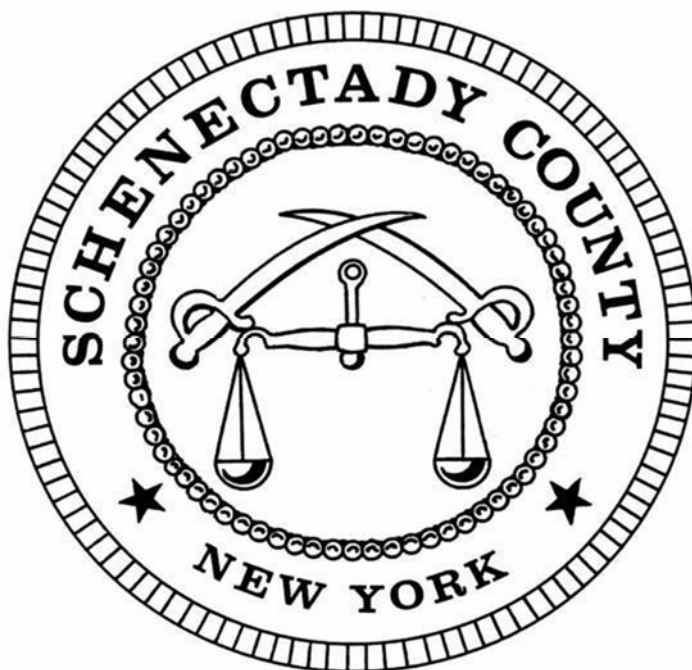


COUNTY OF SCHENECTADY

REQUEST FOR BIDS

Schenectady County
Office of Facilities



Bid # RFB-2024-20
SUNY SCCC ELSTON HALL -
LOBBY AND MOHAWK ROOM RENOVATION

SCHENECTADY COUNTY PURCHASING DEPARTMENT

County Office Building
620 State Street – 2nd Floor
Schenectady, New York 12305
purchasing@schenectadycountyny.gov
Website: www.schenectadycountyny.gov
518.388.4240



Schenectady County Request for Bid
SUNY SCCC ELSTON HALL – LOBBY AND MOHAWK ROOM RENOVATION
RFB-2024-20
Bid Submissions Checklist



COUNTY OF SCHENECTADY

REQUEST FOR BIDS

Schenectady County Office of Facilities

Bid # RFB-2024-20

SUNY SCCC ELSTON HALL - LOBBY AND MOHAWK ROOM RENOVATION

Key Bid Dates

May 16, 2024 at 10:00 AM	On Site Walkthrough
May 30, 2024 at 2:00 PM	Last Date/Time to Submit Questions
June 5, 2024 at 2:00 PM	Bid Submission Deadline/Bid Opening

BID SUBMISSION CHECKLIST

(Please RETURN ONLY the FOLLOWING ITEMS with your BID Submission).
Do not return the full specification set.

Check Mark	Description
	Bid Cover Page/Checklist (This Page)
	Bid Form
	Bid Bond-5% (or Certified Check)
	Non-Collusion Form
	Iranian Divestment Form
	Board of Directors Resolution (if applicable)
	Disclosure of Prior Non-Responsibility Determinations.
	Certification for the Prevention of Sexual Harassment
	Subcontractor's Listing (If there are none-you must notate and submit still.)
	Bidders Qualifications
	Apprenticeship (If bid is for construction project > \$200,000.)
	MWBE Forms (If bid is for construction project > \$100,000.)
	W-9

SCHENECTADY COUNTY PURCHASING DEPARTMENT

County Office Building
620 State Street – 2nd Floor
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April 25, 2024 Elston Hall Lobby, Mohawk, and Van Curler Rooms (ECS Project no. 47:18303)

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G100	Cover Sheet
G101	Sheet List, Abbreviations and Symbols
G102	General Notes
G200	Elston Hall level 1 st Level Life Safety Plan
G203	Accessibility Details
G300	Area of Work Plan

Elston Hall Lobby (Base Bid)

D100A	Elston Hall Lobby Demolition Plan
D600A	Elston Hall Lobby Demolition Details
D800A	Elston Hall Lobby Ceiling Demolition Plan
A100A	Elston Hall Lobby Floor Plan
A600A	Details - Elston Hall Lobby
A601A	Details – Security Desk
A700A	Interior Elevations – Elston Hall Lobby
A701A	Interior Elevations – Elston Hall Lobby
A702A	Interior Elevations and Details – Elston Hall Lobby
A800A	Elston Hall Reflected Ceiling Plan
A900A	Elston Hall Lobby Finish Plan
A901A	Schedules – Elston Hall Lobby

Mohawk Room (Add Alternate #1)

D100B	Mohawk Room Demolition Plan – Add Alternate #1
D800B	Mohawk Room Ceiling Demolition Plan – Add Alternate #1
A100B	Mohawk Room Floor Plan – Add Alternate #1
A700B	Interior Elevations – Mohawk Room - Add Alternate #1



Schenectady County Request for Bid
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A800B	Mohawk Room Reflected Ceiling Plan – Add Alternate #1
A900B	Mohawk Room Finish Plan – Add Alternate #1
A901B	Door Schedule - Mohawk Room – Add Alternate #1

Mechanical (Contract #2)

M001	HVAC Symbols List, Details and Schedules
M101A	Mechanical Removal and Renovation Plan
M101B	Mohawk Room HVAC Plans – Alternate #1

Electrical (Contract #3)

E001	Electrical Legend & Abbreviations
ER101A	Elston Hall Lobby Power and Systems Removals Plan
ER101B	Mohawk Room Electrical Removals Plan – Add Alternate #1
ER201A	Elston Hall Lobby Lighting Floor Plan
ER201B	Mohawk Room Lighting Removals Plan – Add Alternate #1
E101A	Elston Hall Lobby Power and Systems Plan
E101B	Mohawk Room Power & Systems Plan – Add Alternate #1
E201A	Elston Hall Lobby Lighting Floor Plan New
E201B	Mohawk Room Lighting Plan – Add Alternate #1
E701	Electrical Schedules

END OF SECTION 00 01 10



Schenectady County Request for Bid
SUNY SCCC ELSTON HALL – LOBBY AND MOHAWK ROOM RENOVATION
RFB-2024-20
Notice to Bidders

NOTICE TO BIDDERS
RFB-2024-20
SUNY SCCC ELSTON HALL - LOBBY AND MOHAWK ROOM RENOVATION

The County of Schenectady will be accepting bids for the SUNY SCCC Elston Hall – Lobby and Mohawk Room Renovation at 78 Washington Avenue, Schenectady, NY 12305. There will be three prime contracts.

Digital copies of specifications may be obtained from BidNet Direct at www.bidnetdirect.com/new-york or by submitting a request to the Purchasing Department at purchasing@schenectadycountyny.gov. Paper copies may be picked up at the Purchasing Department, 2nd Floor, Schenectady County Office Building at 620 State Street, Schenectady, New York, 12305 between the hours of 9:00 A.M. and 4:00 P.M. weekdays, but must be requested via email 24 hours in advance.

A pre-bid walkthrough will be held on May 16, 2024 at 10:00 AM at the SCCC Elston Hall Lobby at 78 Washington Avenue, Schenectady, NY 12305. Those interested are asked to meet out front of the facility.

All proposals must be delivered in a sealed envelope marked “Bid” and stating **SUNY SCCC Elston Hall – Lobby and Mohawk Room Renovation, RFB-2024-20**, to the Purchasing Agent, no later than June 5, 2024 at 2:00 PM at which time they will be opened.

