc insulation or equal products manufactured by one of the following:
   a. Knauf Insulation.
   b. Owens Corning Fiberglas Insulation.
2. Type I, 850 deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ-SSL.
3. Provide High-impact-resistant, UV-resistant PVC jacketed fitting covers complying with ASTM D 1784, Class 16354-C; Flame spread 25 or less; Smoke development 50 or less.

B. Mineral-Fiber, Pipe and Tank Insulation: Mineral or glass fibers bonded with a thermosetting resin. Semirigid board material with factory-applied FSK jacket complying with ASTM C 1393, Type II or Type IIIA Category 2, or with properties similar to ASTM C 612, Type IB. Nominal density is 2.5 lb/cu. ft. (40 kg/cu. m) or more. Thermal conductivity (k-value) at 100 deg F (55 deg C) is 0.29 Btu x in./h x sq. ft. x deg F (0.042 W/m x K) or less. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, [provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]:
   a. CertainTeed Corp.; CrimpWrap.
   b. Johns Manville; MicroFlex.
   c. Knauf Insulation; Pipe and Tank Insulation.
   d. Manson Insulation Inc.; AK Flex.
   e. Owens Corning; Fiberglas Pipe and Tank Insulation.

C. Flexible Elastomeric Thermal Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.

1. Products: Subject to compliance with requirements, provide products manufactured by one of the following:
   a. Aeroflex USA Inc.; Aerocel.
   b. Armacell LLC; AP Armaflex.
   c. RBX Corporation; Insul-Sheet 1800 and Insul-Tube 180.

2.2 CEMENTS, ADHESIVES AND MASTICS

A. Provide all required types of cements, adhesives, mastics and other accessories required to install all insulation materials and systems per the Manufacturer's Installation Requirements. Prepare surfaces as required by the insulation manufacturers. Install cements, adhesives and mastics per manufacturer's recommendations.

PART 3 - EXECUTION

3.1 GENERAL APPLICATION REQUIREMENTS

A. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; free of voids throughout the length of piping, including fittings, valves, and specialties.

B. Refer to schedules at the end of this Section for materials, forms, jackets, and thicknesses required for each piping system.

C. Use accessories compatible with insulation materials and suitable for the service. Use accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Apply insulation with longitudinal seams at top and bottom of horizontal pipe runs.

E. Apply multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Seal joints and seams with vapor-retarder mastic on insulation indicated to receive a vapor retarder.

H. Keep insulation materials dry during application and finishing.

I. Apply insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by the insulation material manufacturer.

J. Apply insulation with the least number of joints practical.

K. Apply insulation over fittings, valves, and specialties, with continuous thermal and vapor-retarder integrity, unless otherwise indicated. Refer to special instructions for applying insulation over fittings, valves, and specialties.

L. Hangers and Anchors: Where vapor retarder is indicated, seal penetrations in insulation at hangers, supports, anchors, and other projections with vapor-retarder mastic.

1. Apply insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor retarders are indicated, extend insulation on anchor legs at least 12 inches (300 mm) from point of attachment to pipe and taper insulation ends. Seal tapered ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.
3. Install insert materials and apply insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by the insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect the jacket from tear or puncture by the hanger, support, and shield.

M. Insulation Terminations: For insulation application where vapor retarders are indicated, taper insulation ends. Seal tapered ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.

N. Apply adhesives and mastics at the manufacturer's recommended coverage rate.

O. Apply insulation with integral jackets as follows:
   1. Pull jacket tight and smooth.
   2. Circumferential Joints: Cover with 3-inch- (75-mm-) wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip and spaced 4 inches (100 mm) o.c.
   3. Longitudinal Seams: Overlap jacket seams at least 1-1/2 inches (40 mm). Apply insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches (100 mm) o.c.
      a. Exception: Do not staple longitudinal laps on insulation having a vapor retarder.
   4. Vapor-Retarder Mastics: Where vapor retarders are indicated, apply mastic on seams and joints and at ends adjacent to flanges, unions, valves, and fittings.
   5. At penetrations in jackets for thermometers and pressure gages, fill and seal voids with vapor-retarder mastic.

P. Roof Penetrations: Apply insulation for interior applications to a point even with top of roof flashing.
   1. Seal penetrations with vapor-retarder mastic.
   2. Apply insulation for exterior applications tightly joined to interior insulation ends.
   3. Extend metal jacket of exterior insulation outside roof flashing at least 2 inches (50 mm) below top of roof flashing.
   4. Seal metal jacket to roof flashing with vapor-retarder mastic.

Q. Exterior Wall Penetrations: For penetrations of below-grade exterior walls, terminate insulation flush with mechanical sleeve seal. Seal terminations with vapor-retarder mastic.

R. Interior Wall and Partition Penetrations: Apply insulation continuously through walls and floors.

S. Fire-Rated Wall and Partition Penetrations: Apply insulation continuously through penetrations of fire-rated walls and partitions.
   1. Firestopping and fire-resistive joint sealers are specified in other Division 22 Sections.

T. Floor Penetrations: Apply insulation continuously through floor assembly.
   1. For insulation with vapor retarders, seal insulation with vapor-retarder mastic where floor supports penetrate vapor retarder.

3.2 MINERAL-FIBER INSULATION APPLICATION

A. Insulation Installation on Straight Pipes and Tubes per manufacturer's instructions. Where vapor barriers are required, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant. For insulation with factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at 6 inches (150 mm) o.c. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Fittings, Elbows, Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.3 FLEXIBLE ELASTOMERIC INSULATION APPLICATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated. Apply Insulation on Pipe Fittings, Elbows, Valves and Pipe Specialties.

3.4 INSULATION APPLICATION SCHEDULE, GENERAL

A. Refer to insulation application schedules for required insulation materials, vapor retarders, and field-applied jackets. Application schedules identify piping system and indicate pipe size ranges and material, thickness, and jacket requirements.

3.5 INTERIOR INSULATION APPLICATION SCHEDULE

A. Service: Condensate drain piping.

1. Insulation Material: ¾" Flexible elastomeric.

END OF SECTION 15091

SECTION 15130 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This section includes domestic water piping and accessories located within the building. The scope of work consists of the extension of piping to a new hand washing sink that is located in the kitchen. This is part of Alternate Bid.

1.3 SUBMITTALS

A. Product Data: For the following products:

1. Piping materials.

1.4 QUALITY ASSURANCE

A. The installation shall comply with the requirements of the 2009 International Plumbing Code (I.P.C.) and any applicable local code amendments. Verify the code with requirements with the local code official(s) before beginning the work.

B. All domestic water system components require third party certification as indicated in Chapter 3; Table 303.4 of the IPC.

C. All domestic water piping and fittings are required to bear the identification of the manufacturer as required in Chapter 3; 303.1 of the IPC.

D. Comply with NSF 61 for potable domestic water piping and components.

1.5 PROJECT CONDITIONS

A. Interruption of Existing Water Service: Do not interrupt service to any portion of the existing occupied facilities until receiving permission. If interruption of the existing service is required, coordinate the work with the Owner and if necessary perform the work at a time, other than normal working hours, which is suitable to the owner.

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.

1. Wrought-Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
2. Fittings: manufactured to copper tube sizes with grooves designed to accept grooved couplings. Fittings shall be wrought copper conforming to ASTM B-75 alloy C12200 or ASTM B-152 alloy C11000 and ANSI B16.22.

B. Press-Fit Joint Copper Piping Systems: Provide Press-fit copper pipe products manufactured by Viega, Elkhart Products or NIBCO, Inc

1. Hard Copper Tube: ASTM B88.
2. Copper fittings: ASME B16.18, ASME B16.22 or ASME B16.26.
3. Press Fitting: Copper and copper alloy press fittings shall conform to material requirements of ASME B16.18 or ASME B16.22 and performance criteria of IAPMO PS 117. Sealing elements for press fittings shall be EPDM. Sealing elements shall be factory installed or an alternative supplied by fitting manufacturer. Press ends shall have SC (Smart Connect™) feature design (leakage path). In ProPress ½" to 4" dimensions the Smart Connect Feature assures leakage of liquids and/or gases from inside the system past the sealing element of an unpressed connection. The function of this feature is to provide the installer quick and easy identification of connections which have not been pressed prior to putting the system into operation.

2.2 PIPING JOINING MATERIALS

A. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

2.3 FLEXIBLE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Hyspan Precision Products, Inc.
2. Metraflex, Inc.
3. Universal Metal Hose; a Hyspan company.

B. Bronze-Hose Flexible Connectors: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.

1. Working-Pressure Rating: Minimum 200 psig (1380 kPa).
2. End Connections NPS 2 (DN 50) and Smaller: Threaded copper pipe or plain-end copper tube.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Install shutoff valve immediately upstream of each dielectric fitting.

C. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas. Install exposed piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

D. Install piping adjacent to equipment and specialties to allow service and maintenance. Install piping to permit valve servicing.

E. Install piping free of sags and bends.

F. Install fittings for changes in direction and branch connections.

3.2 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

B. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

C. Soldered Joints: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."

D. Pressure-Sealed Joints: Join copper tube and pressure-seal fittings with tools recommended by fitting manufacturer.

3.3 VALVE INSTALLATION

A. Install shutoff valve close to water main on each branch and riser serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops. Use ball valves for piping NPS 3 and smaller. Use butterfly valves for piping NPS 3 and larger.

3.4 PIPE HANGER AND SUPPORT INSTALLATION

A. Support all domestic water piping in accordance with the 2009 International Plumbing Code or local code requirements.

3.5 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties. Install piping adjacent to equipment and machines to allow service and maintenance.

B. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:

1. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code. Comply with requirements in Division 22 plumbing fixture Sections for connection sizes.

3.6 ESCUTCHEON INSTALLATION

A. Install escutcheons for penetrations of walls, ceilings, and floors.

3.7 FIELD QUALITY CONTROL

A. Test systems according to procedures of authorities having jurisdiction or, in absence of such procedures, testing shall be per the requirements on the International Plumbing Code Section 312, Test And Inspections.

B. Piping Inspections: coordinate all inspection requirements with the Authorities Having Jurisdiction. Do not enclose, cover, or put piping into operation until it has been inspected and approved.

C. Domestic water piping will be considered defective if it does not pass tests and inspections.

3.8 DISINFECTION OF POTABLE WATER SYSTEM(S)

A. All domestic water piping shall be purged and disinfected prior to utilization. The method to be followed shall be that required by the 2009 International Plumbing Code, Section 610, or the requirements of the local authorities.

3.9 PIPING SCHEDULE

A. Aboveground domestic water piping, shall be the following:

1. Hard copper tube, ASTM B 88, Type L (ASTM B 88M, Type B) copper solder-joint fittings; and soldered, press-fit or grooved joints.

3.10 VALVE SCHEDULE

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use ball valves for piping NPS 2 (DN 50) and smaller. Use butterfly or ball valves with flanged ends for piping NPS 2-1/2 (DN 65) and larger.

END OF SECTION 15130

SECTION 15161 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes soil, waste, and vent piping inside the building. The scope of work consists of the extension of piping to a new hand washing sink that is located in the kitchen. This is part of Alternate Bid.

1.3 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. The installation shall comply with the requirements of the 2009 International Plumbing Code (I.P.C.) and any applicable local code amendments. Verify the code with requirements with the local code officials before beginning the work.

C. All sanitary piping and fittings are required to bear the identification of the manufacturer as required in Chapter 3; 303.1 of the IPC. PVC pipe and fittings shall be third party certified per the requirements of the I.P.C.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.2 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

A. Hub and Spigot Cast Iron pipe and fittings shall be manufactured from gray cast iron and shall conform to ASTM A 74. All pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute® and listed by NSF® International. Pipe and fittings to be Service (SV) class.

B. Provide joints using a compression gasket manufactured from an elastomer meeting the requirements of ASTM C 564 or lead and oakum.

C. All pipe and fittings to be produced by a single manufacturer and are to be installed in accordance with manufacturer's recommendations and applicable code requirements.

2.3 PVC PIPE AND FITTINGS

A. Pipe and fittings shall be manufactured from virgin rigid PVC (polyvinyl chloride) vinyl compounds with a Cell Class of 12454 as identified in ASTM D 1784.

B. PVC Schedule 40 pipe shall be Iron Pipe Size (IPS) conforming to ASTM D 1785 and ASTM D 2665. PVC DWV fittings shall conform to ASTM D 2665. Pipe and fittings shall be manufactured as a system and be the product of one manufacturer. All pipe and fittings shall be manufactured in the United States. All systems shall utilize a separate waste and vent system. Pipe and fittings shall conform to NSF International Standard 14.

C. Adhesive Primer: ASTM F 656.

1. Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

D. Solvent Cement: ASTM D 2564.

1. Use PVC solvent cement that has a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Aboveground, soil and waste piping NPS 4 and smaller shall be any of the following:

1. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

3.2 PIPING INSTALLATION

A. PVC piping: Installation shall comply with the latest installation instructions published by the manufacturer and shall conform to all applicable plumbing code requirements. Buried pipe shall be installed in accordance with ASTM D 2321 and ASTM F 1668. Solvent cement joints shall be made in a two step process with primer conforming to ASTM F 656 and solvent cement conforming to ASTM D 2564. The system shall be protected from chemical agents, fire stopping materials, thread sealant, plasticized vinyl products, or other aggressive chemical agents not compatible with PVC compounds. Systems shall be hydrostatically tested after installation.

B. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

C. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:

1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.

D. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

E. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

3.3 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect drainage and vent piping to the following:

1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.

3.4 FIELD QUALITY CONTROL

A. Test systems according to procedures of authorities having jurisdiction or, in absence of such procedures, testing shall be per the requirements on the International Plumbing Code Section 312, Test And Inspections.

B. Piping Inspections: coordinate all inspection requirements with the Authorities Having Jurisdiction. Do not enclose, cover, or put piping into operation until it has been inspected and approved.

3.5 CLEANING

A. Clean interior of piping. Remove dirt and debris as work progresses. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work. Place plugs in ends of uncompleted piping at end of day and when work stops.

END OF SECTION 15161

SECTION 15171 - NATURAL-GAS PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This section includes natural gas piping, valves and accessories. The scope of work consists of the modifications and extensions of the piping to the new Rooftop Units. This is part of the Alternate Bids.

1.3 SUBMITTALS

A. Product Data: For each type of the following:

1. Piping materials and specialties.
2. Valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.
3. Pressure regulators. Indicate pressure ratings and capacities.

B. Operation and Maintenance Data: For gas valves and other accessories.

1.4 QUALITY ASSURANCE

A. The installation shall conform to the requirements of the 2009 International Fuel Gas Code and the requirements of the local utility company. Verify the code with requirements with the local utility before beginning the work.

B. Refer to the International Fuel Gas Code, Section 107, for the requirements of Inspections and Testing. Coordinate requirements with the applicable code officials and the utility company representatives.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Handling Flammable Liquids: Remove and dispose of liquids from existing natural-gas piping according to requirements of authorities having jurisdiction.

B. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

C. Store and handle pipes and tubes having factory-applied protective coatings to avoid damaging coating, and protect from direct sunlight.

1.6 PROJECT CONDITIONS

A. Interruption of Existing Natural-Gas Service: Do not interrupt natural-gas service to any portion of the existing occupied facilities until receiving permission. If interruption of the existing service is required, coordinate the work with the Owner and if necessary perform the work at a time, other than normal working hours, which is suitable to the owner.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

A. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40.

1. Malleable-Iron Threaded Fittings: ASME B1.20.1.
2. Wrought-Steel Welding Fittings: ASTM A 234/A 234M for butt welding and socket welding."
3. Protective Coating for Underground Piping: Factory-applied, three-layer coating of epoxy, adhesive, and PE.

a. Joint Cover Kits: Epoxy paint, adhesive, and heat-shrink PE sleeves.