Bid Security shall be submitted with each bid as described in General Instructions to Bidders.

Woman and minority owned businesses are encouraged to submit proposals. Schenectady County is an Equal Employment Opportunity/Affirmative Action employer.

Schenectady County will make any investigation it deems necessary to determine the responsibility of any bidder to perform the work. The County reserves the right to reject any bid if an investigation of the bidder fails to satisfy the county that the bidder is responsible and can carry out the obligations of the contract.

Schenectady County reserves the right to waive any informality in a bid or to reject any or all bids.

Purchasing Department
County of Schenectady
Schenectady County Office Building
620 State Street-2nd Floor
Schenectady, NY 12305
(518) 388-4240



Schenectady County Request for Bid
SUNY SCCC ELSTON HALL – LOBBY AND MOHAWK ROOM RENOVATION
RFB-2024-20
Bid Summary Sheet

1.0 Bid Identification

1.1 SUNY SCCC Elston Hall – Lobby and Mohawk Room Renovation

2.0 Requesting Department

2.1 Schenectady County Office of Facilities

3.0 Bid Number

3.1 RFB-2024-20

4.0 Purpose

4.1 The intent of these specifications is to gather bids for SUNY SCCC Elston Hall - Lobby and Mohawk Room Renovation. *at 78 Washington Avenue, Schenectady, NY 12305.*

4.2 Minority Business Enterprises (MBE's) and Women Business Enterprises (WBE's) are encouraged to apply.

5.0 Bid Submission Deadline

5.1 Bids must be received to the Purchasing Department no later than June 5, 2024, at 2:00 PM at which time they will be opened and reviewed.

5.2 Bids must be clearly marked with the BID NAME and NUMBER.

5.3 Bids must be submitted to Schenectady County Purchasing Department, County Office Building, 620 State St., Schenectady, NY 12305.

5.4 Delay in mail delivery is NOT an exception; allowance for timely arrival should be made. Bids received late will be rejected.

6.0 Bid Bond

6.1 A 5 % bid bond on the total bid submitted must be included with this bid.

7.0 Bid Schedule

7.1 May 16, 2024 at 10:00 AM: On Site Walkthrough will be held at the Elston Hall Lobby located in Elston Hall *at 78 Washington Avenue, Schenectady, NY 12305.*

7.1.1 While Bid Walkthroughs are not mandatory, it is highly encouraged that the contractor make every effort to see the site/facility/space prior to bidding. The contractor is responsible for all means, methods, and existing conditions that would be noticed or questioned by visiting the site prior to bidding.

7.1.2 Should the contractor not be able to make the designated walk through, they should email purchasing@schenectadycountyny.gov for an appointment to see the space.

7.2 May 30, 2024, at 2:00 PM: Last Date for questions to be submitted regarding this project.

7.2.1 Questions should be submitted to purchasing@schenectadycountyny.gov. Please do not call with questions; they must be received in writing.

7.2.2 Responses to questions will be issued via Addendum only to all parties who have been formally added to the plan holder's list. To be added to the plan holder's list, your plans MUST have been downloaded from BidNet Direct or requested from the Schenectady County Purchasing Department purchasing@schenectadycountyny.gov or via mail send to Attn: Purchasing Agent, Schenectady County – Purchasing (2nd Floor), 620 State St., Schenectady, NY, 12305 (518.388.4240).

7.2.3 Corrections or written instructions to all bidders will be issued via written addenda.

7.2.4 Addenda will be published electronically to all entities listed on the plan holder's list.

7.2.5 The County will not be responsible for any oral instructions or interpretations of the meaning of specifications or other contract documents to any bidder by any person or person(s).



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General Instructions to Bidders – Purchasing

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I. Bid Distribution

- A. The County of Schenectady officially distributes bidding documents through the Purchasing Division Office or through the Bidnet/Empire State Purchasing Group bid notification system (www.bidnetdirect.com/new-york). Copies of bidding documents obtained from any other source are not considered official documents. Only those vendors who obtain bidding documents from either the Purchasing Division Office or the ESPG are guaranteed to receive addendum information, if such information is issued.
- B. If you have obtained this document from a source other than the Schenectady County Purchasing Division or the Bidnet bid notification system, it is strongly recommended that you obtain an official copy.

II. Bidding Documents

- A. Complete sets of the Bidding Documents may be obtained or examined as stated in the Notice to Bidders.
- B. Complete sets of Bidding Documents must be used in preparing bids. The County does not assume any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

III. Submission of Bids

- A. Bids and any other required documents must be submitted, sealed in an opaque envelope, plainly marked with the name and number of the bid and the name and address of the bidder and accompanied by the required documents.
- B. Bids must be received no later than the date and time specified in the Bid Summary Sheet.
- C. Bids must be submitted to:
Schenectady County Purchasing Department
County Office Building
620 State Street – 2nd Floor
Schenectady, NY 12305
- D. Schenectady County reserves the right to reject any or all bids in whole or in part, to waive any and all informalities, and to disregard all non-conforming, non-responsive, or conditional bids.

IV. Bid Security

- A. Unless otherwise stated in the Bid Summary sheet, the following requirements are in place for Bid Security.

- B. Each bid must be accompanied by a bid bond or certified check in the amount equal to five (5) percent of the total base bid drawn upon a national or state bank or trust company, to the order of the Commissioner of Finance, Schenectady, County. If bid is accepted, the successful Bidder will enter into a contract for the same and will execute such further security as may be required for the performance of the contract. **BID SECURITY SHALL BE INCLUDED WITH BID AT TIME OF BID OPENING; FAILURE TO DO SO MAY CAUSE REJECTION OF THE BID AS MATERIALLY INCOMPLETE.**

- C. The Bid Security of the successful Bidder will be retained until such Bidder has executed the contract and furnished the required Contract Security, whereupon it will be returned. If the successful Bidder fails to execute and deliver the contract and furnish the required Contract Security within fifteen (15) days of the Notice of Award, the County may annul the Notice of Award and the Bid Security of that Bidder will be forfeited.
- D. Bid security of other bidders will be returned within seven (7) days after the award of contract to the successful Bidder.
- E. Bid security is required unless otherwise noted in the Bid Summary provided to the Bidders/Providers.

V. Non-Appropriations Clause

- A. Notwithstanding anything contained herein to the contrary, no default shall be deemed to occur in the event no funds or insufficient funds are appropriated and budgeted by or are otherwise unavailable to the County for payment under this Agreement. The County will immediately notify the Contractor of such occurrence and this Agreement shall terminate on the last day of the fiscal period for which appropriations were received without penalty or expense to the County of any kind whatsoever, except as to those portions herein agreed upon for which funds shall have been appropriated and budgeted.

VI. Qualification of Bidder

- A. Schenectady County may make such investigations as it deems necessary to determine the ability of the Bidder to perform the work. The Bidder shall furnish to the County, within five (5) days of a request, all such information requested to complete the



Schenectady County Request for Bid
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investigation. Conditional bids will not be accepted.