2.2 PIPING SPECIALTIES

A. Appliance Flexible Connectors:

1. Indoor, Fixed-Appliance Flexible Connectors: Comply with ANSI Z21.24.
2. Indoor, Movable-Appliance Flexible Connectors: Comply with ANSI Z21.69.
3. Outdoor, Appliance Flexible Connectors: Comply with ANSI Z21.75.
4. Corrugated stainless-steel tubing with polymer coating.
5. Operating-Pressure Rating: 0.5 psig (3.45 kPa).
6. End Fittings: Zinc-coated steel.
7. Threaded Ends: Comply with ASME B1.20.1.
8. Maximum Length: 72 inches (1830 mm).

B. Quick-Disconnect Devices: Comply with ANSI Z21.41.

1. Copper-alloy convenience outlet and matching plug connector.
2. Nitrile seals.
3. Hand operated with automatic shutoff when disconnected.
4. For indoor or outdoor applications.
5. Adjustable, retractable restraining cable.

2.3 JOINING MATERIALS

A. Joint Compound and Tape: Suitable for natural gas.

B. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.4 MANUAL GAS SHUTOFF VALVES

A. Shut off valves are to conform to the requirements of the International Fuel Gas Code and the following standards, depending on gas pressure and application:

1. ANSI Z21.15.
2. ASME B16.44
3. ASME B16.33

B. General Requirements for Valves, NPS 2 and Smaller: Comply with ASME B16.33.

1. CWP Rating: 125 psig (862 kPa).
2. Threaded Ends: Comply with ASME B1.20.1.
3. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
4. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
5. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves 1 inch (25 mm) and smaller.
6. Service Mark: Valves 1-1/4 inches (32 mm) to NPS 2 (DN 50) shall have initials "WOG" permanently marked on valve body.

C. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim: MSS SP-110.

1. Body: Bronze, complying with ASTM B 584.
2. Ball: Chrome-plated bronze.
3. Stem: Bronze; blowout proof.
4. Seats: Reinforced TFE; blowout proof.
5. Packing: Threaded-body packnut design with adjustable-stem packing.
6. Ends: Threaded, flared, or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
7. CWP Rating: 600 psig (4140 kPa).
8. Listing: Valves NPS 1 (DN 25) and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
9. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

2.5 PRESSURE REGULATORS

A. Line Pressure Regulators: Comply with ANSI Z21.80.

1. Body and Diaphragm Case: Cast iron or die-cast aluminum.
2. Springs: Zinc-plated steel; interchangeable.
3. Diaphragm Plate: Zinc-plated steel.
4. Seat Disc: Nitrile rubber resistant to gas impurities, abrasion, and deformation at the valve port.
5. Orifice: Aluminum; interchangeable.
6. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
7. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet, and no pressure sensing piping external to the regulator.
8. Pressure regulator shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff.

9. Overpressure Protection Device: Factory mounted on pressure regulator.
10. Atmospheric Vent: Factory- or field-installed, stainless-steel screen in opening if not connected to vent piping.
11. Maximum Inlet Pressure: 5 psig.

B. Appliance Pressure Regulators: Comply with ANSI Z21.18.

1. Body and Diaphragm Case: die-cast aluminum.
2. Springs: Zinc-plated steel; interchangeable.
3. Diaphragm Plate: Zinc-plated steel.
4. Seat Disc: Nitrile rubber.
5. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
6. Factory-Applied Finish: Minimum three-layer polyester and polyurethane paint finish.
7. Regulator may include vent limiting device, instead of vent connection, if approved by authorities having jurisdiction.
8. Maximum Inlet Pressure: 5 psig.

PART 3 - EXECUTION

3.1 OUTDOOR PIPING SCHEDULE

A. Aboveground natural-gas piping shall be one of the following:

1. Steel pipe with malleable-iron fittings and threaded joints.
2. Steel pipe with wrought-steel fittings and welded joints.

3.2 INDOOR PIPING SCHEDULE FOR SYSTEM PRESSURES LESS THAN 5 PSIG

A. Aboveground branch piping shall be:

1. Steel pipe with malleable-iron fittings and threaded joints.
2. Steel pipe with wrought-steel fittings and welded joints.

3.3 ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE

A. Two-piece, full-port, bronze ball valves with bronze trim.

3.4 EXAMINATION

A. Examine roughing-in for natural-gas piping system to verify actual locations of piping connections before equipment installation. Proceed with installation only after unsatisfactory conditions have been corrected.

3.5 OUTDOOR PIPING INSTALLATION

A. Comply with NFPA 54 and the International Fuel Gas Code for installation and purging of natural-gas piping.

B. Install fittings for changes in direction and branch connections.

C. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Install steel pipe for sleeves smaller than 6 inches in diameter.
2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.

D. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

E. All piping to be installed a minimum of 4" above grade. Where gas piping is located on a roof surface, the pipe is shall be a minimum of 4' above the surface and properly supported.

F. Install pressure gage upstream and downstream from each service regulator.

3.6 INDOOR PIPING INSTALLATION

A. Comply with NFPA 54 and the International Fuel Gas Code for installation and purging of natural-gas piping.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure during progress of construction, to allow for mechanical installations.

D. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal. Locate valves for easy access.

F. Install natural-gas piping with a slope conforming to the requirements of the International Fuel Gas Code. Install piping free of sags and bends. Install fittings for changes in direction and branch connections.

G. Install escutcheons at penetrations of interior walls, ceilings, and floors.

H. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with fire stop materials.

I. Drips and Sediment Traps: Install drips at points where condensate may collect, including service-meter outlets. Locate where accessible to permit cleaning and emptying. Do not install where condensate is subject to freezing.

1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use nipple a minimum length of 3 pipe diameters, but not less than 3 inches (75 mm) long and same size as connected pipe. Install with space below bottom of drip to remove plug or cap.

J. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings, below grade or floors, and in floor channels unless indicated to be exposed to view.

K. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.

L. Connect branch piping from top or side of horizontal piping.

M. Install unions in pipes NPS 2 and smaller, adjacent to each valve, at final connection to each piece of equipment. Unions are not required at flanged connections.

N. Do not use natural-gas piping as grounding electrode.

O. Install strainer on inlet of each line-pressure regulator and automatic or electrically operated valve.

3.7 VALVE INSTALLATION

A. Install a manual gas shutoff valve, in an accessible location, at the gas connection to all gas fired equipment and/or gas fueled appliances. Shutoff valves to be installed per the following requirements:

1. The valve is to be located within the same room as the equipment.
2. The valve is to be located within 6'-0" of the equipment.
3. The valve shall be installed upstream of the union, connector or disconnect device.

B. Shutoff valves connected to emergency generators and other gaseous fueled equipment are to be installed per NFPA 37.

3.8 PIPING JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

B. Threaded Joints:

1. Thread pipe with tapered pipe threads complying with ASME B1.20.1.
2. Cut threads full and clean using sharp dies.
3. Ream threaded pipe ends to remove burrs and restore full inside diameter of pipe.
4. Apply appropriate tape or thread compound to external pipe threads unless dryseal threading is specified.

5. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

C. Welded Joints:

1. Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators.
2. Bevel plain ends of steel pipe.
3. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.

3.9 HANGER AND SUPPORT INSTALLATION

A. Pipe hangers and supports shall conform to the requirements of MSS SP-58.

B. Support vertical piping at base and at each floor with a maximum spacing of 120".

B. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:

1. NPS ¾ and NPS 1: Maximum span, 96 inches.
2. NPS 1-1/4 and larger: Maximum span, 120 inches.

3.10 CONNECTIONS

A. Connect to utility's gas main according to utility's procedures and requirements.

B. Install natural-gas piping electrically continuous, and bonded to gas appliance equipment grounding conductor of the circuit powering the appliance according to NFPA 70.

C. Install piping adjacent to appliances to allow service and maintenance of appliances.

D. Connect piping to appliances using manual gas shutoff valves and unions. Install valve within 72 inches (1800 mm) of each gas-fired appliance and equipment. Install union between valve and appliances or equipment.

E. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance.

3.11 PAINTING

A. Paint all exposed, exterior steel piping, valves, service regulators, valves, and piping specialties, except components, with factory-applied paint or protective coating.

1. Alkyd System: MPI EXT 5.1D.

a. Prime Coat: Alkyd anticorrosive metal primer.
b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
c. Topcoat: Exterior alkyd enamel semigloss.
d. Color: Gray.

B. Damage and Touchup: Repair marred and damaged factory-applied finishes with materials and by procedures to match original factory finish.

3.12 FIELD QUALITY CONTROL

A. Perform all required tests and inspections. Refer to Section 406 of the International Fuel Gas Code for requirements.

B. Natural-gas piping will be considered defective if it does not pass tests and inspections.

END OF SECTION 15171

SECTION 15200 - METAL DUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes metal ducts and accessories for air distribution systems.

1.3 PERFORMANCE REQUIREMENTS

A. Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article as indicated in Part 3 of this specification.

1.4 QUALITY ASSUANCE

A. Comply with the requirements of NFPA 90A and 90B.

B. The installation of all ductwork shall comply with the requirements of the 2009 International Mechanical Code and all applicable local codes and/or code amendments.

1.5 SUBMITTALS

A. Product Data: For each type of the following products:

1. Duct Liners and adhesives.
2. Sealants and gaskets.

1.6 DELIVERY, STORAGE AND HANDLING

A. Protect all ductwork, accessories and purchased products from damage during shipping, storage and handling. Prevent dirt and moisture from entering ducts and fittings. Store ductwork in an area which is protected from the weather. Ship, and store on-site, all ductwork with a protective closure at the ends of all ducts and fittings. The closure shall be a polyethylene film or other water tight covering.

PART 2 - PRODUCTS

2.1 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible, "Transverse (Girth) Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible, "Longitudinal Seams - Rectangular Ducts," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 2, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.2 SINGLE-WALL ROUND AND FLAT-OVAL DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.

B. Flat-Oval Ducts: Indicated dimensions are the duct width (major dimension) and diameter of the round sides connecting the flat portions of the duct (minor dimension).

C. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," "Transverse Joints - Round Duct," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

D. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," "Seams - Round Duct and Fittings," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

E. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," provide conical tees and laterals as indicated in Figure 3-5, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.3 SHEET METAL MATERIALS

A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G60.
2. Finishes for Surfaces Exposed to View: Mill phosphatized.

C. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304 or 316, as indicated in the "Duct Schedule" Article; cold rolled, annealed, sheet. Exposed surface finish shall be No. 2B, No. 2D, No. 3, or No. 4 as indicated in the "Duct Schedule" Article.

D. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.

E. Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for lengths 36 inches (900 mm) or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

2.4 DUCT LINER

A. Fibrous-Glass Duct Liner: Comply with, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers:

a. CertainTeed Corporation.
b. Johns Manville.
c. Knauf Insulation.
d. Owens Corning.

2. Materials: ASTM C 1071; surfaces exposed to airstream shall have a factory applied coating to prevent erosion of glass fibers and a factory applied coating on the edge of the liner.

a. Thickness: 1 inch or as noted on the drawings.
b. Density: 1.6 pcf.
c. Thermal performance: 4.2 "R"
d. Sound Absorption Coefficient: NRC 0.70
e. Fire-Hazard Classification: Maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84.
f. Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C 916.
f. Antimicrobial Erosion-Resistant Coating: Apply to the surface of the liner that will form the interior surface of the duct to act as a moisture repellent and erosion-resistant coating.

Antimicrobial compound shall be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.

B. Shop Application of Duct Liner: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," and manufacturer's instructions.

1. Where lined ducts are indicated, the duct dimensions indicated on the drawings are the metal size. The net free area size of the duct is the metal size minus the liner thickness. Adhere to a single layer of liner with adhesive coverage per the manufacturer's recommendations.
2. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.
3. Butt transverse joints without gaps, and coat joint with adhesive.
4. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.
5. Secure liner with mechanical fasteners per SMACNA standards and the manufacturer's recommendations.
6. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profiles or are integrally formed from duct wall. Fabricate edge facings at the following locations:

    a. Fan discharges.
    b. Intervals of lined duct preceding unlined duct.

7. Terminate inner ducts with buildouts attached to fire-damper sleeves, dampers, turning vane assemblies, or other devices. Fabricated buildouts (metal hat sections) or other buildout means are optional; when used, secure buildouts to duct walls with bolts, screws, rivets, or welds.

2.5 SEALANT AND GASKETS

A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.

B. Two-Part Tape Sealing System:

1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
2. Tape Width: 3 inches.
3. Sealant: Modified styrene acrylic.
4. Water resistant.
5. Mold and mildew resistant.
6. Maximum Static-Pressure Class: 10-inch wg (2500 Pa), positive and negative.
7. Service: Indoor and outdoor.
8. Service Temperature: Minus 40 to plus 200 deg F (Minus 40 to plus 93 deg C).
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
10. For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Water-Based Joint and Seam Sealant:

1. Application Method: Brush on.

2. Solids Content: Minimum 65 percent.
3. Shore A Hardness: Minimum 20.
4. Water resistant.
5. Mold and mildew resistant.
6. VOC: Maximum 75 g/L (less water).
7. Maximum Static-Pressure Class: 10-inch wg (2500 Pa), positive and negative.
8. Service: Indoor or outdoor.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

D. Solvent-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Base: Synthetic rubber resin.
3. Solvent: Toluene and heptane.
4. Solids Content: Minimum 60 percent.
5. Shore A Hardness: Minimum 60.
6. Water resistant.
7. Mold and mildew resistant.
8. For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
9. VOC: Maximum 395 g/L.
10. Maximum Static-Pressure Class: 10-inch wg (2500 Pa), positive or negative.
11. Service: Indoor or outdoor.
12. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

E. Flanged Joint Sealant: Comply with ASTM C 920.

1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.
5. Use: O.
6. For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

F. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

G. Round Duct Joint O-Ring Seals:

1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg (0.14 L/s per sq. m at 250 Pa) and shall be rated for 10-inch wg (2500-Pa) static-pressure class, positive or negative.
2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.6 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.

C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," "Rectangular Duct Hangers Minimum Size," - "Minimum Hanger Sizes for Round Duct."

D. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

E. Trapeze and Riser Supports:

1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

A. Install ductwork and accessories according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

B. The installing contractor is required to field verify all duct locations and elevations prior to fabrication of the ductwork.

C. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.

D. Electrical Equipment Spaces: Route ducts to avoid passing through transformer vaults and electrical equipment spaces and enclosures. Do not locate ducts over electrical panels.

E. Ship and store all ductwork with a protective closure at the ends of all ducts and fittings. The closure shall be a polyethylene film or other water tight covering. During construction, provide temporary polyethylene film enclosures at all openings in the duct systems, at the time of ductwork installation, to prevent entrance of dust and debris until final connections are completed. Failure to protect duct systems from construction dust and debris will result in the installing contractor being required to Mechanically Clean the affected duct system(s) as indicated in following Section 3.9.

F. Install round and flat-oval ducts in maximum practical lengths.

G. Install ducts with fewest possible joints. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.

H. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.

I. Install ducts with a clearance of 1 inch (25 mm), plus allowance for insulation thickness.

J. Where ducts pass through non-fire-rated interior masonry or drywall partitions and any type of exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.

K. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Division 23 Section "Air Duct Accessories" for fire and smoke dampers. Provide firestopping as specified in Section 230500.

L. Support ducts as indicated in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible Hangers. Spacing of all hangers shall be per SMACNA standards but in no case shall hangers be spaced at more than 10'-0" intervals.

3.2 DUCT SEALING

A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

3.3 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Hangers and Supports and the requirements of the International Mechanical Code.

B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.

1. Where practical, install concrete inserts before placing concrete.
2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches (100 mm) thick.
4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches (100 mm) thick.

C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," "Rectangular Duct Hangers Minimum Size," and "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches (610 mm) of each elbow and within 48 inches (1200 mm) of each branch intersection.

D. Hangers Exposed to View: Threaded rod and angle or channel supports.

E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet (5 m).

F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.4 CONNECTIONS

A. Make connections to equipment with flexible connectors complying with Section "Air Duct Accessories."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.5 DUCT SCHEDULE

A. Fabricate ducts with galvanized sheet steel except as otherwise indicated and as follows:

1. Exhaust Hood Baffle: Type 304 stainless steel. Double wall, insulated. Insulation shall be rigid fire rated insulation as specified in section 15090.

B. Supply Ducts:

1. Ducts Connected to the discharge of Air-Handling Units:

a. Pressure Class: Positive 2-inch wg.
b. Minimum SMACNA Seal Class: C.
c. SMACNA Leakage Class for Rectangular: 24.
d. SMACNA Leakage Class for Round and Flat Oval: 12.

C. Return Ducts:

1. Pressure Class: Positive or negative 1-inch wg.

a. Minimum SMACNA Seal Class: C.

D. Exhaust Ducts:

1. Pressure Class: Positive or negative 1-inch wg.

a. Minimum SMACNA Seal Class: C if negative pressure, and B if positive pressure.

E. Elbow Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."

a. Radius Type RE 1 with radius minimum equal to duct width.
b. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows." Use double width turning vanes in all ducts 18" wide and larger.

2. Round Duct: Provide stamped or segmented elbows similar to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "Round Duct Elbows."

a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Provide elbows with a center line radius equal to the duct diameter.

F. Branch Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connections."

    a. Rectangular Main to Rectangular Branch: 45 degree entry.
    b. Rectangular Main to Round Branch: 45 degree lead in

2. Round and Flat Oval: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-6, "Conical Tees."

END OF SECTION 15200

SECTION 15210 - DUCT ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes various duct accessories such as fire dampers, volume dampers and other items that are typically part of a duct system.

1.3 SUBMITTALS

A. Submit Product Data for all accessories provided on the project.

1.4 QUALITY ASSURANCE

A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Where indicated in Part 2, provide products manufactured by the listed companies.

2.2 SHEET METAL MATERIALS

A. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated.

B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653/A 653M and having G60 or G90 coating designation; ducts shall have mill-phosphatized finish for surfaces exposed to view.

C. Stainless Steel: ASTM A 480/A 480M.

D. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

E. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.3 BACKDRAFT DAMPERS

A. Manufacturers:

1. Air Balance, Inc.
2. American Warming and Ventilating.
3. CESCO Products.
4. Duro Dyne Corp.
5. Greenheck.
6. Penn Ventilation Company, Inc.
7. Prefco Products, Inc.
8. Ruskin Company.
9. Vent Products Company, Inc.

B. Description: Multiple-blade, parallel action gravity balanced, with center-pivoted blades of maximum 6-inch width, with sealed edges, assembled in rattle-free manner with 90-degree stop, steel ball bearings, and axles; adjustment device to permit setting for varying differential static pressure.

C. Frame: 0.052-inch thick, galvanized sheet steel, with welded corners and mounting flange.

D. Blades: 0.025-inch thick, roll-formed aluminum.

E. Blade Seals: Vinyl or Neoprene.

F. Blade Axles: Nonferrous.

G. Tie Bars and Brackets: Galvanized steel.

H. Return Spring: Adjustable tension.

2.4 MANUAL BALANCING DAMPERS

A. Manufacturers:

1. Air Balance, Inc.
2. American Warming and Ventilating.
3. Flexmaster U.S.A., Inc.
4. McGill AirFlow Corporation.
5. METALAIRE, Inc.
6. Nailor Industries Inc.
7. Penn Ventilation Company, Inc.
8. Ruskin Company.
9. Vent Products Company, Inc.

B. General Description: Factory fabricated, with required hardware and accessories. Stiffen damper blades for stability. Include locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.

1. Pressure Classes of 3-Inch wg or Higher: End bearings or other seals for ducts with axles full length of damper blades and bearings at both ends of operating shaft.

C. Standard Balancing Dampers: Multiple or single-blade, with opposed blade design, standard leakage rating, with linkage outside airstream, and suitable for horizontal or vertical applications. Provide single blade dampers where the duct dimension is 10 inches or less in height. Provide dampers with multiple blade design in larger ducts.

1. Steel Frames: Hat-shaped, galvanized sheet steel channels, minimum of 0.064 inch thick, with mitered and welded corners; provide frames with flanges where required for attaching to walls and flangeless frames where indicated for installing in ducts.
2. Roll-Formed Steel Blades: 0.064-inch thick, galvanized sheet steel.
3. Blade Axles: Galvanized steel.
4. Bearings: Molded synthetic.
5. Tie Bars and Brackets: Galvanized steel.

D. Jackshaft: 1-inch diameter, galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.

1. Length and Number of Mountings: Appropriate to connect linkage of each damper in multiple-damper assembly.

E. Damper Hardware: Zinc-plated, die-cast core with dial and handle made of 3/32-inch thick zinc-plated steel, and a 3/4-inch hexagon locking nut. Include center hole to suit damper operating-rod size. Include factory supplied or field installed elevated platform for insulated duct mounting.

2.5 FIRE DAMPERS

A. Manufacturers:

1. Air Balance, Inc.
2. CESCO Products.
3. Greenheck.
4. McGill AirFlow Corporation.
5. METALAIRE, Inc.
6. Nailor Industries Inc.
7. Penn Ventilation Company, Inc.
8. Prefco Products, Inc.
9. Ruskin Company.

B. Fire dampers shall be listed and bear the label of an approved testing agency indicating compliance with the requirements of the International Mechanical Code 607.3.1. Fire dampers shall be labeled according to UL 555.

C. Fire Rating: 1-1/2 or 3 hours as noted on the drawings.

D. Frame: Curtain type with blades outside airstream; fabricated with roll-formed, 0.034-inch thick galvanized steel; with mitered and interlocking corners.

E. Mounting Sleeve: Factory- or field-installed, galvanized sheet steel.

1. Minimum Thickness: 0.052 or 0.138 inch thick and of length to suit application.

F. Mounting Orientation: Vertical or horizontal as required.

G. Blades: Roll-formed, interlocking, 0.034-inch thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch thick, galvanized-steel blade connectors.

H. Horizontal Dampers: Include blade lock and stainless-steel closure spring.

I. Fusible Links: Replaceable, 165 deg F rated.

2.6 TURNING VANES

A. Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for vanes and vane runners. Vane runners shall automatically align vanes with the edge of the vanes parallel with the air flow.

B. Manufactured Turning Vanes: Fabricate 1-1/2-inch wide, double vane, curved blades of galvanized sheet steel; support with bars perpendicular to blades set 2 inches and set into vane runners suitable for duct mounting.

1. Manufacturers:

a. Ductmate Industries, Inc.
b. Duro Dyne Corp.
c. METALAIRE, Inc.
d. Ward Industries, Inc.

C. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill and install where noted on the drawings.

2.7 DUCT-MOUNTING ACCESS DOORS

A. General Description: Fabricate doors airtight and suitable for duct pressure class.

B. Door: Double wall, duct mounting, and rectangular; fabricated of galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class. Include 1-by-1-inch butt or piano hinge and cam latches.

1. Manufacturers:

a. American Warming and Ventilating.
b. CESCO Products.
c. Ductmate Industries, Inc.
d. Flexmaster U.S.A., Inc.
e. Greenheck.
f. McGill AirFlow Corporation.
g. Nailor Industries Inc.
h. Ventfabrics, Inc.
i. Ward Industries, Inc.

2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
3. Provide number of hinges and locks as follows:

a. Less Than 12 Inches Square: Secure with two sash locks.

b. Up to 18 Inches Square: Two hinges and two sash locks.
c. Up to 24 by 48 Inches: Three hinges and two compression latches with outside and inside handles.
d. Sizes 24 by 48 Inches and Larger: One additional hinge.

C. Seal around frame attachment to duct and door to frame with neoprene or foam rubber.

D. Insulation: 1-inch thick, fibrous-glass or polystyrene-foam board.

2.8 FLEXIBLE CONNECTORS

A. Manufacturers:

1. Ductmate Industries, Inc.
2. Duro Dyne Corp.
3. Ventfabrics, Inc.
4. Ward Industries, Inc.

B. General Description: Flame-retardant or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.

C. Metal-Edged Connectors: Factory fabricated with a fabric strip 5-3/4 inches wide attached to two strips of 0.028-inch thick, galvanized sheet steel or 0.032-inch thick aluminum sheets. Select metal compatible with ducts.

D. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.

1. Minimum Weight: 26 oz./sq. yd.
2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
3. Service Temperature: Minus 40 to plus 200 deg F.

E. Outdoor System, Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.

1. Minimum Weight: 24 oz./sq. yd.
2. Tensile Strength: 530 lbf/inch in the warp and 440 lbf/inch in the filling.
3. Service Temperature: Minus 50 to plus 250 deg F.

2.9 FLEXIBLE DUCTS

A. Manufacturers:

1. Thermaflex MK-E or equal..

B. Insulated Flexible Duct: UL 181, Class 1, flexible air duct complying with NFPA Standards 90A and 90B. Flexible duct shall be factory made and composed of: a CPE liner duct permanently bonded to a coated spring steel wire helix and supporting a fiberglass insulating blanket.

C. Operating temperatures: -20 Deg. F. minimum; 250 deg. F. maximum.

D. Operating pressure: 10" w.g. positive; 1" w.g. negative.

E. Insulation: minimum R 6.0.

F. Rated velocity 5000 fpm.

G. Flexible Duct Clamps: Nylon strap to suit duct size.

2.10 DUCT ACCESSORY HARDWARE

A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct insulation thickness.

B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 APPLICATION AND INSTALLATION

A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for metal ducts.

B. Provide duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.

C. Install backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.

D. Install manual balancing dampers where indicated on the contract drawings.

E. Install fire and smoke dampers, with fusible links, according to manufacturer's UL-approved written instructions.

F. Install duct access doors to allow for inspecting, adjusting, and maintaining accessories and terminal units as follows:

1. Adjacent to fire or smoke dampers, providing access to reset or reinstall fusible links.
2. To interior of ducts for cleaning at maximum 100-foot.

G. Install the following sizes for duct-mounting, rectangular access doors:

1. Minimum size 12 x 12 inches.
2. Ducts with one dimension 24" or larger, install a 20" x 20" access door.

H. Install flexible connectors immediately adjacent to equipment in ducts associated with fans and motorized equipment supported by vibration isolators.

I. Provide turning vanes in all mitered elbows.

3.2 ADJUSTING

A. Adjust duct accessories for proper settings.

END OF SECTION 15210

SECTION 15230 - DIFFUSERS, REGISTERS AND GRILLES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes ceiling and wall mounted diffusers, registers, and grilles.

B. Submit manufacturer's technical product data for all air outlets. For each model indicated, include the following:

1. Data Sheet: For each type of air outlet and inlet, and accessory furnished; indicate construction, finish, and mounting details.
2. Schedule of diffusers, registers, and grilles indicating drawing designation, room location, quantity, model number, size, and accessories furnished. The schedule shall also indicate static-pressure drop, and noise criteria ratings (NC) for each air outlet and inlet. A generic catalog sheet indicating pressure drop and NC ratings is not acceptable.

1.2 QUALITY ASSURANCE

A. Install diffusers, registers, and grilles according to NFPA 90A, "Standard for the Installation of Air-Conditioning and Ventilating Systems.

B. Source Limitations: Obtain diffusers, grilles and registers through one source from a single manufacturer, regularly engaged in production of the equipment.

PART 2 - PRODUCTS

2.1 LOUVERED FACE CEILING AIR DIFFUSERS

A. General: Provide manufacturer's standard ceiling air diffusers where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation.

B. Ceiling diffusers shall have a fixed or adjustable horizontal discharge pattern. The inner louver assembly shall be flush with the outer frame with a 1, 2, 3 or 4-way directional pattern. Individual louvers shall have a horizontal lip to create a ceiling pattern at reduced air flows. The inner core must be easily removable .

C. Ceiling Compatibility: Provide louvered diffusers with border styles that are compatible with adjacent ceiling systems. Refer to general construction drawings and specifications for types of ceiling systems which will contain each type of ceiling air diffuser.

D. Types: The model numbers and manufacturers indicated on the diffuser schedule set the standard for the products to be used. Provide louvered diffusers of type as scheduled and with accessories as required.

E. Provide each diffuser in the manufacturer's standard white electro-coated finish unless otherwise indicated on the drawings.

F. Diffusers shall be provided with the same style and characteristics as provided with the basis of design product named on the drawings.

2.2 REGISTERS AND GRILLES

A. General: Except as otherwise indicated, provide manufacturer's standard registers and grilles where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation. Provide opposed blade damper on all registers.

B. Performance: Provide registers and grilles that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device as listed in manufacturer's current data.

C. Structural Integrity: floor registers and grilles are required to meet the structural requirements indicated in the International Mechanical Code Chapter 6: 603.17.1.

D. Compatibility: Provide registers and grilles with border styles indicated and that are compatible with adjacent wall or ceiling systems, and that are specifically manufactured to fit into construction with accurate fit and adequate support. Refer to general construction drawings and specifications for types of construction which will contain each type of register and grille.

E. Types: The model numbers and manufacturers indicated on the schedules set the standard for the products to be used. Provide registers and grilles of type as scheduled and with accessories as required.

F. Provide each register and/or grille in manufacturer's standard white electro-coated finish. Refer to equipment schedules for grilles/registers that require a custom color. When required, the Architect will select the custom colors.

G. Registers and grilles shall be provided with the same style and characteristics as provided with the basis of design product named on the drawings.

2.3 LOUVERED RETURN AIR GRILLES

A. Provide nominal 5" deep extruded aluminum louvered return louvers where shown, of the size, shape, capacity and model type indicated.

B. Provide frame type to suit the requirements of the installation.

C. Provide each louver in a factory applied primer suitable for field painting. Refer to equipment schedules for louvers that require custom colors. When required, provide custom color that will be selected by the Architect.

D. Provide louvered grilles manufactured by Pottorff or equal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install diffusers, registers, and grilles level and plumb.

B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practicable. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.3 ADJUSTING

A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

3.4 CLEANING

A. After installation of diffusers, registers, and grilles, inspect exposed finish. Clean exposed surfaces to remove burrs, dirt, and smudges. Replace diffusers, registers, and grilles that have damaged finishes.

END OF SECTION 15230

SECTION 15400 – PACKAGED ROOFTOP AIR-HANDLING UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes packaged DX cooling / gas heating rooftop air-handling units and accessories. This section of the specifications applied to the alternate bids for the replacement of the existing rooftop unit.

1.3 SUBMITTALS

A. Product Data: Include manufacturer's technical data for each unit, including rated capacities, dimensions, required clearances, characteristics, furnished specialties, and accessories.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

C. Wiring Diagrams: Power, signal, and control wiring.

D. Operation and Maintenance Data for all units.

E. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

A. ARI Compliance:

1. Comply with ARI 210/240 and ARI 340/360 for testing and rating energy efficiencies for RTUs.
2. Comply with ARI 270 for testing and rating sound performance for RTUs.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.5 WARRANTY

A. Special Warranty: Manufacturer agrees to replace components of the units that fail in materials or workmanship within specified warranty period.

1. Warranty Period for Compressors: five years from date of Substantial Completion.

1.6 EXTRA MATERIALS

A. In addition to the equipment and materials furnished with each unit, furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Filters: Two complete sets of each type filter, for each unit.
2. Fan Belts: One set for each air-handling unit fan.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide units manufactured by Johnson Controls/York. The following manufactures, meeting the requirements of these specifications shall also be acceptable:

1. Carrier
2. Lennox
3. Trane

Other manufactures can also be considered, but must be submitted prior to the bid as a substitution. See the substitution section of Division 1 of the specifications.

2.2 GENERAL UNIT DESCRIPTION

A. All units have two compressors with independent refrigeration circuits to provide 2 stages of cooling. The units shall be provided with hot gas reheat and a dehumidification cycle of control. The units shall have economizer cycle and where indicated power exhaust. Units shall be factory assembled, single package, gas heating / DX cooling, designed for outdoor installation. They shall have built in field convertible duct connections for down discharge supply/return or horizontal discharge supply/return and be available with factory installed options or field installed accessories. The units shall be factory wired, piped, charged, and factory tested prior to shipment. All unit wiring shall be both numbered and color coded. The cooling performance shall be rated in accordance with DOE and ARI test procedures. Units shall be CSA certified to ANSI Z21.47 and UL 1995/CAN/CSA No. 236-M90 standards.