VII. Disqualification

- A. Bids received from bidders who have previously failed to complete contracts within the time required, or who have previously performed similar work in an unsatisfactory manner, may be rejected. A bid may be rejected if the bidder cannot show that it has the necessary ability, plant and equipment to commence the work at the time prescribed and thereafter to perform and complete the work at the rate or within the time specified. A bid may be rejected if the bidder is already obligated for the performance of other work which would delay the commencement, performance or completion of the work.
- B. Schenectady County reserves the right to reject any bid if the information submitted by, or investigation of, such bidder fails to satisfy the County that such bidder is properly qualified to carry out the obligations of the contract and to complete the work contemplated therein.
- C. Bids may be considered irregular and may be subject to rejection for the following reasons:
 - 1. If the bid is on a form other than that furnished by Schenectady County, or, if the Schenectady County's form is altered, or, if any part of the bidding documents is detached.
 - 2. If there are unauthorized additions, conditional or alternate pay items, or irregularities of any kind which make the bid incomplete, indefinite, or otherwise ambiguous.
 - 3. If the bid is not accompanied by the Bid Security as specified by Schenectady County.

VIII. Non-Collusive Bidding Certificate

- A. All bidders bidding under the provisions of the specifications are subject to the provisions of Section 103 of the General Municipal Law of the State of New York. A signed Non-Collusive Bidding Certificate is required to be submitted with each bid on the form provided by the County.

IX. Bid Form

- A. Bid Form is attached hereto; additional copies may be obtained from the County.
- B. Bids must be made on the Bid Form provided by the County. The Bid Form must be completed in ink or by typewriter. The Bid

Form must also be signed by an authorized representative of the bidder.

- C. Bids by corporations must be executed in the corporate name by the president or a vice-president (or other corporate officer accompanied by evidence of authority to sign on behalf of the corporation) and the corporate seal must be affixed by the secretary or an assistant secretary. The corporate address and state of incorporation must be shown below the signature.
- D. Bids by partnerships must be executed in the partnership name and signed by a partner, whose title must appear under the signature. The official address of the partnership must be shown below the signature.
- E. All names must be printed or typed below the signature.
- F. The bid must contain an acknowledgment of receipt of all Addenda (the number of which will be filled in on the Bid Form).
- G. The address to which communications regarding the bid are to be directed must be included on the Bid Form.

X. Specification Clarification

- A. All inquiries with respect to this Request for Bids must be directed to the Schenectady County Purchasing Department via email to purchasing@schenectadycountyny.gov
- B. All questions about the meaning or intent of the specification must be submitted to the aforementioned department in writing. Replies will be issued by Addenda via email to all parties recorded as having received the bidding documents.
- C. Addenda will also be posted on the Bidnet Bid System.
- D. Questions received less than three (3) days prior to the date of submission of bids will not be answered. This timetable may be overridden by a specified "Last Date for Submission of Questions" within the bidding documents, Bid Summary Sheet, or Project Timetable.
- E. The County will be bound by responses given by formal written Addenda only.

XI. Bid Evaluation

- A. Bids shall remain valid until:
 - 1. the execution of a contract by Schenectady County; or
 - 2. the award of a purchase order by Schenectady County; or



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3. as otherwise rejected by Schenectady County; or
4. 45 days after bid opening.
- B. Bids received will be evaluated by Schenectady County and will be based, as a minimum, upon the following criteria:
 1. Lowest total bid cost and projected timetable for completion of services and/or delivery of goods described herein;
 2. Completeness of the bid; and
 3. Bidder's demonstrated capabilities and professional qualifications.
- C. The County reserves the right to purchase items pursuant to General Municipal Law 104 from New York State contracts, other County contracts, or New York State Preferred Sources within its discretion.
- D. For those requests for bid issued as requests for bids at the item level:
 1. The County reserves the right to award the contract on a per item, category, or aggregate basis, whichever is most beneficial to the County of Schenectady.
 2. Bidders need NOT submit bids for all items listed to be eligible for an award of the contract.

XII. Modification and Withdrawal of Bids

- A. Bids may be modified or withdrawn at any time prior to the opening of bids by an appropriate document duly executed (in the manner that a bid must be executed) and delivered to the place where bids are to be submitted.
- B. If, prior to awarding of the contract or within three days after opening, whichever period is shorter, any bidder files a duly signed written notice with the County and promptly thereafter demonstrates to the reasonable satisfaction of the County that there was a material and substantial mistake in the preparation of its bid, that bidder may withdraw its bid and the bid security will be returned.

XIII. Award of Bid

- A. Award will be made as determined to be in the best interest of a Schenectady County.
- B. All offers received shall be net cost to the County of Schenectady. The County shall not be responsible for any additional costs; including, but not limited to, overtime

required by the vendor to meet the appropriate deadlines.

- C. The apparent successful Bidder will be issued a Notice of Award in the form of a Schenectady County purchase order or contract.
- D. The County reserves the right to purchase items pursuant to General Municipal Law 104 from New York State Contracts, other County contracts, or New York State Preferred Sources within its discretion.
- E. No successful bidder to whom a contract or purchase order is let, granted or awarded, shall assign, transfer, convey, sublet, or otherwise dispose of same, or of its right, title, and interest herein, including the performance of the contract or purchase order or the right to receive monies due or to become due, or of its power to execute the contract or purchase order without the prior written consent of the Schenectady County Purchasing Agent. In the event the contractor shall without prior written consent assign, transfer, convey, sublet or otherwise dispose of the contract or purchase order or of its right, title and interest therein, including the performance of this contract or purchase order, or the right to receive monies due or to become due, or its power to execute such contract or purchase order to any other person or corporations, or upon receipt by Schenectady County of an attachment against the Successful Bidder, the County of Schenectady shall be relieved and discharged from any and all liability and obligation growing out of such contract or purchase order to such contractor, and the person or corporation to which such contract or purchase order shall have been assigned, its assignees, transferees or sub lessees shall forfeit and lose all monies theretofore assigned under the contract or purchase order, except so much as may be required to pay its employees.

XIV. Remedy for Breach

- A. In the event of a breach by CONTRACTOR, CONTRACTOR shall pay to the COUNTY all direct and consequential damages caused by such breach, including, but not limited to, all sums expended by the COUNTY to procure a substitute contractor to satisfactorily complete the contract work.

XV. Delivery and Payment



Schenectady County Request for Bid
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- A. **All bid prices shall include freight and shall be quoted F.O.B. destination.**
- B. Schenectady County operates a formal Purchase Order System. Under **NO** circumstances will the vendor or contractor be paid without a purchase order. Contractor shall deliver only the items specified on the purchase order. Any Contractor, who delivers items which are not ordered, or who duplicates or overships items, does so entirely at his own expense. Such shipments will be at no cost or responsibility to Schenectady County.
- C. All deliveries shall be made within ten (10) business days of vendor's receipt of purchase order, unless otherwise specified in the Bid Specifications or Summary Sheet, or as otherwise agreed upon between the vendor and the Purchasing Department.
- D. Unless otherwise specified by the County, inside delivery is required. Some delivery locations are not equipped with loading docks and no additional compensation shall be paid to vendors for inside delivery at those locations.
- E. Orders will be placed on an "As Needed" basis by Schenectady County departments. **There will be no minimum order amounts required.** Bids stipulating minimum quantity of dollar value orders may be rejected by Schenectady County at its sole discretion.
- F. Prior to payment, the items furnished and or work performed will be inspected by the Purchasing Agent or his designee to determine their conformity to specification. No payment will be made for items or work not meeting specification.
- G. COUNTY IS NOT SUBJECT TO FEDERAL, STATE OR LOCAL TAXES.