B. Unit cabinet shall be constructed of G90 galvanized steel with exterior surfaces coated with a non-chalking, powder paint finish, certified at 1000 hour salt spray test per ASTM-B117 standards. Indoor blower sections shall be insulated with 1" thick insulation coated on the airside. Aluminum foil faced insulation shall be used in the unit's compartments and be fastened to prevent insulation from entering the air stream. Cabinet doors shall be hinged with access for easy servicing and maintenance. Full perimeter base rails shall be provided to assure reliable transit of equipment, overhead rigging, fork truck access and proper sealing on roof curb applications. Disposable 2" filters shall be furnished and be accessible through hinged access door. Fan performance measuring ports shall be provided on the outside of the cabinet to allow accurate air measurements of evaporator fan performance without removing panels or creating bypass of the coils. Condensate pan shall be slide out design, constructed of a non corrosive material, internally sloped and conforming to ASHRAE 62-89 standards. Condensate connection shall be a minimum of ¾" I.D. female and be rigid mount connection.

C. Fan shall be a belt drive assembly and include an adjustable pitch motor pulley. Job site selected brake horsepower shall not exceed the motors nameplate horsepower rating plus the service factor. Units shall be designed to operate within the service factor. Fan wheel shall be double inlet type with forward curve blades, dynamically balanced to operate smoothly throughout the entire range of operation. Airflow design shall be constant volume. Bearings shall be sealed and permanently lubricated for longer life and no maintenance. Entire blower assembly and motor shall be slide out design.

D. The outdoor fans shall be of the direct drive type, discharge air vertically, have aluminum blades riveted to corrosion resistant steel spider brackets and shall be dynamically balanced for smooth operation. The outdoor fan motors shall have permanently lubricated bearings internally protected against overload conditions and staged independently. A cleaning window shall be provided on two sides of the units for coil cleaning.

2.3 REFRIGERANT COMPONENTS

A. Compressors: Shall be fully hermetic type (scroll), direct drive, internally protected with internal high-pressure relief and over temperature protection. The hermetic motor shall be suction gas cooled and have a voltage range of + or – 10% of the unit nameplate voltage. Provide internal spring isolation and sound muffling to minimize vibration and noise, and be externally isolated on a dedicated, independent mounting.

B. Coils: Evaporator and Condenser coils shall have aluminum plate fins mechanically bonded to seamless internally enhanced copper tubes with all joints brazed. Evaporator and Condenser coils shall be of the direct expansion, draw-thru design.

C. Refrigerant Circuit and Refrigerant Safety Components:

1. Independent fixed-orifice or thermally operated expansion devices.
2. Solid core filter drier/strainer to eliminate any moisture or foreign matter.

3. Accessible service gage connections on both suction and liquid lines to charge, evacuate, and measure refrigerant pressure during any necessary servicing or troubleshooting, without losing charge.
4. The unit shall have two independent refrigerant circuits, equally split in 50% capacity increments. Units shall be equipped with hot gas reheat and a dehumidification cycle of control.

2.4 GAS HEATING

A. Heat exchanger and exhaust system shall be constructed of aluminized steel and shall be designed with induced draft combustion with post purge logic, energy saving direct spark ignition, and redundant main gas valve. The heat exchanger shall be of the tubular type, constructed of T1-40 aluminized steel for corrosion resistance and allowing minimum mixed air entering temperature of 40 °F. Burners shall be of the in-shot type, constructed of aluminum-coated steel. Gas heater shall be two stage. All gas piping shall enter the unit cabinet at a single location, through either the side or bottom, without any field modifications. An integrated control board shall provide timed control of evaporator fan functioning and burner ignition. Heating section shall be provided with the following minimum protection:

1. Primary and auxiliary high-temperature limit switches.
2. Induced draft motor speed sensor.
3. Flame roll out switch.
4. Flame proving controls.

2.5 ELECTRICAL

A. All unit power wiring shall enter unit cabinet at a single factory provided location and be capable of side or bottom entry to minimize roof penetrations and avoid unit field modifications. Separate side and bottom openings shall be provided for the control wiring. Unit shall have single point power connection.

2.6 CONTROLS

A. Unit shall be complete with self-contained low-voltage control circuit protected by a resettable circuit breaker on the 24-volt transformer side.

B. Unit shall incorporate a lockout circuit which provides reset capability at the space thermostat or base unit should any of the following standard safety devices trip and shut off compressor:

1. Loss-of-charge/Low-pressure switch.
2. High-pressure switch.

3. Freeze-protection thermostat, evaporator coil. If any of the above safety devices trip, an LED (light-emitting diode) indicator shall flash a diagnostic code that indicates which safety switch has tripped.

C. Unit shall be complete with self-contained low-voltage control circuit protected by a resettable circuit breaker on the 24-volt transformer side.

D. Unit shall incorporate "AUTO RESET" compressor over temperature, over current protection.

E. Unit shall operate with conventional thermostat designs and have a low voltage terminal strip for easy hook-up. Refer to HVAC Control Section of these specifications for the coordination of the required controls. New equipment controller must be compatable with the specified controls.

F. Unit control board shall have on-board diagnostics and fault code display.

G. Standard controls shall include anti-short cycle and low voltage protection.

H. Control board shall monitor each refrigerant safety switch independently.

I. Control board shall retain last 5 fault codes in non-volatile memory, which will not be lost in the event of a power loss.

2.7 ROOF CURBS

A. Provide factory supplied insulated, solid bottom, plenum roof curb, 16 gauge perimeter made of zinc coated steel. Curb must be 30" high and the supply plenum and return plenum must be fully separated. Curb shall be manufactured in accordance with the National Roofing Contractors Association guidelines. The contractor must field cut the curb for supply and return connection. See contract drawing for details.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of RTUs.

B. Examine roughing-in for RTUs to verify actual locations of piping and duct connections before equipment installation.

C. Examine roofs for suitable conditions where RTUs will be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Roof Curb: Install on roof structure level and secure, according to manufacturer's instructions. Install units on curbs and coordinate roof penetrations and flashing with roof construction. Secure units to curb, and secure curb base to roof framing.

3.3 CONNECTIONS

A. Install condensate drain, minimum connection size, with trap and indirect connection to nearest roof drain or area drain.

B. Install piping adjacent to unit's to allow service and maintenance.

C. Duct installation requirements are specified in other Sections. Drawings indicate the general arrangement of ducts. HVAC contractor must field cut roof curb for supply and return connections. Do not cut out decking under entire roof curb. Connect supply ducts to RTUs with flexible duct connectors

3.4 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service. Complete installation and startup checks according to manufacturer's written instructions.

1. After startup and performance testing and prior to Substantial Completion, replace existing filters with new filters.

3.5 CLEANING AND ADJUSTING

A. After completing system installation and testing, adjusting, and balancing RTU and air-distribution systems, clean filter housings and install new filters.

3.6 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain RTUs.

END OF SECTION 15400

SECTION 15530 – ELECTRIC HEATERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes various types of electric heaters.

1.3 SUBMITTALS

A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for each product indicated.

B. Source Limitations: Obtain all electric heating units through one source from a single manufacturer, regularly engaged in production of components who issues complete catalog data on the product offering.

C. Shop Drawings: Detail equipment assemblies and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection. Include the following:

1. Plans, elevations, sections, and details.
2. Location and size of each field connection.
3. Equipment schedules to include rated capacities, operating characteristics, furnished specialties, and accessories.
4. Location and arrangement of integral controls.
5. Wiring Diagrams: Power, signal, and control wiring.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2004, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

C. ASHRAE/IESNA 90.1-2004 Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2004, Section 6 - "Heating, Ventilating, and Air-Conditioning."

PART 2 - PRODUCTS

2.1 WALL/CABINET UNIT HEATERS (less than 5 k.w.)

A. Manufacturers: Subject to compliance with requirements, provide products manufactured by MARKEL. Products considered equal, by the Engineer, will be considered.

B. The heating equipment shall include an electric, automatic fan forced electric air heater. The heater shall be designed for wall recess or surface mounting. Heaters shall be UL Listed.

C. The heating element shall be of the non-glowing design consisting of a special resistance wire enclosed in a steel sheath to which steel plate fins are copper brazed. It shall be warranted for 5 years.

D. Fan and motor: Fan shall be five-bladed aluminum. Fan motor shall be totally enclosed.

E. Provide fan delay switch. Control shall be of bi-metallic, snap-action type and shall activate fan after heating element reaches operating temperature. The fan shall continue to operate after the thermostat is satisfied and until the heating element is cool.

F. Provide factory mounted double-pole, single throw disconnect switch. Mount to the box for positive disconnect of power supply. The disconnect will be completely concealed behind the front grille panel.

G. Low Voltage Relays: Provide 24-volt and 120-volt low voltage relays to control 208, 240 or 277 volt heaters in conjunction with central energy control systems. The built-in thermostat can then be used as one of the thermostats in an automatic night set back operation. Control devices and operational sequences are specified in Division 230905.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive unit heaters for compliance with requirements for installation tolerances and other conditions affecting performance. Examine roughing-in for electrical connections to verify actual locations before unit heater installation. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install cabinet unit heaters to comply with NFPA 90A.

B. Install new filters in each fan-coil unit within two weeks of Substantial Completion.

3.3 CONNECTIONS

A. Ground equipment according to the applicable Division 26 Specifications.

B. Connect wiring according to the applicable Division 26 Specifications.

3.4 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections and prepare test reports:

1. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Operate electric heating elements through each stage to verify proper operation and electrical connections. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

B. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 15530

SECTION 15900 - HVAC SYSTEM CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Refer to other HVAC Specification Sections which describe the requirement s of HVAC system components.

1.2 SUMMARY

A. This section of the specification describes the control components and materials required to control the Rooftop HVAC units on this project. The control scope as described in these specifications is required for the BASE BID (reusing existing equipment) as well as Alternate Bid 1 and Alternate Bid 2 (New Equipment).

1.3 SUBMITTALS

A. Product Data: Include manufacturer's technical literature for each control device. Indicate dimensions, capacities, performance characteristics, electrical characteristics, finishes for materials, and installation and startup instructions for each type of product indicated.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

E. Operation and Maintenance Data: For HVAC instrumentation and control system to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Automatic control system manufacturer's authorized representative who is trained and approved for installation of system components required for this Project.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with ASHRAE 135 for DDC system components.

D. UL listed to Standards UL864 (Fire), UL2017 (Signaling Systems), UL916 (Energy Management Systems), UL1017 (Security), UL1610 (Central Station) and UL 294 (Access Control).

1.6 COORDINATION

A. Coordinate location of thermostats, humidistats, and other exposed control sensors with plans and room details before installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements provide a control system, with products manufactured by:

1. Honeywell or Equal.

2.2 COMMERCIAL PROGRAMMABLE THERMOSTAT

A. Description: Provide 7-day programmable thermostats and proper sub base where indicated on the contract drawing. Thermostat shall be Honeywell model T7350 or equal. Thermostat most must be capable of three stage cooling, two stage heating, economizer control, dehumidification cycle, receive input from multiple remote temperature sensors for averaging control, receive input from remote return air temperature sensor, receive input from return air humidity sensor for dehumidification cycle, discharge air and outdoor air inputs. Thermostat must automatically changeover modes of operation.

B. Electrical Ratings: 24 Vac, 50/60 Hz, output 4-20 MA

C. Accessories:

1. Remote Space Temperate Sensors; Honeywell TR21, or equal.
2. Remote Return Air Temperature Sensors; Honeywell H7015, or equal.
3. Outdoor Air Sensors; Honeywell C703IG, or equal.
4. Economizer Modual; Honeywell W7210, or equal.
5. Remote Return Air Humidity Sensors; Honeywell H7635, or equal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that power supply is available to all system components. Where required, provide low and/or line voltage power from the nearest electrical panel.

B. Install all power wiring per the National Electric Code and applicable Division 26 Sections.

3.2 INSTALLATION

A. Connect and configure equipment to achieve sequence of operation specified.

B. Verify location of thermostats, humidistats, and other exposed control sensors with Drawings and room details before installation. Install devices 48 inches above the floor.

3.3 ELECTRICAL WIRING AND CONNECTION INSTALLATION

A. Install raceways, boxes, and cabinets according to Division 26 Sections.

B. Install building wire and cable according to Division 26 Sections.

3.4 PACKAGED ROOFTOP UNIT CONTROL SEQUENCES

A. Space temperatures shall be controlled by 7-Day programmable thermostat and accessories as described here-in. Provide remote air temperature sensors for RTU-1 and RTU-2. Provide remote wall sensors (where indicated on the drawings) for RTU-3 and RTU-4. Wire these remote devises to the appropriate programmable thermostat.

B. For units over 2000 cfm, provide control wiring between the unit starter and auxiliary contact on duct mounted smoke detectors, furnished by others, to allow for fan shut down when the fire alarm system activates. If activated close the outside air damper.

C. Unoccupied heating cycle: The unit will be off with the outside air damper closed. When the space temperature (return or average) falls below the unoccupied set point temperature of 60 degrees F. (adjustable), start the supply fan and energize the gas heat. The outdoor air damper will remain closed. When the unoccupied set point temperature has been restored, reverse the above sequence.

D. Unoccupied cooling cycle: The unit will be off with the outside air damper closed. When the space temperature (return or average) is above the unoccupied set point temperature, start the supply fan, energize the DX cooling. The outdoor air damper will remain closed. When the unoccupied set point temperature has been restored, reverse the above sequence.

E. Occupied Heating Cycle:

1. During the occupied cycle the supply fan will run continuously. Stage the gas heat to maintain the adjustable space temperature set point (return or average). The outdoor air damper will be open to allow the scheduled amount of outdoor air.

F. Occupied Cooling Cycle:

1. During the occupied cycle the supply fan will run continuously and the DX cooling will modulate to maintain the space temperature (return or average). The outdoor air damper will be open to allow the scheduled amount of outdoor air.

2. When outdoor air conditions are suitable (both dry bulb and wet bulb) allow the unit to provide free space cooling by modulating open the outdoor air damper past the maximum ventilation position. When outdoor air damper goes beyond the minimum position start the unit power exhaust fan (RTU-3 and RTU-4).

G. De-Humidification Mode:

1. Provide return air humidity sensor for each unit. Whenever the relative humidity exceeds the relative humidity set point, energize cooling and the hot gas reheat to maintain set point.

3.5 ADJUSTING

A. Calibrating and Adjusting:

1. Calibrate all sensors in accordance with the manufactures recommendations.

B. Adjust and program thermostats to the building owner's requirements.

3.6 DEMONSTRATION AND ON-SITE ASSISTANCE

A. The Contractor/Installer shall provide a complete demonstration of the control system. Provide and schedule a minimum of 4 hours on-site training at a time suitable to the owner's representative.

B. On-site assistance: during the warranty period, the Contractor/Installer shall provide additional on-site assistance for training and re-programming, when requested by the owner. This on-site assistance shall be for a period of 2 hours for each visit, with a total of 3 visits.

END OF SECTION 15900

16

SECTION 16010 – BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes general administrative and procedural requirements for electrical installations. The following administrative and procedural requirements are included in this Section to expand the requirements specified in Division-1:

1. Submittals.
2. Coordination Drawings.
3. Record documents.
4. Maintenance manuals.
5. Rough-ins.
6. Electrical installations.
7. Cutting and patching.

1.2 SUBMITTALS

A. Follow the procedures specified in Division 1.

B. Submit a minimum of Six (6) copies of electrical related Shop Drawings, Product Data, and Samples submitted, to allow for required distribution of each submittal required, which will be retained by the Electrical Consulting Engineer.

C. Provide the following shop drawings in booklet form:

1. Panelboards, disconnect switches, manual motor starters, combination motor starters/disconnect switches, and contactors shall be submitted all at one (1) time in a booklet form. All equipment shall be of one manufacturer.
2. Wire devices shall be submitted all at one (1) time in a booklet form and be from one (1) manufacturer.

1.3 PRODUCT REVIEWS AND SUBSTITUTIONS

A. Refer to Division 1 for substitutions requirements under this contract. Division 1 requirements supersede requirements listed elsewhere.