XVI. Indemnification

- A. The successful bidder shall indemnify, save, and hold harmless the County of Schenectady, its officers, agents, servants, and employees from any and all liability for anything and everything whatsoever arising from loss or damage due to any act or omission of the Contractor, its clients, agents, or employees. See attached Standard Provisions

XVII. Anti-Discrimination Clause

- A. Pursuant to Section 220-E of the NYS Labor Law, regarding provisions in contracts prohibiting discrimination on account of race,

creed, color or national origin in employment of citizens upon public works, the Contractor agrees:

1. That in the hiring of employees for the performance of work under this contract or any subcontract hereunder, no contractor, subcontractor, nor any person acting on behalf of such contractor or subcontractor, shall by reason of race, creed, color, disability, gender, marital status, military status, sexual orientation or national origin discriminate against any citizen of the state of New York who is qualified and available to perform the work to which the employment relates;
2. That no contractor, subcontractor, nor any person on his behalf shall, in any manner, discriminate against or intimidate any employee hired for the performance of work under this contract on account of race, creed, color, disability, gender, marital status, military status, sexual orientation or national origin;
3. That there may be deducted from the amount payable to the contractor by the state or municipality under this contract a penalty of fifty dollars for each person for each calendar day during which such person was discriminated against or intimidated in violation of the provisions of the contract;
4. That this contract may be cancelled or terminated by the state or municipality, and all moneys due or to become due hereunder may be forfeited, for a second or any subsequent violation of the terms or conditions of this section of the contract; and
5. The aforesaid provisions of this section covering every contract for or on behalf of the state or a municipality for the manufacture, sale or distribution of materials, equipment or supplies shall be limited to operations performed within the territorial limits of the state of New York.

XVIII. Interpretation

- A. In the event of any discrepancy, disagreement or ambiguity among the documents which comprise this RFB, and/or, the Agreement (between the County and the successful bidder/proposer) and its incorporated



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documents, the documents shall be given preference in the following order to interpret and to resolve such discrepancy, disagreement or ambiguity: 1) the Agreement; 2) the RFB; 3) the Contractor's proposal or bid.

XIX. Equivalent Goods

- A. Manufacturers name brands are listed to indicate minimum requirements and bidding may be on brands listed, (if specified), or equivalent. Specifications shall be furnished by bidder to support equivalency. In the event of any claim by any unsuccessful bidder concerning or relating to the issue of "equal or better" or "or equal", the successful bidder agrees, that his own cost and expense, to defend such claim or claims and agrees to hold the County of Schenectady free and harmless from any and all claims for loss or damage arising out of this transaction for any reasons.
- B. UPON REQUEST ONLY, unless otherwise notated in the bid specifications, vendors are required to submit a sample of each item quoted **within 72 hours** of request to the Schenectady County Purchasing Department or to any political subdivision or authorized districts located in the state of New York. It is the bidder's responsibility to assure that the Schenectady County Purchasing Department has received the sample. Schenectady County will not be responsible for any charges incurred by the vendor for the provision, packaging, shipping, or return of samples. Items submitted shall be clearly and securely marked for identification, as per the specifications. Labels showing manufacturer and fabric content should be attached to all samples. The awarded vendors' samples will be retained by the Department for the duration of the quote, for verification of future deliveries.

XX. Insurance Requirements

- A. See attached Standard Provisions
- B. No work shall be commenced under the contract or purchase order until the successful Bidder has delivered to the County Purchasing Agent or his designee proof of issuance of all policies of insurance required by the contract to be procured by the successful Bidder.
- C. If at any time, any of said policies shall expire or become unsatisfactory to the

County, the successful Bidder shall promptly obtain a new policy and submit proof of insurance of the same to the County for approval. Upon failure of the successful Bidder to furnish, deliver and maintain such insurance as above provided, the contract or purchase order may, at the election of the County, be forthwith declared suspended, discontinued or terminated.

- D. Failure of the successful Bidder to procure and maintain any required insurance shall not relieve the successful Bidder from any liability under the contract, nor shall the insurance requirements be construed to conflict with the obligations of the successful Bidder concerning indemnification.

XXI. Prevailing Wage-As applicable.

- A. All laborers providing services under this contract, whether employed by the Contractor or by the Subcontractor(s), shall be paid not less than the current prevailing rate of wages and shall be provided supplements not less than the prevailing supplements as established by the New York State Department of Labor, per the New York State Prevailing Schedule of Wages.
- B. All vendors submitting bids agree to conform to all current NYS Department of Labor and prevailing wage laws. The County has applied for and has received a PRC number for this project, which has been included with this document as an attachment. The successful vendor(s) is/are responsible for complying with all current labor rates and regulations throughout the duration of any contract resulting from this document. For policy or rate questions call the NYS Department of Labor at (585) 258-4505. Actual rates are available via the internet at: http://198.22.236.39/prevailing_wage_home.shtm or from the Schenectady County Purchasing Department at the address listed on the Notice to Bidders.
- C. Payrolls and Payroll Records: Every contractor and subcontractor MUST keep original payrolls or transcripts subscribed and affirmed as true under penalty of perjury. Payrolls must be maintained for at least five (5) years from the project's date of completion. At a minimum, payrolls must show the following information for each person employed on a public work project: Name, Social Security number,



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Classification(s) in which the worker was employed, Hourly wage rate(s) paid, Supplements paid or provide, and Daily and weekly number of hours worked in each classification.

- D. Every contractor and subcontractor shall submit to the Department of Jurisdiction (Contracting Agency), within thirty (30) days after issuance of its first payroll and every thirty (30) days thereafter, a transcript of the original payrolls, subscribed and affirmed as true under penalty of perjury. The Department of Jurisdiction (Contracting Agency) shall receive and maintain such payrolls.

XXII. Apprenticeship Training Program

- A. This section is applicable to construction contracts of \$200,000 or more.
- B. In accordance with Schenectady County Legislative Resolution No. 22 of February 11, 2003 and Section 816-b of the new York State Labor Law, **contractors and subcontractors of County construction contracts of \$200,000 or more** shall have in place agreements providing appropriate apprenticeship training programs approved by the Commissioner of the Department of Labor for the type and scope of work to be performed before the contracts are let. These agreements shall conform to the procedures and requirements set forth in Section 816-b of the New York State Labor Law.

XXIII. Affirmative Action Requirements

- A. This section is applicable to construction contracts of \$100,000 or more.
- B. It is the policy of the County of Schenectady that Minority Business Enterprises (MBE) and Woman Business Enterprises (WBE) are afforded the maximum opportunity to participate in the performance of contracts, in excess of \$100,000, let by the County and its several agencies and authorities. The County commits itself to a goal-oriented Contract Compliance Program which assures that Minority Business Enterprises and Woman Business Enterprises are considered in awarding contracts for goods, services and construction. Furthermore, it is the policy of the County of Schenectady that contractors and subcontractors utilize minority and women labor to the greatest extent feasible.
- C. In bidding on this contract, the contractor acknowledges an understanding of this

policy. The contractor shall carry out the policy by making every reasonable effort to award contracts and subcontracts to MBEs and WBEs and utilizing minority and women labor in the performance of this contract.

- D. In an effort to assist contractors with compliance attached you will find the following documents attached: Affirmative Action WMBE Utilization Policy and Affirmative Action Compliance Forms.

XXIV. Iranian Energy Sector Divestment

- A. Contractor/Proposer hereby represents that said Contractor/Proposer is familiar with New York State General Municipal Law Section 103-g entitled “Iranian Energy Sector Divestment”, in that said Contractor/Proposer has not:
1. Provided goods or services of \$20 Million or more in the energy sector of Iran including but not limited to the provision of oil or liquefied natural gas tankers or products used to construct or maintain pipelines used to transport oil or liquefied natural gas for the energy sector of Iran.
 2. Acted as a financial institution and extended \$20 Million or more in credit to another person for forty-five days or more, if that person’s intent was to use the credit to provide goods or services in the energy sector in Iran.
- B. Any Contractor/Proposer who has undertaken any of the above is identified on a list created pursuant to Section 165-a (3)(b) of the New York State Finance Law as a person engaging in investment activities in Iran, shall not be deemed a responsible bidder pursuant to Section 103 of the New York State General Municipal Law.
- C. Except as otherwise specifically provided herein, every Contractor/Proposer submitting a bid/proposal in response to this Request for Bids/Request for proposals must certify and affirm the following under penalties of perjury:
1. “By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid, each party thereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and belief, that each bidder is not on the list created pursuant to NYS Finance



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- Law Section 165-a (3)(b).” Schenectady County
2. will accept this statement electronically in accordance with the provisions of Section 103 of the General Municipal Law.
 3. Except as otherwise specifically provided herein, any Bid/Proposal that is supplied without having complied with subdivision (a) above, shall not be considered forward. In any case where the Bidder/Proposer cannot make the certification as set forth in subdivision (a) above, the Bidder/Proposer shall so state and shall furnish with the bid a signed statement setting forth in detail the reasons therefor. The County reserves its rights, in accordance with General Municipal Law Section 103-g to award the Bid/Proposal to any Bidder/Proposer who cannot make the certification, on a case-by-case basis under the following circumstances:
 - a. The investment activities in Iran were made before April 12, 2012, the investment activities in Iran have not been expanded or renewed after April 12, 2012, and the Bidder/Proposer has adopted, publicized and is implementing a formal plan to cease the investment activities in Iran and to refrain in engaging in any new investments in Iran; or
 - b. The County of Schenectady has made a determination that the goods or services are necessary for the County to perform its functions and that, absent such an exemption, the County would be unable to obtain the goods or services for which the Bid/Proposal is offered. Such determination shall be made by the County in writing and shall be a public document.

XXV. Disclosure of Non-Responsibility Determinations

- A. In accordance with New York State Finance Law §139-k(2) a Governmental Entity is obligated to obtain specific information regarding prior non-responsibility determinations with respect to State Finance Law §139-j. In accordance

with State Finance Law §139-k, an Offeror must be asked to disclose whether there has been a finding of non-responsibility made within the previous four (4) years by any Governmental Entity due to: (a) a violation of State Finance Law §139-j or (b) the intentional provision of false or incomplete information to a Governmental Entity. The terms “Offeror” and “Governmental Entity” are defined in State Finance Law § 139-k(1). State Finance Law §139-j sets forth detailed requirements about the restrictions on Contacts during the procurement process. A violation of State Finance Law §139-j includes, but is not limited to, an impermissible Contact during the restricted period (for example, contacting a person or entity other than the designated contact person, when such contact does not fall within one of the exemptions).

- B. As part of its responsibility determination, State Finance Law §139-k(3) mandates consideration of whether an Offeror fails to timely disclose accurate or complete information regarding the above non-responsibility determination. In accordance with law, no Procurement Contract shall be awarded to any Offeror that fails to timely disclose accurate or complete information under this section, unless a finding is made that the award of the Procurement Contract to the Offeror is necessary to protect public property or public health safety, and that the Offeror is the only source capable of supplying the required Article of Procurement within the necessary timeframe. *See State Finance Law §§139-j (10)(b) and 139-k(3).*



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XXVI. Extension of Bids to All Political Subdivisions and Authorized Districts Located in the State of New York

- A. It is the intent of this Request For Bids that all political subdivisions, and districts located in the State of New York, be entitled to make purchases of materials, equipment or supplies from the resulting bid award.
- B. No officer, board or agency of a county, town, village, or school district shall make any purchase through the County when bids have been received for such purchase by such officer, board or agency, unless such purchase may be made upon the same terms, conditions and specifications at a lower price through the County.
- C. All purchases shall be subject to audit and inspection by the other political subdivisions for which the purchase was made.
- D. All orders will be placed by the participating entities. Each participating entity shall be billed by and make payment directly to the successful Bidder.
- E. Upon request, participating entities must furnish the successful Bidder with the proper tax exemption certificates or documentation of tax exempt status. (Purchase orders should have this information and be retained for documenting the tax exempt sale.)
- F. The sole responsibility in regard to performance of the bid, or any obligation, covenant, condition or term thereunder by the successful Bidder and the participating entities will be borne and is expressly assumed by the successful Bidder and the participating entities and not by Schenectady County. In the event of a failure or breach in performance of any such bid by a participating entity or the successful Bidder, Schenectady County, specifically and expressly disclaims any and all liability for such defective performance or breach, or failure of either party to perform in accordance with its obligations, covenants and the terms and conditions of this Schenectady County centralized bid.

XXVII. Title VI

- A. *The County of Schenectady, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 U.S.C. §§ 2000d to 2000d-4) and the Regulations, i.e.*
 1. *Civil Rights Restoration Act of 1987*

2. Federal Transit Laws, Title 49, United States Code, Chapter 53
3. 49 CFR. § 1.51
4. 49 CFR Part 21
5. 28 CFR § 42.401 et seq.
6. 28 CFR. § 50.3
7. 70 FR 74087, December 14, 2005
hereby notifies all bidders that it will affirmatively insure that in any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award.

- B. A copy of Schenectady County's full Title VI Program and Assurances Statement is available for download on our website at <http://www.schenectadycountyny.gov/AffirmativeAction>.

- XXVIII.** Pursuant to State Finance Law §139-j and §139-k, this solicitation includes and imposes certain restrictions on communications between the County and a Bidder during the procurement process. A Bidder is restricted from contacting other than the designated staff from the earliest notice of intent to solicit offers through final award and approval of the Procurement Contract (or Purchase Order) unless it is a contract that is included amount certain statutory exceptions set forth in State Finance Law §139-j(3)(a). County Employee are required to obtain certain information when contacted during the restricted period. The designated staff contact is the Purchasing Agent or their representative, 518.388.4240, purchasing@schenectadycountyny.gov. Bidders responding to this RFB must familiarize themselves with these State Finance Law requirements and will be expected to affirm they understand and agree to comply on the form included with the bid.



STANDARD PROVISIONS

The parties to the attached contract further agree to be bound by the following, which is hereby made a part of said contract. In the event of any conflict between the provisions of the attached contract and these standard provisions, unless otherwise provided, these standard provisions shall prevail.

I. This contract shall be deemed executory only to the extent of monies appropriated and available for the purpose of the contract, and no liability on account thereof shall be incurred by the County beyond the amount of such monies.

II. The Contractor specifically agrees to adhere to the provisions of the New York State Labor Law Article 8, entitled Public Work and all of the provisions contained therein, including Labor Law Section 220-d entitled “Minimum rate of wage and supplement” and Article 9 entitled Prevailing Wage for Building Service Employees.

III. The Contractor specifically agrees, as required by the provisions of the Labor Law, Section 220-e, as amended, that:

- (a) In hiring of employees for the performance of work under this contract or any subcontract hereunder for the manufacture, sale or distribution of materials, equipment or supplies hereunder, no contractor, subcontractor nor any person acting on behalf of such contractor or subcontractor shall by reason of race, creed, color, sex or national origin, discriminate against any citizen of the State of New York who is qualified and available to perform the work to which the employment relates.
- (b) No contractor, subcontractor, nor any person on his behalf shall in any manner discriminate against or intimidate any employee hired for the performance of work under this contract on account of race, creed, color, sex or national origin.
- (c) There may be deducted from the amount payable to the contractor by the county under this contract a penalty of five dollars for each person for each calendar day during which such person was discriminated against or intimidated in violation of the terms or conditions of this section of the contract, and
- (d) This contract may be cancelled or terminated by the county or municipality and all monies due or to become due hereunder may be forfeited for a second or any subsequent violation of the terms or conditions of this section of the contract, and



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- (e) The aforesaid provisions of this section covering every contract for or on behalf of the county or a municipality for the manufacture, sale or distribution of materials, equipment or supplies shall be limited to operations performed within the territorial limits of the State of New York.