B. No Manufacturer's products will be reviewed as an equivalent to the specified products unless submitted by a Bidding Contractor for review ten (10) calendar days prior to bid due date. No products will be reviewed after that time. Product review requests must be submitted in accordance with Division 1 and Section 16010. An addendum will be issued to all Bidding Contractors listing any Manufacturers whose products have been added to the Contract Documents as equivalents to the specified products.

C. No substitutions will be reviewed by the Engineer after the Bid Due Date unless specifically requested by the Owner or Architect in writing with an associated credit with the substitution.

1.4 SHOP DRAWINGS

A. Refer to the Conditions of the Contract (General and Supplementary) and Division-1 for submittal definitions, requirements, and procedures.

B. Submittal of Shop Drawings, Product Data, and Samples will be reviewed only when submitted by the Prime Contractor. Submittals from sub-Contractors and material suppliers directly to the Architect/Engineer will not be reviewed. No equipment/materials shall be installed until the Shop Drawings have been stamped with "No Exceptions Taken" or "Make Corrections Noted" by the Architect/Engineer.

C. Submit Shop Drawings as listed in each specification section. Following is a list of shop drawings to assist the contractor; however, the contractor shall supply all shop drawings as listed in each individual section whether listed below or not.

1. Disconnect Switches.
2. Individually-Mounted Circuit Breakers.
3. Fuses.
4. Fire Alarm Equipment and associated wiring diagrams and layout drawings.
5. Metal Surface Raceway.

D. When preparing submittals and any required final programming, use a room number schedule generated by the architect and/or the owner, which indicates the actual room numbers that will be used when the building is occupied. If the schedule is not available, revise the initial submittal, when a schedule is available, to reflect the proper room numbers.

1.5 PRODUCT OBSOLESCENCE

A. In all cases, the most current iteration of the specified product shall be submitted. Where the specified product is no longer manufactured, the contractor shall submit an equivalent product with the same or better specifications. Where specific manufacturers are specified, the contractor shall supply from the same manufacturer the recommended replacement; however, under no circumstances shall the replacement product be deficient in any aspect to the specified product.

B. In the submittal for the product, the Contractor shall provide a signed letter clearly indicating the reason for the replacement product, and confirmation that the replacement product meets or exceeds all of the specified product's specifications to the best of the Contractor's knowledge.

C. The replacement product shall be provided at no additional cost to the owner, and shall not constitute any extension to the project schedule.

D. These requirements shall be inclusive to requirements listed elsewhere in the specifications, and shall not void any other requirements.

1.6 INSPECTIONS

A. The Contractor shall provide certificates of approval, in triplicate, for service equipment, building rough wiring, and building finished wiring.

B. Inspection certificates shall be submitted to the Engineer within 30 days after the inspections are made. Contractor shall use an independent NEC Certified Inspection Agency as the approved agency. Contractor must verify that the Certified Inspection Agency is approved by the local municipality and the Owner to inspect electrical installations in the project locality. All inspection certificates must be received before final payment can be made.

C. Refer to General Conditions for additional information.

1.7 MANUFACTURER'S REQUIREMENTS

A. All material shall be new, of the best respective kinds, manufactured by the company or companies mentioned and shall be of domestic manufacture unless specified otherwise.

B. All equipment, material or apparatus of any one system must be the product of one Manufacturer, or system tested products.

C. Manufacturers not listed in the Contract Documents must submit to the Engineer via a Bidding Contractor all product information per Division 1 requirements.

1.8 NAMEPLATE DATA

A. Each item of power operated equipment shall be provided with a permanent operational data nameplate on indicating Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliance, and similar essential data. Nameplates shall be located in an accessible location.

1.9 FAMILIARITY WITH PROPOSED WORK

A. All Contracts are with the understanding that the Contractor, prior to submission of his bid, acquainted himself with the requirements of the Drawings and Specifications, including "Conditions of the Contract," conditions of the site, its terrain, soil conditions, all other requirements of the Contract, and that he obtained all information necessary for completion of the work on or before the date specified for receiving of bids.

B. In all cases where a device or part of the equipment is herein referred to in the singular, such reference shall apply to as many such items as are required to complete the installation.

C. "Existing" information does not necessarily represent "as-built" conditions. The Contractor shall verify all existing conditions. If discrepancies are found the Contractor shall notify the Architect/Engineer for a resolution before proceeding.

1.10 DEFINITIONS

A. The terms "The Contractor" or "This Contractor" mentioned in these Specifications refers to the Electrical Contractor responsible for the work and equipment included in these Specifications.

B. The term Sub-Contractor refers to any reference to, or letting of work contained in these Specifications to any Sub-Contractor or Manufacturer by the Prime Contractor. This does not relieve the Prime Contractor of his responsibility for all work, material and equipment in this Specification.

C. The term "Provide," when used separately, shall mean to "Furnish and Install."

D. The term "Furnish," when used separately, shall mean to obtain and deliver on the job for installation by other trades.

E. The term "Install," when used separately, shall mean to mount in place, connect and make operable.

1.11 INTENT OF THE DRAWINGS AND SPECIFICATIONS

A. The Drawings which accompany the Specifications are for the purposes of illustrating the character and extent of the work, and are subject to such modifications by Architect/Engineer as may be found either necessary or advisable before ordering the prosecution of the work. The Contractor shall conform to and abide by whatever Supplementary Drawings and explanations which may be furnished by the Architect/Engineer for the purpose of illustrating the work. The Architect/Engineer shall decide as to the meaning or intention of any portion of the Specifications and Drawings.

B. Where the work is shown in complete detail on only half or a portion of a Drawing, or there is an indication of continuation, the remainder being shown in outline, the work drawn out in detail shall be understood to apply to other like portions of the structure. All work that may be called for in the Specifications and not shown on the Drawings, or shown on the Drawings and not called for in the Specifications, shall be executed and furnished by the Contractor as described in both.

C. Should any incidental work or materials be required, but not set forth in the Specifications or Drawings, either directly or indirectly, but which is necessary to fulfill the intent thereof, the Contractor is to understand same to be implied and required, and he shall perform all such work and furnish all such materials as fully as if they were particularly delineated or described, without additional cost to Owner. This shall include all materials, devices, methods peculiar to the machinery, equipment, apparatus, or systems as described herein.

1.12 WIRING LAYOUTS

A. Should it become necessary to rearrange any of the circuit or feeder wiring, approval to do so shall first be obtained from the Engineer. The Contractor will be supplied with a spare set of Drawings on which all such approved changes shall be noted. Upon completion of all work under this Contract, these Drawings shall be returned to the Architect/Engineer, who will issue a receipt for same.

1.13 FIELD MEASUREMENTS

A. Before ordering any materials or doing any work, Contractor shall verify all measurements at the building site, and shall be responsible for correctness of same. At no time shall the Contractor scale Drawings for the purpose of installation.

B. No extra compensation will be allowed on account of differences between actual dimensions and those indicated on the Drawings. Any difference which may be found shall be submitted to the Architect/Engineer for consideration before proceeding with the work.

1.14 COORDINATION

A. The Contractor shall cooperate with the other Contractors and shall arrange to eliminate conflicts with the equipment and work of the Contractors.

B. The Contractor shall be responsible for coordinating all Electrical devices/equipment with Architectural casework Drawings before rough-in. Any conflicts with casework and Electrical devices/equipment shall be brought to the attention of the Architect/Engineer before rough-in. Any Electrical device/equipment installed in conflict with casework shall be removed and reinstalled at the Contractor's expense.

C. The Contractor shall be responsible to coordinate all electrical conduits which are installed for rooftop equipment. Where the equipment can be fed from within the equipment curb, the contractor shall utilize this space. Where the equipment must be fed from the exterior, the contractor shall furnish and install a roof curb designed for conduit penetrations.

1.15 CHASES AND OPENINGS

A. The Contractor shall determine, in advance, the locations and sizes of all chases and openings necessary for the proper installation of his work and have same provided during construction. Any chase or opening not made during construction, due to the Contractor's failure to determine same in advance, shall be done by the Contractor at his own expense. Any unnecessary cutting shall be repaired to match the original conditions of the area disturbed at the Contractor's expense.

1.16 AIR PLENUMS

A. The Electrical Contractor shall use a conduit system or approved plenum rated wiring.

1.17 RECORD DOCUMENTS

A. Refer to Division-1 for requirements. The following requirements supplement the requirements of Division-1.

B. Mark Drawings to indicate revisions to conduit size and location both exterior and interior; actual equipment locations, dimensioned from column lines; concealed equipment, dimensioned from column lines; distribution and branch electrical circuitry; fuse and circuit breaker size and arrangements; support and hanger details; work performed via Change Orders; concealed control system devices. Include sketches on As-Built drawings.

C. Mark Specifications to indicate changes by addendum or Change Orders; actual equipment and materials used.

1.18 OPERATION AND MAINTENANCE DATA

A. Refer to Division-1 for requirements.

B. Contractor shall provide Operation and Maintenance data listed in individual section in addition to requirements listed in Division 1.

C. Contractor shall include all wiring inspection certificates and other system commissioning sign off information that system was tested and functioning properly.

1.19 WARRANTIES

A. Division 1 warranties shall be considered minimum warranties. Any warranties listed in the individual sections that are longer than Division 1 warranties shall be honored.

B. Refer to individual sections for warranty requirements beyond those as specified in Division 1.

1.20 TEST AND ADJUST

A. All systems installed under this Contract shall be tested and adjusted to insure that all equipment and systems meet or exceed the specified requirements.

1.21 PHASE LOAD BALANCE

A. A reasonable balance shall be secured on the phases of all main distribution feeders and bus bars.

B. Following installation and with the system in operation, the Electrical Contractor shall check the balance and rearrange connections so that the ampacity on any of the two single-phase phases of the main bus shall not vary more than 10% of each other.

1.22 PAINTING

A. Refer to Division-1 for general requirements.

B. No painting will be performed under this Contract except any "touch-up" required to restore "factory-finished" equipment and material to its original new condition, unless noted otherwise in the specifications or on the drawings.

C. The Electrical Contractor shall be responsible for all touch up painting on this project for electrical work.

D. The Electrical Contractor shall be responsible for painting of all exposed conduits installed in the existing Gymnasium space.

1.23 CLEANING

A. Refer to Division-1 Section, "Project Closeout" or "Final Cleaning" for general requirements for final cleaning.

B. The Contractor shall keep the building free of rubbish and material during the course of construction insofar as the work under this Contract is concerned.

C. Upon completion of the project, the Contractor shall remove all rubbish, surplus equipment and shipping labels and have all areas broom clean. The Contractor shall thoroughly clean all fixtures, and other electrical equipment, leaving same in first-class working condition.

1.24 INSTRUCTION OF OWNER'S PERSONNEL

A. The Contractor shall provide instruction of the owner's personnel as outlined in Division 1. The following requirements shall be included in addition to Division 1 requirements.

B. The Contractor shall provide the services of competent personnel and/or Manufacturer trained personnel to instruct employees designated by the Owner in the proper operation, care and maintenance of the equipment and system installed under the Contract.

C. A letter of certification itemizing the equipment, system, instructor, and bearing signatures of the employees instructed shall be delivered to the Engineer and the Owner upon completion of the project. The letter of certification shall note the number of hours spent in explanation and actual operation of system with maintenance personnel.

1.25 DELIVERY AND STORAGE OF MATERIALS

A. Refer to the Division-1 for delivery and storage of materials requirements.

B. The Contractor shall provide for, or secure use of, suitable-dry storage space for the safe delivery and storage of his materials. The Contractor shall be responsible for providing their own storage trailers on site. The use of Owner's inside-building storage will not be permitted, unless accepted otherwise by the owner.

1.26 PROTECTION OF EQUIPMENT AND MATERIALS

A. Responsibility for care and protection of electrical work rests with the Contractor until it has been tested and accepted by the Owner. After delivery, before and after installation, protect equipment and materials against theft, injury, or damage in all cases.

B. Protect equipment outlets, and pipe openings with temporary plugs, caps, or burlap. Electrical conduit openings shall be covered with capped bushing or fiber disks and bushings.

C. The contractor shall be responsible to protect all existing electrical or communications equipment to remain from construction dirt and debris, whether created from this contractor or another contractor. The contractor shall determine the method needed to protect each piece of equipment to remain. Should existing equipment be damaged during demolition it will be the responsibility of the contractor to provide necessary repairs or replacement of the damaged equipment.

1.27 SCAFFOLDING AND HOISTING

A. The Contractor shall provide all lumber and other material required for the erection of all staging, scaffolding, shoring, protective platforms, railings and ladders. Scaffolding shall be removed at the completion of the work.

B. The Contractor shall protect any flooring that is to remain. The Contractor shall inspect the flooring before the scaffolding is installed and report any damage that exists before the stat of the construction. The Contractor shall be responsible to repair any damage to the flooring after the scaffolding is removed to the acceptance of the owner at no additional cost to the owner.

1.28 PERMITS AND FEES

A. Unless noted otherwise, all permits, certificates, tests, and inspection fees required for the work provided under this contract shall be paid by the Contractor. Refer to General Conditions for additional information.

PART 2 - PRODUCTS

Not Applicable.

PART 3 - EXECUTION

3.1 ROUGH-IN

A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

3.2 CUTTING AND PATCHING

A. Perform cutting and patching in accordance with Division-1. In addition to the requirements specified in Division-1, the following requirements apply. The Electrical Contractor shall be responsible for providing all cutting and patching required to perform his work unless noted otherwise.

B. Perform cutting, fitting, and patching of electrical equipment and materials required to:

1. Uncover work to provide for installation of ill-timed work.
2. Remove and replace defective work.
3. Remove and replace work not conforming to requirements of the Contract Documents.
4. Remove samples of installed work as specified for testing.
5. Install equipment and materials in existing structures.
6. Upon written instructions from the Architect, uncover and restore work to provide for Architect observation of concealed work.

C. Cut, remove, and legally dispose of selected electrical equipment, components, and materials as indicated, including but not limited to removal of electrical items indicated to be removed and items made obsolete by the new work.

D. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

E. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

3.3 PROTECTION OF INSTALLED WORK

A. During construction activities, including cutting and patching operations, protect adjacent installations.

B. Patch existing finished surfaces and building components using new materials matching existing materials and experienced installers. For installers' qualifications refer to the materials and methods required for the surface and building components being patched.

3.4 ELECTRICAL INSTALLATION

A. Coordinate electrical equipment and materials installation with other building components. Verify all dimensions by field measurements. If no dimensions are given, Contractor shall verify with Architect or Engineer before starting work. At no time shall the Contractor scale Drawings for the purpose of locating items.

B. Provide for chases, slots, and openings in other building components to allow for electrical installations. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.

C. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the work. Give particular attention to large equipment requiring positioning prior to closing-in the building.

D. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible, or to meet current local and national codes.

E. Coordinate connection of electrical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.

F. Install systems, materials, and equipment to conform with submittal data, including Coordination Drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Architect/Engineer.

G. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.

H. Install electrical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.

I. Install access panel or doors where units are concealed behind finished surfaces. Access panels and doors are specified in 16500.

J. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

3.5 ELECTRICAL REQUIREMENTS FOR EQUIPMENT INSTALLATION

A. Conduit and power wiring of required size and voltage, from a panelboard or similar source, shall be furnished and installed by the Electrical Contractor, to the equipment furnished by the HVAC, Plumbing, Sprinkler, or General Contractor. A junction box or means of disconnect (as required) shall be furnished and installed at the equipment by the Electrical Contractor.

B. Unless noted otherwise, a full complement of electrical control components, required for the intended use and/or operation of specified equipment, including variable frequency controllers, speed controllers and/or other control devices required, whether integral or remote, shall be furnished by the Contractor furnishing the equipment. These control devices as well as power wiring (where required) through these devices shall be installed by the Electrical Contractor.

3.6 CONTROL WIRING FOR EQUIPMENT INSTALLED BY ANOTHER CONTRACTOR

A. This Contractor shall be responsible for providing all required control wiring, (except HVAC system control wiring) for any equipment provided by another Contractor which shall include, but not be limited to, motorized backboards, screens, partitions, curtains, motor operated doors, etc, unless noted otherwise.