IV. The Contractor will comply with the provisions of Section 291-299 of the Executive Law and the Civil Rights Law and the Governor's Code of Fair Practice, and any amendments and rules and regulations pursuant thereto, will furnish all information and reports deemed necessary by the State Division of Human Rights under the law, and will permit access to its books, records and accounts by the State Division of Human Rights, the Attorney General and the Industrial Commissioner for the purpose of investigation to ascertain compliance with the non-discrimination clauses, the Executive Law and Civil Rights Law.

V. The Contractor acknowledges that the terms of the contract include the Schenectady Fraud, Waste and Abuse Prevention Policy which is incorporated herein by reference and which is available to Contractor on the internet at www.schenectadycountyny.gov.

VI. The Contractor, if a medical provider under this contract:

- (a) represents and warrants that it is in compliance with all requirements applicable to Medicaid providers, including, but not limited to, the maintenance of a certified Medicaid compliance program for fraud, waste and abuse and further that none of its employees and contractors are an excluded individual or entity as such term is defined under federal or state law;
- (b) agrees that it shall submit no bill for payment for which payment would violate sections [1128](#), 1128A and [1156](#) of the [Social Security Act](#) and 42 CFR1001.1901;
- (c) agrees to continue to screen any and all of its employees and contractors to determine if any such person company or entity is an excluded individual or entity;
- (d) agrees to provide a list of all employees or contractors with sufficient identifying characteristics to allow the County to perform an independent screening of such persons or entities to determine if they are an excluded individual or entity;
- (e) agrees that in the event that any payment made by the County to the Contractor is determined to be in violation of the requirements of sections [1128](#), 1128A and [1156](#) of the [Social Security Act](#) and 42 CFR1001.1901, the Contractor shall indemnify, save and hold harmless the County of Schenectady, its officers, agents, servants and employees from any and all liability for anything and everything whatsoever arising from loss or damage, penalty or recoupment due to any determination that Contractor, its clients, agents or employees is or was an excluded individual or entity.

VII. The relationship of the Contractor to the County shall be that of independent contractor. The Contractor, in accordance with its status as an independent contractor, covenants



and agrees that it neither hold itself out as nor claim to be an officer or employee of the County by reason thereof, make any claim, demand or application to an officer or employee of the County including but not limited to Worker's Compensation coverage, Unemployment Insurance benefits, Social Security coverage or retirement membership or credits.

VIII. Should any claim or demand be made, or any action brought against the County in any way relating to this agreement or the performance thereof, the Contractor agrees to render diligently to the County without additional compensation, any and all cooperation which the County requires of the Contractor. Contractor shall be entitled to reimbursement for expenses incurred in such cooperation.

IX. The Contractor shall indemnify, save and hold harmless the County of Schenectady, its officers, agents, servants and employees from any and all liability for anything and everything whatsoever arising from loss or damage due to any act or omission of the Contractor, its clients, agents or employees.

X. It is expressly understood and agreed by the parties hereto that all claims for payment by the Contractor hereunder are expressly made subject to monies made available to the County therefore, by appropriation or otherwise and that the County shall incur no liability to the Contractor for any such payments beyond the monies so appropriated, or otherwise made available to it.

XI. If this contract is an installment purchase contract, it is not a general obligation of the County. Neither the full faith and credit nor the taxing power of the County are pledged to the payment of any amount due or to become due under such installment purchase contract. It is understood that neither this contract nor any representation by any public employee or officer creates any legal or moral obligation to appropriate or make monies available for the purpose of the contract.

XII. The Contractor will carry public liability and property damage insurance and, if this is a construction contract, owners and contractors protective insurance issued by a company authorized to do business in the State of New York, in amounts satisfactory to the County, which shall name the County as a primary non-contributory additional insured.

The Contractor shall also carry disability benefits and workers' compensation insurance. Certificates of workers' compensation insurance shall be delivered on one of the following forms:

- CE-200, Certificate of Attestation of Exemption from NYS Workers' Compensation and/or Disability Benefits coverage; or
- C-105.2 – Certificate of Workers' Compensation Insurance; or
- SI-12 – Certificate of Workers' Compensation Self-Insurance, GSI-105.2 – Certificate of Participation in Workers' Compensation Group Self-Insurance.



Certificates of disability benefits coverage shall be delivered on one of the following forms:

- CE-200, Certificate of Attestation of Exemption from NYS Workers' Compensation and/or Disability Benefits Coverage; or
- DB-120.1 – Certificate of Disability Benefits; or
- DB-155 – Certificate of Disability Benefits Self-Insurance.

Contractor shall attach to this Agreement certificates of insurance evidencing Contractor's compliance with these requirements.

XIII. Each and every provision of law and clause required by law to be inserted in this Contract shall be deemed to have been inserted herein. If any such provision is not inserted, through mistake or otherwise, then upon the application of either party, this Contract shall be physically amended forthwith to make such insertion.

XIV. The Contractor shall keep and maintain efficient, complete and separate books and records concerning any and all costs incurred in the performance of this agreement. Such books and records shall be kept available and maintained in a format for examination by qualified personnel of the County and/or the New York State Department of Audit and Control at all reasonable times and places during the period of execution of this agreement and for six (6) years from the date of final payment thereunder.

If part or all of the performance hereunder is to be conducted through subcontractors with other entities, then the Contractor agrees that it shall make the provisions of this article a formal part of all such subcontracts which shall specifically make reference to the records as noted hereinabove, and that all such records maintained by such subcontractors shall be made available and disclosed to qualified personnel of the County and/or the New York State Department of Audit and Control.

XV. It is understood that this instrument represents the entire agreement of the parties hereto; that all previous understandings are merged herein; and that no modifications hereof shall be valid unless written evidence thereof shall be executed by the party to be charged.

XVI. If any term or provision of this agreement or the application thereof to any person or circumstance shall to any extent be held invalid or unenforceable, the remainder of this agreement or the application of such term or provision to persons or circumstances other than those as to which it is held invalid or unenforceable, shall not be affected thereby and every other term and provision of this agreement shall be valid and be enforced to the fullest extent permitted by law.

XVII. Any contractor or subcontractor on a public works construction contract with the County of Schenectady, exceeding two-hundred thousand dollars (\$200,000.00), shall have an approved apprenticeship program as provided for in Article 23 of the New York State Labor Law



and shall so certify on the Apprenticeship Certification Form – Schenectady County Public Works Contract prior to execution of the contract by the County.