B. The Contractor shall provide all boxes and conduit required for any equipment provided by another Contractor. Control wiring shall also include any wiring of motion or occupancy sensors for doors, curtains, etc.

C. Coordinate all required work for a complete and functional system with the Contractor supplying the equipment. Make all required connections.

3.7 ELECTRICAL DEMOLITION

A. The Electrical Contractor shall be responsible for all electrical demolition as outlined on the drawings.

B. Where fastened equipment is removed, the contractor shall be responsible to remove the associated lags or bolts that fastened the equipment down. Grind lags or bolts to below exiting surface and patch surface to match existing condition.

3.8 SALVAGE

A. The Owner reserves the right to salvage any electrical equipment prior to the start of construction.

END OF SECTION 16010

SECTION 16281 – FUSES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes cartridge fuses, rated 600 V and less, for use in switches, panelboards, switchboards, controllers, and motor control centers; and spare fuse cabinets.

1.2 SUBMITTALS

A. Product Data: Include dimensions and Manufacturer's technical data on features, performance, electrical characteristics, and ratings for each fuse type indicated.

1.3 QUALITY ASSURANCE

A. Source Limitations: Provide fuses from a single Manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NEMA FU 1.

D. Comply with NFPA 70.

1.4 PROJECT CONDITIONS

A. Where ambient temperature to which fuses are directly exposed is less than 40 deg F or more than 100 deg F, apply Manufacturer's ambient temperature adjustment factors to fuse ratings.

1.5 COORDINATION

A. Coordinate fuse ratings with HVAC and refrigeration equipment nameplate limitations of maximum fuse size.

1.6 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged in original cartons or containers and identified with labels describing contents.

1. Fuses: Quantity equal to one (1) set for every five (5) installed sets, but not fewer than one set of three of each kind.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cooper Industries, Inc.; Bussmann Div.
2. General Electric Co.; Wiring Devices Div.
3. Mersen (Ferraz Shawmut).
4. Tracor, Inc.; Littelfuse, Inc. Subsidiary.

2.2 CARTRIDGE FUSES

A. Characteristics: NEMA FU 1, nonrenewable cartridge fuse; class and current rating indicated; voltage rating consistent with circuit voltage.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.

B. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FUSE APPLICATIONS

A. Main Service: Class L, time delay (601 to 6000A) or Class J, time delay (0 to 600A).

B. Main Feeders: Class L, time delay (601 to 6000A) or Class J, time delay (0 to 600A).

C. Combination Starter/Disconnect Switches: Class RK1, time delay.

D. Disconnect Switches: Class RK1, time delay (30-600A).

E. Other Branch Circuits: Class RK5, time delay.

3.3 INSTALLATION

A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

3.4 IDENTIFICATION

A. Install labels indicating fuse replacement information on inside door of each fused switch.

END OF SECTION 16281

SECTION 16286 – DISCONNECT SWITCHES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Disconnect switches.

B. Enclosures.

1.2 REFERENCES

A. FS W F 870 Fuseholders (For Enclosed Cartridge Fuses).

B. FS W S 865 Switch, Box, (Enclosed), Surface Mounted.

C. NEMA KS 1 Enclosed Switches.

1.3 SUBMITTALS

A. Submit product data under provisions of Section 16010.

B. Include outline Drawings with dimensions, and equipment ratings for voltage, capacity, horsepower, and short circuit.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Square D Company.

B. No Other Manufacturers will be considered.

2.2 HEAVY DUTY TYPE

A. All switches shall have switch blades which are visible when the switch is OFF and the cover is open.

B. Lugs shall be front removable and UL listed for 60°C or 75°C conductors in switches rated 30 100 ampere, 75°C conductors in switches rated 200 1200 ampere, copper conductors.

C. All current carrying parts shall be plated to resist corrosion.

D. Switches shall have removable arc suppressors to facilitate easy access to line side lugs.

E. Switches shall have provisions for a field installable electrical interlock.

F. Switch operating mechanism shall be quick make, quick break such that, during normal operation of the switch, the operation of the contacts shall not be capable of being restrained by the operating handle after the closing or opening action of the contacts has started.

G. The operating handle shall be an integral part of the box, not the cover.

H. The handle position shall travel at least 90 degrees between OFF and ON positions to clearly distinguish and indicate handle position.

I. All switches shall have a dual cover interlock mechanism to prevent unintentional opening of the switch cover when the switch is ON and prevent turning the switch ON when the cover is open. The cover interlock mechanism shall have an externally operated override but the override shall not permanently disable the interlock mechanism. The tool used to override the cover interlock mechanism shall not be required to enter the enclosure in order to override the interlock.

J. Switch enclosure shall be NEMA 1 unless otherwise on the Drawings or required by the NEC in accordance with the project conditions.

K. The enclosure shall be finished with Gray baked enamel paint which is electrodeposited on cleaned, phosphate pre treated steel (Type 1), or Gray baked enamel paint which is electrodeposited on cleaned, phosphate pre treated galvannealed steel (Type 3R).

L. The enclosure shall have ON and OFF markings on the cover to clearly identify the position of the switch.

M. All switches shall have provisions to lock the operating handle in the OFF position.

N. Tangential knockouts shall be provided to facilitate ease of conduit entry for switches rated 30-200A.

O. Enclosures for Type 3R switches through 200 ampere shall have provisions for interchangeable bolt on hubs in the top endwall.

P. Switches shall be horsepower rated for ac and/or dc as indicated on the plans.

Q. The UL listed short circuit current rating of the switches shall be: 200,000 rms symmetrical amperes when used with or protected by Class R fuses (30-600 ampere switches employing appropriate fuse rejection schemes).

2.3 SWITCH ACCESSORIES

A. Where switches are designated to be used as service entrance, the switch shall be labeled for such use.

B. Where fused switches are designated to have type "R" fuses, the switch shall be provided with rejection clips.

C. Provide fuse clip adaptors as required to accommodate smaller fuses when required.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install disconnect switches to meet N.E.C. working clearance requirements.

B. Install fuses in fusible disconnect switches.

3.2 LABELING

A. Provide labeling on the exterior of each disconnect switch Stating the following:

1. What the piece of equipment is fed from the switch.
2. Where the piece of equipment is fed from the switch.
3. Size, type and quantity of fuses within cabinet.

3.3 FIELD QUALITY CONTROL

A. Subsequent to completion of installation of disconnects, energize circuits and demonstrate capability and compliance with requirements. Demonstrate switch operation through six (6) opening/closing cycles with circuit unloaded. Open each switch enclosure to display interior, mechanical and electrical connections and fuse installation, and for verification of type and rating of fuses installed. Where possible, correct deficiencies at project site, then retest or demonstrate compliance; otherwise, remove and replace with new units and retest.

END OF SECTION 16286

SECTION 16500 – COMMON REQUIREMENTS – ELECTRICAL CONSTRUCTION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes materials and methods that are common to various Electrical Systems.

1.2 SUBMITTALS

A. Product Data: For the following:

1. Fireproofing
2. Access Doors

1.3 COORDINATION

A. Arrange for conduit spaces, chases and openings in building structure during progress of construction to allow for electrical installations.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are construction as applicable.

C. Coordinate requirements for access panels and doors for electrical items requiring access that are concealed behind finished surfaces.

PART 2 - PRODUCTS

2.1 FIRESTOPPING

A. The Contractor shall be responsible for providing permanent, UL approved firestopping systems for all penetrations through fire rated floor or fire rated wall assemblies. For areas that will require future access for the installation of additional cables, repair, or retrofit, the firestopping system shall consist of re-usable intumescent pillows or putty. All firestopping shall meet the requirements of ASTM E-814 and UL 1479.

1. Subject to compliance with project requirements, firestopping materials may be provided by one of the following Manufacturers.

a. Specified Technologies Inc. (STI) Somerville, NJ (800) 992-1180
b. Tremco, Beechwood, OH (800) 321-7906
c. 3M, St. Paul, MN (800) 328-1687

2. Submit for review the following product data.

a. Product data sheets.
b. UL System Drawings for each firestopping application.
c. Manufacturer's Certificates of Conformance for their products.

2.2 ACCESS DOORS

A. Refer to Division 8, "Access Doors and Frames" for additional requirements. Access doors furnished and installed under this contractor shall comply with Division 8 requirements in addition to the following.

B. Manufacturers: Subject to review, provide access doors manufactured by Milcor, Inc or equal.

C. Description: Steel access doors and frames for installation in masonry and/or drywall/gypsum board assemblies. Provide fire rated access doors when doors are installed in a fire rated assembly.

D. Frames: minimum 16 gage steel with exposed nominal 1" flange around the perimeter of the unit. Where doors are to be installed in drywall/gypsum board assemblies provide frames with a drywall bead. Doors to be installed in masonry shall be furnished with adjustable metal masonry anchors.

E. Flush Panel Doors: minimum 14 gage steel with concealed spring or piano hinge(s) with a minimum swing of 175 degrees. Finish to be a factory-applied primer, suitable for field painting. Provide flush cylinder lock with key. Key all locks alike.

F. Provide the following access doors to be installed where directed by the architect or engineer:

1. Two 16" x 16" to be installed in drywall/gypsum construction.

PART 3 - EXECUTION

3.1 ROUGH-IN

A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

3.2 EQUIPMENT INSTALLATION – COMMON REQUIREMENTS

A. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.

B. Install electrical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.

3.3 FIRESTOPPING

A. Comply with manufacturer's written instructions for install fire stopping. When mechanical system is used, set securely in place in accessible locations.

B. Firestopping shall be installed in all fire rated walls. Review all drawings, including architectural, and site conditions to determine where fire rated walls are located.

3.4 ACCESS DOORS

A. Comply with manufacturer's written instructions for installing access doors and frames. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces. Install doors flush with adjacent finished surfaces or recessed to receive finish material.

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

END OF SECTION 16500

SECTION 16519 – WIRES AND CABLES – 600V AND BELOW

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. The extent of the wire and cable work is indicated by Drawings and by requirements or other sections of the Specifications for cables used for power and related system rated 600 volts or less. See below paragraph 2.4 B. for permitted use of Type MC Cables on this project.

1.2 CODES AND STANDARDS

A. NEC Compliance: Comply with applicable requirements of NEC for construction and installation of wires/cables and connectors.

B. UL Compliance: Comply with UL Stds 83 and 486A, B and C. Provide wiring/cabling and connector products which are UL-listed and labeled consistent with their uses.

C. ICEA Compliance: Insulated Cable Engineers Association Inc., Standard WC-5-86.

D. IEEE Compliance: Institute of Electrical and Electronic Engineers, Standard 82-83.

1.3 SUBMITTALS

1. Submit manufacturer's descriptive literature and produce specifications for each product.
2. Manufacturer's product drawings.

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide all wires and cables of sizes indicated on the Drawings and suitable for the temperature, conditions and location where installed. Install all wire in raceway.

2.2 CONDUCTOR MATERIAL

A. Use copper conductors of 98% conductivity and rated at 600V for all wires and cables, unless otherwise noted.

2.3 INSULATION

A. No conductors smaller than No. 12 AWG shall be used unless noted elsewhere. All wires No. 8 AWG or larger shall be stranded copper. Wire sizes No. 12 and No. 10 AWG. shall be solid copper (stranded wire used for No. 12 AND 10 will not be permitted unless otherwise noted). For all sizes provide THHN/THWN insulation as appropriate for the locations where installed or as noted elsewhere.

B. All branch circuits shall be run in conduit from panel circuit breaker to accessible above ceiling junction box located near panel. All 20A branch circuits shall be run concealed with MC Cable (solid conductors) from above ceiling/panel junction box to device(s). All exposed wiring in the Gymnasium space must be run in conduit.

C. Each circuit shall be provided with a dedicated neutral wire. Sharing of neutral wire for multiple circuits shall not be permitted, unless otherwise noted.

2.4 CABLES

A. Provide the following in NEC approved locations and project applications where indicated.

B. Type MC Cable: Provide Metallic Cable wiring using two No. 12 AWG with separate copper ground wire unless noted otherwise. Metallic cable may be used on this project only as follows:

1. Fishing existing walls.
2. Branch circuits in stud walls.
3. Mechanical equipment/miscellaneous branch circuits inside of the building (less than 50amps) where condition warrants.

C. Where MC cables are run in parallel (i.e. down corridors), the Contractor shall bundle the cables and zip tie them together.

D. The Contractor shall bear all costs related for removing MC cable not pre-approved. Support and secure type MC cable at intervals not exceeding 6'-0". In addition, type MC cable must be supported within 12" of every fitting, junction box or outlet box that the cable enters.

E. All other wiring shall be installed in conduit as specified in section 16533, unless approved otherwise by the Engineer prior to installation.

F. All feeder wiring shall be run in conduit.

2.5 CONNECTORS FOR CONDUCTORS

A. Provide UL-listed factory-fabricated, solderless metal connectors of sizes, ampacity ratings, materials, types and classes for applications and for services indicated. Use connectors with temperature ratings equal to or greater than those of the wires upon which used.

PART 3 - EXECUTION

3.1 WIRES AND CABLES

A. General: Install electrical cables, wires, and connectors in compliance with NEC. Coordinate cable installation with other work. Pull conductors simultaneously where more than one is being installed in same raceway. Use UL listed pulling compound or lubricant, where necessary.

B. Use pulling means including, fish tape, cable, rope, and basket weave wire/cable grips which will not damage cables or raceways. Do not use rope hitches for pulling attachment to wire or cable.

C. While installing cables, care shall be taken to protect outer coating. If outer coating is damaged, contractor shall remove and reinstall cables.

D. Conceal all cable in finished spaces. Install exposed cable parallel and perpendicular to surfaces or exposed structural members, and follow surface contours, where possible. Keep conductor splices to minimum.

E. Install splice and tap connectors which possess equivalent or better mechanical strength and insulation rating than conductors being spliced. Use splice and tap connectors which are compatible with conductor material.

F. Provide adequate length of conductors within electrical enclosures and train the conductors to terminal points with no excess. Bundle multiple conductors, with conductors larger than No. 10 AWG cabled in individual circuits. Make terminations so there is no bare conductor at the terminal. Provide wire ties and neatly train and rack wires in all boxes, panels, and other areas as required.

G. Tighten electrical connectors and terminals, including screws and bolts, in accordance with Manufacturer's published torque tightening values. Where Manufacturer's torque requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL 486A and UL 486B.

H. Each branch circuit shall be provided with a dedicated neutral wire.

3.2 FIELD QUALITY CONTROL

A. Prior to energizing, check installed wires and cables with megohm meter to determine insulation resistance levels to assure requirements are fulfilled.

B. Prior to energizing, test wires and cables for electrical continuity and for short-circuits.

C. Subsequent to wire and cable hook-ups, energize circuits and demonstrate proper functioning. Correct malfunctioning units, and retest to demonstrate compliance.

D. Color-Coding for Phase Identification:

1. Color-code secondary service, feeder, and branch circuit conductors with factory-applied color as follows:

Phase	120/208 Volts	120/240 Volts	277/480 Volts
A	Black	Black	Brown
B	Red	Orange (High-Leg)	Orange
C	Blue	Blue	Yellow
Traveler	Yellow	Yellow	Yellow w/ "T" tag
Neutral	White	White	Gray
Ground	Green	Green	Green w/ Yellow stripe

2. Switch legs shall include an additional "S" tag.
3. Provide visible colored taped as listed above at all termination points for No. 8 and larger wires.

END OF SECTION 16519

SECTION 16526 – GROUNDING

PART 1 - GENERAL

1.1 SUMMARY

A. Extent of electrical grounding and bonding work is indicated by Drawings and Schedules and as specified herein. Grounding and bonding work is defined to encompass systems, circuits, and equipment.

B. Type of electrical grounding and bonding work specified in this section includes the following:

1. Solidly grounded.

1.2 CODES AND STANDARDS

A. Electrical Code Compliance: Comply with applicable local electrical code requirements of the authority having jurisdiction, and NEC as applicable to electrical grounding and bonding, pertaining to systems, circuits and equipment.

B. UL Compliance: Comply with applicable requirements of UL 467, 486A, and 869, pertaining to grounding and bonding of systems, circuits and equipment. Provide grounding and bonding products which are UL-listed and labeled for their intended usage.

PART 2 - PRODUCTS

2.1 MATERIALS AND COMPONENTS

A. General: Except as otherwise indicated, provide electrical grounding and bonding system assembly of materials, including, but not limited to, cables/wires, connectors, solderless lug terminals, grounding electrodes and plate electrodes, bonding jumper braid, surge arresters, and additional accessories needed for a complete installation. Where more than one type component product meets indicated requirements, selection is Installer's option. Where materials or components are not indicated, provide products which comply with NEC, UL, and IEEE requirements and with established industry standards for those applications indicated.

B. Conductors: Unless otherwise indicated, provide electrical grounding conductors for grounding system connections that match power supply wiring materials and are sizes according to NEC.

C. Bonding Plates, connectors, Terminals, and Clamps: Provide electrical bonding plates, connectors, terminals, lugs and clamps as recommended by bonding plate, connector, terminal and clamp Manufacturers for indicated applications.

D. Ground Electrodes and Plates:

1. Grounding Electrodes: Solid copper, 5/8" diameter by 10 feet.

2. Grounding Electrodes: Steel with copper welded exterior, 3/4"diameter.

E. Electrical Grounding connection Accessories: Provide electrical insulating tape, heat shrinkable insulating tubing, welding materials, bonding straps, as recommended by accessories Manufacturers for type service indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions under which electrical grounding and bonding connections are to be made and notify Architect/Engineer in writing of conditions detrimental to proper completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.2 INSTALLATION OF ELECTRICAL GROUNDING AND BONDING SYSTEM

A. General: Install electrical grounding and bonding system as indicated, in accordance with Manufacturer's instructions and applicable portions of NEC, NECA's "Standard of Installation", and in accordance with recognized industry practices to ensure that products comply with requirements.

B. Coordinate with other electrical work as necessary to interface installation of electrical grounding and bonding system work with other work.

C. Branch Circuits: Install a minimum 12 AWG ground wire in each 20A circuit and conduit run and connect to each device. Size larger circuit ground wires as per NEC Table 250-122.

D. Exothermically weld grounding conductors to underground grounding electrodes.

E. Ground electrical service system neutral at service entrance equipment to grounding electrodes per NEC Article 250. Grounding conductor shall be 4/0 copper, unless otherwise noted.

F. Ground each separately-derived system neutral to separate grounding electrode.

G. Connect together system neutral, service equipment enclosures, exposed noncurrent carrying metal parts of electrical equipment, metal raceway systems, grounding conductor in raceways and cables, receptacle ground connectors, and plumbing systems.

H. Terminate feeder and branch circuit insulated equipment grounding conductors with grounding lug, bus, or bushing.

I. Connect grounding electrode conductors to copper electrodes as per N.E.C. and 1" diameter, or greater, metallic cold water pipe using a suitably sized ground clamp. Provide grounding electrode connection to concrete slab rebar to meet NEC. Provide 4/0 copper conductor for all connections.

J. Tighten grounding and bonding connectors and terminals, including screws and bolts, in accordance with Manufacturer's published torque tightening values for connectors and bolts. Where Manufacturer's

torquing requirements are not indicated, tighten connections to comply with tightening torque values specified in UL 486A to assure permanent and effective grounding.

K. Route grounding connections and conductors to ground and protective devices in shortest and straightest paths as possible to minimize transient voltage rises.

L. Apply corrosion-resistant finish to field-connections, buried metallic grounding and bonding products, and places where factory-applied protective coatings have been destroyed, which are subjected to corrosive action.

M. Install clamp-on connectors on clean metal contact surfaces, to ensure electrical conductivity and circuit integrity.

N. Provide ground wire connection to all electrical boxes and wiring devices.

O. Provide #6 AWG copper ground conductor connection to all cable trays. Cable tray grounding shall be continuous.

P. Bond service ground conduit to grounding conductor if conduit is metallic.

Q. The contractor shall be responsible to provide grounding connection on gas piping where an appliance or mechanical piece of equipment has gas and electric circuit run to it. The ground conductor size shall be the same size as the electrical branch circuit run to the appliance or equipment to meet NEC Article 250.

3.3 FIELD QUALITY CONTROL

A. Upon completion of installation of electrical grounding and bonding systems, test ground resistance with ground resistance tester. Where tests show resistance-to-ground is over 25 ohms, take appropriate action to reduce resistance to 25 ohms, or less, by driving additional ground rods; then retest to demonstrate compliance.

B. The contractor shall be responsible to test grounding system on site and turnover documentation to owner that grounding system is compliant with specifications.

C. Contractor shall coordinate with local inspector to provide tests as required.

END OF SECTION 16526

SECTION 16529 – SUPPORTING DEVICES

PART 1 - GENERAL

1.1 CODES AND STANDARDS

A. NEC Compliance: Comply with NEC as applicable to construction and installation of electrical supporting devices.

B. NECA Compliance: Comply with National Electrical Contractors Association's "Standard of Installation" pertaining to anchors, fasteners, hangers, supports, and equipment mounting.

C. UL Compliance: Provide electrical components and devices which are UL-listed and labeled.

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide supporting devices which comply with manufacturer's standard materials, design and construction in accordance with published product information, and as required for complete installation; and as herein specified. Where more than one (1) type of device fulfills indicated requirements, selection is Installer's option.

2.2 SUPPORTS

A. Provide supporting devices of types, sizes and materials indicated; and having the following construction features:

B. Clevis Hangers: For supporting up to 2" rigid metal conduit; galvanized steel; with 2" diameter hole for round steel rod; approximately 54 pounds per 100 units.

C. Riser Clamps: For supporting up to 5" rigid metal conduit; black steel; with 2 bolts and nuts, and 4" ears; approximately 510 pounds per 100 units.

D. Reducing Couplings: Steel rod reducing coupling, 2" x 5/8", black steel; approximately 16 pounds per 100 units.

E. C-Clamps: Black malleable iron; 2"rod size; approximately 70 pounds per 100 units.

F. I-Beam Clamps: Black steel, 1-1/4" x 3/16" stock; 3/8" cross bolt; flanges width 2"; approximately 52 pounds per 100 units.

G. One-Hole Conduit Straps: For supporting 3/4" rigid metal conduit; galvanized steel; approximately 7 pounds per 100 units.

H. Two-Hole Conduit Straps: For supporting 3/4" rigid metal conduit; galvanized steel; 3/4" strap width; and 2-1/8" between center of screw holes.

I. Hexagon Nuts: For 2" rod size; galvanized steel; approximately 4 pounds per 100 units.

J. Round Steel Rod: Black steel; 2" diameter; approximately 67 pounds per 100 feet.

K. Offset conduit clamps: For supporting 2" rigid metal conduit; black steel; approximately 200 pounds per 100 units.

2.3 ANCHORS

A. Provide anchors of types, sizes and materials indicated; and having the following construction features:

B. Lead Expansion Anchors: 2"; approximately 38 pounds per 100 units.

C. Toggle Bolts: Spring head; 3/16" x 4"; approximately 5 pounds per 100 units.

D. Manufacturers: Provide anchors of one of the following (for each type of anchor):

1. Ackerman Johnson Fastening Systems, Inc.
2. Ideal Industries, Inc.
3. Joslyn Manufacturing and Supply Co.
4. McGraw Edison Co.

2.4 SLEEVES AND SEALS

A. Provide sleeves and seals, including armored cable seals, of types, sizes, and materials indicated, with the following construction features:

B. Sleeve Seals: Provide sleeves for piping which penetrated foundation walls below grade, or exterior walls. Caulk between sleeve and pipe with non-toxic, UL-classified caulking material to ensure watertight seal.

C. Wall and Floor Seals: Provide watertight wall and floor seals, or types and sizes indicated; suitable for sealing around conduit, pipe, of tubing passing through concrete floors and walls. Construct seals with steel sleeves, malleable iron body, neoprene sealing grommets and rings, metal pressure rings, pressure clamps, and cap screws.

D. Fire-Rated Walls and Floors: At all locations where conduits, cables, or ducts penetrate a fire-rated wall or floor, a special fire-retardant caulking compound or other approved device as specified in section 16500 shall be used.

2.5 CONDUIT CABLE SUPPORTS

A. Provide cable supports with insulating wedging plug for non-armored type electrical cables in risers; construct for 2" rigid metal conduit; 3-wires, type wire as indicated; construct body of malleable-iron casting with hot-dip galvanized finish.

2.6 U-CHANNEL STRUT SYSTEMS

A. Provide U-channel strut system for supporting equipment supplied under this contract, 12-ga hot-dip galvanized steel, or types and sizes indicated; construct with 9/16" diameter holes, 8" on center on top surface, with standard green finish, and with the fittings which mate and match with U-channel.

B. Auxiliary Steel Supports: Provide all required auxiliary steel to install any equipment supplied under this contract. The design and gauge of steel used shall be as required by the manufacturer's specifications.

C. Manufacturers: Provide U-channel strut systems of one of the following (for each type system):

1. Allied Tube and Conduit Corp.
2. Midland-Ross Corp.
3. OZ/Gedney Div; General Signal Corp.
4. Power-Strut Div; Van Huffel Tube Corp.
5. Unistrut Div; GTE Products Corp.

PART 3 - EXECUTION

3.1 GENERAL

A. Install hangers, anchors, sleeves and seals as indicated, in accordance with manufacturer's written instructions and with recognized industry practices. Comply with installation requirements of NECA and NEC pertaining to supporting devices.

B. Coordinate with other mechanical and electrical work, including raceway and wiring work, as necessary to interface installation of supporting devices with other work.

C. Where supports or anchors are installed after the spray on insulation and/or firestopping is installed, patch the spray on insulation and/or firestopping to match surrounding area.

END OF SECTION 16529

SECTION 16533 – RACEWAYS

PART 1 - GENERAL

1.1. DESCRIPTION OF WORK

A. The extent of the raceway and work required by this section is indicated by Drawings and requirements of other sections of this Specification.

B. Provide metal and nonmetallic conduit, tubing and fittings of types, grades, sizes and weights (wall thicknesses) for each service indicated on plans. Where types and grades are not indicated, provide proper selection determined by installer to fulfill wiring requirements and comply with applicable portions of NEC for raceways.

C. It is the intent of these Specifications and Drawings that all feeder wiring be run in a continuous conduit system. Type MC cables are permitted for branch circuits run concealed above ceilings and to fish existing walls. In areas of exposed structure all wiring shall be run in conduit. At all locations where MC cable cannot be fished in an existing wall, surface metal raceway shall be used where indicated on drawings. Surface raceway shall be screwed into the surface being installed at both ends and every 24" minimum along raceway. All surface raceway shall be run parallel and perpendicular to wall surfaces and run to blend in with surrounding equipment.

D. Refer to section 16519 for acceptable uses of MC cables.

1.2. CODES AND STANDARDS

A. NEMA Compliance: Comply with applicable requirements of NEMA standards pertaining to raceways.

B. UL Compliance and Labeling: Comply with provisions of UL safety standards pertaining to electrical raceway systems; provide products and components which have been UL-listed and labeled.

C. NEC Compliance: Comply with NEC requirements as applicable to construction and installation of raceway systems.

PART 2 - PRODUCTS

2.1. CONDUITS

A. Rigid Steel Conduit: Provide rigid steel, zinc-coated, threaded type conforming to FS WW-C-581, ANSI C80.1 and UL 6. Provide zinc-coating fused to inside and outside walls.

B. Rigid Aluminum Conduit: Provide rigid aluminum, threaded type conforming to ANSI and UL standards.

C. Intermediate Steel Conduit: Provide rigid intermediate grade (IMC) hot-dip galvanized threaded conforming to FS WW-C-581 and UL 1242.

D. Electrical Metallic Tubing (EMT): FSW-C-563, ANSI C80.3, and UL 797.

E. Liquid-Tight Flexible Metal Conduit: Provide liquid-tight flexible metal conduit; construct of single strip, flexible, continuous, interlocked, and double-wrapped steel; galvanized inside and outside; coat with liquid-tight jacket of flexible polyvinyl chloride (PVC).

F. Flexible Metal Conduit: FS WW-C-566 and UL 1. Formed from continuous length of spirally wound, interlocked zinc-coated strip steel.

G. PVC Heavy Wall Conduit: Schedule 40, 90C, UL-rated, constructed of polyvinyl chloride and conforming to NEMA TC-2, for direct burial, or normal above ground use, UL-listed and in conformity with NEC Article 347.

H. PVC Light Wall Conduit shall not be acceptable under any circumstances. PVC Heavy Wall conduit shall be used when encased in concrete.

I. No other type of conduit shall be used, unless otherwise noted, or prior approval granted by the engineer.

2.2. CONDUIT FITTINGS

A. Flexible Metal Conduit Fittings: Provide conduit fittings for use with flexible steel conduit of threadless hinged clamp type.

B. Straight Terminal Connectors: Contractor shall provide one-piece body, with female end with clamp and deep slotted machine screw for securing conduit, and male threaded end provided with locknut.

C. 45-Deg or 90-Deg Terminal Angle Connectors: Two-piece body construction with removable upper section, female end with clamp and deep slotted machine screw for securing conduit, and male threaded end provided with locknut.

D. Rigid Metal Conduit Fittings: Cast-malleable-iron, galvanized or cadmium plated, conforming to FS W-F-408. Use Type 1 fittings for raintight connections, Type 2 fittings for concrete tight connections, and Type 3 fittings for other miscellaneous connections.

E. Rigid Aluminum Conduit Fittings: Provide cast-aluminum conduit fittings and mounting hardware conforming to ANSI and UL standards of types required for the application.

F. Liquid-Tight Flexible Metal Conduit Fittings: FS W-F-406, Type 1, Class 3, Style G. Provide cadmium-plated, malleable-iron fittings with compression type steel ferrule and neoprene gasket sealing rings, with insulated, or non-insulated throat.

G. EMT Fittings: All couplings and connectors shall be of the set-screw type.

H. PVC Heavy Wall Conduit and Tubing Fittings: Mate and match to conduit or tubing type and material.

I. Conduit and Tubing Accessories: Provide conduit, tubing and duct accessories of types, sizes, and materials, complying with Manufacturers' published product information, which mate and match conduit and tubing.

J. Conduit Bodies: Provide galvanized cast-metal conduit bodies of types, shapes, and sizes as required to fulfill job requirements and NEC requirements. Construct conduit bodies with threaded-conduit entrance ends, removable covers, either cast or galvanized steel, and corrosion-resistant screws.

K. All raceway conduit and fittings above a ceiling shall be plenum rated.

2.3. WIREWAYS

A. General: Provide electrical wireways of types, grades, sizes, and number of channels for each type of service as indicated. Provide complete assembly of raceway including, but not limited to, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other components and accessories as required for complete system.

B. Lay-In Wireways: Provide lay-in wireways with hinged covers, in accordance with UL 870 and with components UL-listed, including lengths, connectors and fittings. Design units to allow fastening hinged cover closed without use of parts other than standard lengths, fittings and connectors. Construct units to be capable of sealing cover in closed position with sealing wire. Provide wireways with knockouts.

C. Connectors: Provide wireway connectors suitable for "lay-in" conductors, with connector covers permanently attached that removal is not necessary to utilize the lay-in feature.

D. Finish: Protect sheet metal parts with rust inhibiting coating and baked enamel finish. Plate finish hardware to prevent corrosion. Protect screws installed toward inside of wireway with spring nuts to prevent wire insulation damage.

E. Raintight Troughs: Construct in accordance with UL 870, with components UL listed.

F. Construction: 16-ga galvanized sheet metal parts for 4" x 4" to 6" x 6" sections, and 14-ga parts for 8" x 8" and larger sections. Provide knockouts only in bottom of troughs, with suitable adapters to facilitate or tear during installation, or would compromise raintight capability of the trough. Do not use cover screws that will protrude into the trough area and damage wire insulation.

G. Finish: Provide 14-ga and 16-ga galvanized sheet metal parts with corrosion-resistant phosphate primer and baked enamel finish. Plate hardware to prevent corrosion.