XVIII. Any contractor or subcontractor who receives “State Funds” or “State-Authorized-Payments” acknowledges that they must comply with all applicable provisions of Executive Order #38 promulgated by the Governor of the State of New York, including:

1. Individuals/entities that receive SF/SAP to provide Program Services must determine whether they are qualified as a Covered Provider for a Covered Reporting Period (CRP), by using the EO-38 Covered Provider Determination Worksheet located at: <https://www.eo38.ny.gov/xo/determinationForm>
2. If an individual/entity has determined that it is a Covered Provider (or is projected to qualify as a Covered Provider), it must determine whether it is in compliance with the Administrative Expenses limitations set forth in the regulations. Unless a waiver is granted, the regulations set the limitations on Administrative Expenses that apply to Covered Providers, which can be found at: http://executiveorder38.ny.gov/sites/default/files/EO_38_Provider_Guidance.pdf?v=d101231231233913
3. If an individual/entity has determined that it is a Covered Provider (or is projected to qualify as a Covered Provider), it must then determine whether it is in compliance with the Executive Compensation limitations set forth in the regulations, which can be found at: If an individual/entity has determined that it is a Covered Provider (or is projected to qualify as a Covered Provider), it can then determine whether it is in compliance with the Executive Compensation limitations set forth in the regulations.
4. If an individual/entity has determined that it is a Covered Provider, it must submit an EO #38 Disclosure Form no later than 180 days after the close of their Covered Reporting Period. If a Covered Provider exceeds (or projects that it will exceed) the Administrative Expenses or Executive Compensation limitations, it may submit a timely waiver application no later than submission date of its EO #38 Disclosure Form.
5. If a Covered Provider is found to be out of compliance with the requirements in the regulations, either through the review of an EO #38 Disclosure Form or through failure to submit an EO #38 Disclosure Form, it must comply with all requests and further proceedings with the relevant state agency to comply with EO #38.

XIV. Title VI Policy Statement:

It is the policy of the County of Schenectady to prevent and eliminate discrimination in all of its operations and services as well as all aspects of employment. All Department,



Divisions, Offices, and Bureaus will plan, develop, and implement their programs and activities so that no person is subjected to unlawful discrimination based on race, color, gender, age, national origin, religion, disability, sexual orientation, marital status, or Vietnam era veteran status.

Schenectady County assures that no person shall on the grounds of race, color, national origin as provided by Title VI of the Civil Rights Act of 1964 and the Civil Rights Restoration Act of 1987 (P.L. 100.259) be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity. Schenectady County further assures every effort will be made to ensure nondiscrimination in all of its programs and activities, whether those programs and activities are federally funded or not. In the event that Schenectady County distributes federal aid funds to another government entity, it will include Title VI language in all written agreements and will monitor for compliance.

Title VI Authority:

Title VI of the Civil Rights Act of 1964 is the Federal Law that protects individuals from discrimination on the basis of their race, color or national origin in programs that receive Federal financial assistance.

The Civil Rights Restoration Act of 1987 clarified the broad, institution-wide application of Title VI.

1. Title VI of the Civil Rights Act of 1964, 42 U.S.C. § 2000d et seq.
2. Federal Transit Laws, Title 49, United States Code, Chapter 53
3. 49 CFR § 1.51
4. 49 CFR part 21
5. 28 CFR § 42.401 et seq.
6. 28 CFR § 50.3
7. 70 FR 74087, December 14, 2005

Title VI Program and Assurances:

A copy of Schenectady County's full Title VI Program and Assurances Statement is available for download on our website at,
<http://www.schenectadycountyny.gov/AffirmativeAction>.

Title VI Exhibit 1:

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

1. **Compliance with Regulations:** The contractor (hereinafter includes consultants) will comply with the Acts and the Regulations relative to Non-discrimination in Federally-assisted programs of the U.S. Department of Transportation, Office of the Secretary for



Research and Technology (OST-R), as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.

2. **Non-discrimination:** The contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, national origin, sex, age, or disability in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor will not participate directly or indirectly in the discrimination prohibited by the Acts and the Regulations, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR Part 21.
3. **Solicitations for Subcontracts, Including Procurements of Materials and Equipment:** In all solicitations, either by competitive bidding, or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the contractor of the contractor's obligations under this contract and the Acts and the Regulations relative to Non-discrimination on the grounds of race, color, or national origin.
4. **Information and Reports:** The contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information and its facilities as may be determined by the Recipient or the OST-R to be pertinent to ascertain compliance with such Acts, Regulations, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the contractor will so certify to the Recipient or the OST-R, as appropriate, and will set forth what efforts it has made to obtain the information.
5. **Sanctions for Noncompliance:** In the event of a contractor's noncompliance with the Non-discrimination provisions of this contract, the Recipient will impose such contract sanctions as it or the OST-R may determine to be appropriate, including, but not limited to:
 - a. withholding payments to the contractor under the contract until the contractor complies; and/or
 - b. cancelling, terminating, or suspending a contract, in whole or in part.



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SUNY SCCC ELSTON HALL – LOBBY AND MOHAWK ROOM RENOVATION
RFB-2024-20
General and Supplementary Conditions – Office of Facilities V2017.1

I. Bid Submittal Requirements

A. Amount of Bid Security

Each bid must be accompanied by certified check of the bidder or by a bid bond prepared on a form satisfactory to the OWNER, duly executed by the bidder as principal, and having as surety thereon a surety company authorized to do business within the state of New York.

Bid security shall be in an amount not less than 5% of the total bid price including alternatives. Checks shall be returned to all, except the three lowest formal bidders, within three working days after the formal opening of bids and the remaining checks will be returned to the three lowest bidders within a reasonable time after the OWNER and the accepted bidder have executed a contract. If no contract has been so executed within 60 days after the opening of bids, bid security will be returned upon demand of the bidder any time thereafter so long as he has not been notified of the acceptance of his bid.

The successful low bidder, upon his failure to execute and deliver the contract and required bonds and insurance certification within 15 days after he has received notice of the acceptance of his bid, shall forfeit to the OWNER, as liquidated damages for the failure or refusal, the security deposited with his bid, as specified above.

B. Awarding of the Contract

OWNER reserves the right to reject any and all Bids, to waive any and all informalities not involving price, time or changes in the Work, and to negotiate contract terms with the successful Bidder, and the right to disregard all non-conforming, non-responsive, unbalanced, or conditional bids. Discrepancies between words and figures will be resolved in favor of words. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

OWNER reserves the right to reject any Bid of any Bidder if the OWNER believes that it would not be in the best interest of the project to make an award to that Bidder, whether because the Bidder is not responsive or the Bidder is unqualified or of doubtful financial ability or fails to meet any other pertinent standard or criteria established by the OWNER.

In evaluating Bids, OWNER shall consider the qualifications of the Bidders, whether or not the bids comply with the prescribed requirements and alternatives and unit prices if requested in the Bid form. It is the OWNER'S intent to accept alternatives (if any are accepted) in the order in which they are listed in the Bid form but OWNER may accept them in any order or combination.

OWNER may conduct such investigations as he deemed necessary to assist in the evaluation of any Bid and to establish the responsibility, qualifications and financial ability of the Bidders, proposed Subcontractors and other persons and organizations to do the work in accordance with the Contract Documents to the OWNER'S satisfaction within the prescribed time.

OWNER may consider the qualifications and experience of Subcontractors and other persons and organizations (including those who are to furnish the principal items of material or equipment) proposed for those portions of the work as to which the identity of Subcontractors and other persons and organizations must be submitted as provided in these Contract Documents. Operating costs, maintenance considerations, performance data and guarantees of material and equipment may also be considered by the OWNER.

OWNER reserves the right to reject the Bid of any Bidder who does not pass any such evaluation to the OWNER'S satisfaction.

If the contract is to be awarded, it will be awarded to the lowest responsible Bidder meeting these specifications whose evaluation by the OWNER indicates to OWNER that the award will be in the best interests of the project.



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If the contract is to be awarded, OWNER will give the successful Bidder a Notice of Award within 45 days after the day of the Bid opening. Distribution of contracts may constitute said notice of award.

C. Bid Document Copies

Complete sets of the Bidding Documents may be obtained as stated in the Notice to Bidders.