PART 3 - EXECUTION

3.1. GENERAL

A. All conduit shall be installed concealed throughout existing construction work, either in walls, under slabs, or above ceilings unless noted otherwise. Type MC cables are permitted only as noted.

B. Use PVC Schedule 40 conduit where feeders and service conductors are embedded in concrete, masonry, or earth, and use rigid galvanized steel elbows with large sweep elbows wherever turns are needed. Where PVC conduit is installed below finished floor level within the building pad, contractor shall transition to an approved type of above ground conduit within the floor slab. Where PVC conduit

is used exterior to the building under finished grade, contractor shall transition to galvanized rigid steel conduit at the elbow up, and continue using galvanized rigid steel along the riser to above finished grade.

C. PVC Schedule 40 conduit may be run in CMU wall cavities when originating from below finished grade and terminating at a recessed box no higher than 48" above finished floor or grade. For all other installations within wall cavities, PVC conduit shall not be used.

D. Use rigid galvanized steel conduit where installed exposed outdoors.

E. Use EMT conduit in mechanical equipment rooms, electrical equipment rooms, penthouses, crawl spaces, walls, and areas above accessible ceilings.

F. Use flexible metal conduit in moveable partitions and from outlet boxes to recessed lighting fixtures, and final 24" of connection to motors, or control items subject to movement or vibration, and in cells of precast concrete panels. Conduit size shall be increased as required to fit wiring per NEC.

G. Use liquid-tight flexible metal conduit for final connections to rooftop mechanical equipment. Conduit size shall be increased as required to fit wiring per NEC.

H. Cut conduits straight, properly ream, and cut threads for heavy wall conduit deep and clean.

I. Field-bend conduit with benders designed for purpose so as not to distort nor vary internal diameters.

J. Size conduits to meet NEC, except no conduit shall be smaller than 3/4" on this project.

K. Fasten conduit terminations in sheet metal enclosures by two locknuts, and terminate with bushing. Install locknuts inside and outside enclosure. Metallic insulating conduit bushings shall be used on all power conduits. Split bushings shall not be acceptable.

L. Conduits are not to cross pipe shafts or ventilating duct openings.

M. Keep conduits a minimum distance of 6" from parallel runs of hot water pipes or other sources of heat. Wherever possible, install horizontal raceway runs above water and steam piping.

N. Support riser conduit at each floor level with clamp hangers.

O. Use of running threads at conduit joints and terminations is prohibited.

P. Where required, use 3-piece union or split coupling.

Q. Complete installation of electrical raceways before starting installation of cables/wires within raceways.

R. For concrete floors-on-grade, install PVC Schedule 40 conduits under concrete slabs.

S. Install underground conduits minimum of 24" below finished grade.

T. Install conduits so as not to damage or run through structural members. Avoid horizontal or cross runs in building partitions or side walls.

U. Above requirements for exposed conduits also apply to conduits installed in space above hung ceilings, and in crawl spaces.

V. Conduits shall not be installed against roof deck. Allow minimum 3" space between top conduit and roof deck for the possible penetration of roof nails to protrude without damaging conduit.

W. In finished spaces without ceilings (i.e. gymnasiums, natatoriums, etc.), conduits shall be installed as high as possible, while meeting other requirements within these specifications. Conduits along bottom cord of open joists shall not be acceptable. Where conduits need to be installed along bottom of joists or beams, they shall be installed against walls.

X. Provide fish wire or pull string in all spare conduits.

Y. Cap all spare conduits installed for future use.

Z. There shall be no more than three (3) 20A branch circuits installed in a single 3/4" conduit. Each circuit shall be provided with a dedicated neutral wire. Sharing of neutral wire for multiple circuits will not be permitted.

3.2. EXPOSED CONDUITS

A. Install exposed conduits and extensions from concealed conduit systems neatly, parallel with, or at right angles to walls of building.

B. Install exposed conduit work as not to interfere with ceiling inserts, lights, or ventilation ducts or outlets.

C. Support exposed conduits by use of hangers, clamps, or clips. Support conduits on each side of bends and on spacing not to exceed following: Up to 1": 6'-0"; 1-1/4" and over: 8'-0".

D. Run conduits for outlets on waterproof walls exposed. Set anchors for supporting conduit on waterproof wall in waterproof cement.

E. Cap all spare and active conduits stubbed up from the floor with secure PVC caps. Caps used for active conduits shall be notched to accommodate the quantity and size of cables installed in each conduit.

F. Exposed conduits shall be run along walls and at 12" from roof deck.

3.3. NON-METALLIC CONDUITS

A. Make solvent cemented joints in accordance with recommendations of Manufacturer.

B. Install PVC conduits in accordance with NEC and in compliance with local utility practices. Provide expansion joints as required by Manufacturer and NEC.

3.4. CONDUIT FITTINGS

A. Construct locknuts for securing conduit to metal enclosure with sharp edges for digging into metal, and ridged outside circumference for proper fastening.

B. Bushings for terminating conduits smaller than 1-1/4" are to have flared bottom and ribbed sides, with smooth upper edges to prevent injury to cable insulation.

C. Install insulated type bushings for terminating conduits 1-1/4" and larger.

D. Bushings are to have flared bottom and ribbed sides. Upper edge to have phenolic insulating ring molded into bushing.

E. Bushing of standard or insulated type to have screw type grounding terminal.

F. Miscellaneous fittings such as reducers, chase nipples, 3-piece unions, split couplings, and plugs to be specifically designed for their particular application.

3.5. RACEWAYS AND WIREWAYS

A. Avoid use of dissimilar metals through system to eliminate possibility of electrolysis. Where dissimilar metals are in contact, coat all surfaces with corrosion inhibiting compound before assembling.

B. Install expansion fittings in all raceways/wireways wherever structural expansion joints are crossed.

C. Make changes in direction to raceway/wireway run with proper fittings, supplied by raceway Manufacturer. No field bends of raceway/wireway sections will be permitted.

D. Properly support and anchor raceways/wireways for their entire length by structural materials. Raceways are not to span any space unsupported.

E. Use boxes as supplied by Manufacturer wherever junction, pull or device boxes are required. Standard electrical "handy" boxes, etc., shall not be permitted for use with surface installations.

END OF SECTION 16533

SECTION 16535 – ELECTRICAL BOXES AND FITTINGS

PART 1 - GENERAL

1.1. DESCRIPTION OF WORK

A. The extent of electrical box and associated fittings work is indicated by Drawings and Schedules.

1.2. CODES AND STANDARDS

A. NEC Compliance: Comply with NEC as applicable to construction and installation of electrical wiring boxes and fittings.

B. UL Compliance: Comply with UL Std No.'s 50, 514-series and 886. Provide electrical boxes and fittings which are UL-listed and labeled.

C. NEMA Compliance: Comply with applicable requirements of NEMA Stds/Pub No.'s OS1, OS2 and Pub 250.

PART 2 - PRODUCTS

2.1. FABRICATED MATERIALS

A. Outlet Boxes: Provide galvanized coated flat-rolled sheet-steel outlet wiring boxes, of shapes, cubic inch capacities, and sizes, including box depths as indicated (or as required), suitable for installation at respective locations. Construct outlet boxes with mounting holes, and with cable and conduit-size knockout openings in bottom and sides. Provide boxes with threaded screw holes, with corrosion-resistant cover and grounding screws for fastening surface and device type box covers, and for equipment type grounding. Flush boxes must be mounted flush with finished wall surface.

B. Outlet Box Accessories: Provide outlet box accessories as required for each installation, including box supports, mounting ears and brackets, wallboard hangers, box extension rings, fixture studs, cable clamps and metal straps for supporting outlet boxes, which are compatible with outlet boxes being used to fulfill installation requirements for individual wiring situations. Choice of accessories is Installer's code - compliance option.

C. Device Boxes: Provide galvanized coated flat-rolled sheet-steel non-gangable device boxes, of shapes, cubic inch capacities, and sizes, including box depths as indicated (or as required), suitable for installation at respective locations. Construct device boxes for flush mounting with mounting holes, and with cable-size knockout openings in bottom and ends, and with threaded screw holes in end plates for fastening devices. Provide cables clamps and corrosion-resistant screws for fastening cable clamps, and for equipment type grounding. Flush boxes must be mounted flush with finished wall plate.

D. Device Box Accessories: Provide device box accessories as required for each installation, including mounting brackets, device box extensions, switch box supports, plaster ears, and plaster board expandable grip fasteners, which are compatible with device boxes being utilized to fulfill installation requirements for individual wiring situations. Choice of accessories is Installer's codes-compliance option.

E. Surface-Mounted Device and Outlet Boxes: Provide a minimum depth galvanized-coated steel box where indicated on the Drawings without pre-punched knockouts.

F. Raintight Outlet Boxes: Provide corrosion-resistant cast-metal raintight outlet wiring boxes, of types, shapes and sizes, including depth of boxes, with threaded conduit holes for fastening electrical conduit, including face plate gaskets and corrosion-resistant plugs and fasteners.

G. Junction and Pull Boxes: Provide galvanized code-gauge sheet steel junction and pull boxes, with screw-on covers; of types, shapes and sizes, to suit each respective location and installation; with welded seams and equipped with stainless steel nuts, bolts, screws and washers. Provide handles on covers over 4 square feet.

H. Where surface or recessed boxes are indicated to be blank or with wire leads for future use, they shall be provided with blank covers per Division 16 "Wiring Devices".

PART 3 - INSTALLATION

3.1. GENERAL

A. Install electrical boxes and fittings as indicated, in accordance with Manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation", and in accordance with recognized industry practices to fulfill project requirements.

B. Coordinate installation of electrical boxes and fittings with wire/cable, wiring devices, and raceway installation work.

C. Provide weathertight outlets for interior and exterior locations exposed to weather or moisture.

D. Provide knockout closures to cap unused knockout holes where blanks have been removed.

E. Install electrical boxes in those locations which ensure ready accessibility to enclosed electrical wiring.

F. Avoid installing boxes back-to-back in walls. Provide not less than 6" (150mm) separation or separate stud spaces.

G. Position recessed outlet boxes accurately to allow for surface finish thickness.

H. Avoid using round boxes where conduit must enter box through side of box, which would result in difficult and insecure connections when fastened with locknut or bushing on rounded surfaces.

I. Fasten electrical boxes firmly and rigidly to substrates, or structural surfaces to which attached, or solidly embed electrical boxes in concrete or masonry.

J. Provide electrical connections for installed boxes.

K. Subsequent to installation of boxes, protect boxes from construction debris and damage.

L. Ground electrical boxes properly upon completion of installation work and demonstrate compliance with requirements. Ground electrical box and wiring device.

END OF SECTION 16535

SECTION 16553 – ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 CODES AND STANDARDS

A. UL Compliance: Comply with UL Std 969.

B. NEC and NEMA Compliances: Comply with NEC and NEMA WC-1 and WC-2.

C. ANSI Compliance: Comply with ANSI Std A13.1.

PART 2 - PRODUCTS

2.1 GENERAL

A. Except as otherwise indicated, provide Manufacturer's standard products of categories and types required for each application. Where more than single type is specified for an application, selection is installer's option, but provide single selection for each application.

2.2 CABLE/CONDUCTOR IDENTIFICATION BANDS

A. Provide Manufacturer's standard vinyl-cloth self-adhesive cable/conductor markers of wrap-around type; either pre-numbered plastic coated type, or write-on type with clear plastic self-adhesive cover flap; numbered to show circuit identification.

2.3 SELF-ADHESIVE PLASTIC SIGNS

A. Provide Manufacturer's standard, self-adhesive or pressure-sensitive, pre-printed, flexible vinyl signs for operational instructions or warnings; of sizes suitable for application areas and adequate for visibility, with proper wording for each application areas and adequate for visibility, with proper wording for each application (e.g., "EXHAUST FAN FED FROM PANEL PD1").

B. Colors: Unless otherwise indicated, or required by governing regulations, provide white signs with black lettering.

2.4 ENGRAVED PLASTIC-LAMINATE SIGNS

A. Provide engraving stock melamine plastic laminate with black face and white core plies (letter color), complying with FS L-P-387, in sizes and thicknesses indicated. Engrave laminate with engraver's standard letter style of sizes and wording indicated, and punch for mechanical fastening except where adhesive mounting is necessary because of substrates.

B. Thickness: 1/16", for units up to 20 sq. in. or 8" length; 1/8" for larger units.

C. Fasteners: Self-tapping stainless steel screws, except contact-type permanent adhesive where screws cannot or should not penetrate substrate.

2.5 LETTERING AND GRAPHICS

A. Coordinate names, abbreviations and other designations used in electrical identification work, with corresponding designations shown, specified or scheduled. Provide numbers, lettering and wording as indicated or, if not otherwise indicated, as recommended by Manufacturers or as required for proper identification and operation/maintenance of electrical systems and equipment systems and equipment. Comply with ANSI A13.1 pertaining to minimum sizes for letters and numbers.

2.6 MANUFACTURER

A. Provide electrical identification products of one of the following (for each type marker):

1. Ideal Industries, Inc.
2. LEM Products, Inc.
3. Markal Company
4. National Band and Tag Co.

PART 3 - EXECUTION

3.1 GENERAL

A. Install electrical identification products as indicated, in accordance with Manufacturer's written instructions, and requirements of NEC.

3.2 COORDINATION

A. Where identification is to be applied to surfaces which require finish, install identification after completion of painting.

3.3 REGULATIONS

A. Comply with governing regulations and requests of governing authorities for identification of electrical work.

3.4 CABLE/CONDUCTOR IDENTIFICATION

A. Apply cable-conductor identification where wires of communication/signal system are present, except where another form of identification (such as color-coded conductors) is provided. Match identification with marking system used in panelboards, shop drawings, Contract Documents, and similar previously established identification for project's electrical work.

B. Install engraved plastic-laminate tags on new power cables in all manholes and in pullboxes to identify over current device number. Use tie wraps to attach tag to cables. The nameplate shall bear the following information: Building served; voltage, cable size, class of insulation, phase designation.

3.5 ARC FLASH SIGNS

A. Provide arc flash stickers on equipment per NEC and NFPA. Stickers shall be placed in a prominent position that is clearly visible before access to a dangerous area is reached. This includes the front of devices similar to disconnect switches, motor starters, switchboards, etc. and just inside the front cover of panelboards.

B. Provide signs for each unit of the following categories of electrical work.

1. Disconnect switches.

3.6 EQUIPMENT/SYSTEM IDENTIFICATION

A. Install engraved plastic-laminate sign on each major unit of electrical equipment in building; including central or master unit of each electrical system including communication/control/signal systems, unless unit is specified with its own self-explanatory identification or signal system. Except as otherwise indicated, provide single line of text, 1/2" high lettering on 1-1/2" high sign (2" high where 2 lines are required), White lettering in Black field. Provide text matching terminology and numbering of the Contract Documents and shop drawings. Each listed piece of equipment below shall have a sign that has the following: 1. Equipment Name, 2. Where the equipment is fed from. Example: PANEL "PD1" (FED FROM PANEL DPD)

B. Provide signs for each unit of the following categories of electrical work.

1. Disconnect switches.

C. Install signs at locations indicated or, where not otherwise indicated, at location for best convenience of viewing without interference with operation and maintenance of equipment. Secure to substrate with fasteners, except use adhesive where fasteners should not or cannot penetrate substrate.

3.7 PANELBOARD DIRECTORIES

A. Provide typed circuit directory cards for all "Existing" panelboards where the Contractor has added, deleted or moved circuits within an "Existing" panelboard.

1. Contractor shall trace existing circuits within existing panelbaords to properly identify all circuits within the panelboards.

B. Panelboard directories shall use actual room numbers to indicate locations of all devices, including, but not limited to receptacles, lighting, mechanical equipment, etc.

3.8 ADDITIONAL FUSE LABELING

A. At the exterior enclosure of all fused switches, provide additional labeling designating fuse sizes, types and quantity.

3.9 RECEPTACLE CIRCUIT IDENTIFICATION

A. Identify panelboard and circuit number from which receptacle is served. Use machine printed, pressure sensitive, abrasion resistant label tape on backs of the wall plate and durable wire markers or tags within outlet boxes.

END OF SECTION 16553