Complete sets of the Bidding Documents shall be used in preparing Bids: neither OWNER nor ENGINEER/ARCHITECT assume any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

OWNER and ENGINEER/ARCHITECT in making copies of Bidding Documents available on the above terms do so only for the purpose of obtaining Bids on the work and do not confirm a license or grant for any other use.

D. Bid Submission and Acceptance

Bids shall be submitted to the County Purchasing Agent at the County Office Building, 620 State Street, Schenectady New York, at the time and date indicated in the legal advertisement and in the Notice To Bidders and shall be included in an opaque sealed envelope, marked with the project title and project number and the name and address of the Bidder and accompanied by the Bid Security, Non-Collusion Bid Certification, Certified Copy of Resolution of Board of Directors and other required documents. If the Bid is sent through the mail or other delivery system, the sealed envelope shall be enclosed in a separate envelope with the notation "BID ENCLOSED" on the face thereof. Bids submitted shall be in sealed envelopes with the type of contract (General Construction, Plumbing, Electrical, Mechanical, etc.) indicated on the cover of the envelope.

E. Bid Opening and Review

The Bids will be opened publicly and reviewed by the OWNER. All obviously non-responsive bids will not be reviewed and will be returned to the Bidder. When the Bids are opened publicly, they will be read aloud and an abstract of the amounts of the Base Bids and major alternates (if any) will be made available after the opening of the Bids.

F. Bids to Remain Open Subject to Acceptance

All Bids shall remain open for forty-five (45) days after the day of the Bid opening, but the OWNER may, in his sole discretion, release any Bid and return the Bid security prior to that date.

G. Bonds and Insurance

Performance and other Bonds: CONTRACTOR shall furnish Performance and Payment Bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all the CONTRACTOR'S obligations under the Contract Documents. These bonds shall remain in effect until the project is fully completed and accepted by the OWNER. All bonds shall be in the forms prescribed by the bidding documents and be executed by such Sureties as are licensed to conduct business in New York State. If the surety of and Bond by CONTRACTOR is declared bankrupt or becomes insolvent or its right to do business is terminated by the state of New York or it ceases to meet the requirements of the section titled "Bonds and Insurance", CONTRACTOR shall within five (5) days thereafter substitute another Bond and Surety, both of which are acceptable to the OWNER.

Contractor's Liability Insurance: CONTRACTOR shall purchase and maintain such comprehensive general liability and other insurance in his name and that of the OWNER as will provide protection from claims set forth below which may arise out of or result from CONTRACTOR'S performance of work and CONTRACTOR'S other obligations under the Contract Documents, whether such performance is by the



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Contractor, by any Subcontractor, 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' and workmen's compensation, disability benefits and other similar employee benefit acts;
2. Claims for damages because of bodily injury, occupational sickness or disease, or death of CONTRACTOR'S employees;
3. Claims for damages because of bodily injury, sickness or disease, or death of any person other than CONTRACTOR'S employees;
4. Claims for damages insured by personal injury liability coverage which are sustained (i) by any person as a result of an offense directly or indirectly related to the employment of such person by the CONTRACTOR, or (ii) by any other person for any other reason;
5. Claims for damages, other than to the work itself, because injury to or destruction of tangible property, including loss of use resulting there from;
6. Claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

The insurance required by this section shall include the specific coverage and be written for not less than the limits of liability and coverage's provided below or required by law, whichever is greater. All such insurance's shall contain a provision that the coverage afforded will not be canceled, materially changed or renewal refused until at least thirty (30) days prior written notice has been given to OWNER.

All such insurance shall remain in effect until final payment and at all times thereafter when CONTRACTOR may be correcting, removing or replacing defective work in accordance with the section titled "Warranty: Tests, Inspection, and Defective Work - One Year Correction Period".

The comprehensive general liability insurance required above will include contractual liability insurance applicable to CONTRACTOR'S obligations under the section titled "Contractor's Responsibilities - Indemnifications".

Required Limits of Insurance: Coverage shall be at least as broad as:

1. Commercial General Liability (CGL): Insurance Services Office (ISO) Form CG 00 01 covering CGL on an "occurrence" basis, including products and completed operations, property damage, bodily injury and personal & advertising injury with limits no less than \$1,000,000 per occurrence. General aggregate limit (per project CG 25 03) shall be twice the required occurrence limit.
2. Automobile Liability: Must include coverage for liability arising out of all owned, leased, hired and non-owned automobiles, with limits no less than \$1,000,000 per accident for bodily injury and property damage.
3. Worker's Compensation: As required by the State of New York, with Statutory Limits, and Employers' Liability insurance with a limit no less than \$1,000,000 per accident for bodily injury or disease.
4. Umbrella/Excess Liability: Limits no less than \$5,000,000 per occurrence/aggregate.
5. Builder's Risk: Shall utilize an "All Risk" coverage form, with limits equal to the completed value of the project.

The OWNER and its officers, employees and agents, shall be named as primary non-contributory additional insured on the insurance policies issued for the required Comprehensive General Liability, Excess "Umbrella" Liability and Builder's Risk Insurance coverages. The OWNER and its officers, employees and agents shall not be named as additional insured on the Automobile Liability policy.

Partial Utilization - Property Insurance: If OWNER finds it necessary to occupy or use a portion or portions of the work prior to Substantial Completion of all the work, such use or occupancy may be



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accomplished in accordance with the section titled "Payments To Contractor and Completion - Substantial Completion"; provided that no such use or occupancy shall commence before the insurers providing property insurance have acknowledged notice thereof and in writing effected the changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on any policy or policies, but the property insurance shall not be canceled or lapse on account of any such partial use or occupancy.

Surety Bonds and Insurance: The section titled "Bonds and Insurance" sets forth the OWNER'S requirements as to performance, payment, and other Bonds. When the successful Bidder delivers the executed Agreement to the OWNER, it must be accompanied by the required Surety on forms acceptable to the OWNER. Proof of Insurance Coverage's required in the Contract Documents shall be by actual delivery of the policies of insurance to the OWNER or by delivery of an AIA G 705 Certificate of Insurance or such other certificates or other proof of insurance as approved by the OWNER.

H. Contract Documents: Intent and Reuse

Intent of These Documents: The Contract Documents comprise the entire Agreement between the OWNER and CONTRACTOR concerning the work. They may be altered only by a modification agreed upon by both OWNER and CONTRACTOR. The Contract Documents are complementary; what is called for by one is as binding as if called for by all. If, during the performance of work, the CONTRACTOR finds a conflict, error or discrepancy in the Contract Documents, he shall report it to the ENGINEER or OWNER in writing at once and before proceeding with the work affected thereby.

In case of ambiguity or conflict between any components of the Contract Documents, the Bidder shall request a written Addendum from the ENGINEER to resolve the ambiguity or conflict.

The components of the Contract Documents shall govern in the following order of precedence:

1. Addenda (if any), with those of later date having precedence over those of earlier date;
2. Special Notice to Bidders;
3. Contract Agreement;
4. The Specifications;
5. The Drawings;
6. Bidding Requirements and Conditions;
7. Specific Project Provisions and Special Conditions;
8. General Construction Contract Provisions;
9. Other Documents.

Whenever reference is made to any published standards, codes or standard specifications, it shall mean the latest standard code, specification or tentative specification of the technical society, organization or body referred to, which is in effect at the date of invitation to bids. Where specified articles, sections, paragraphs or other subdivisions of the referenced publications are not stated, the referenced publication shall apply in full.

However, no provision of any reference standard specification, manual or code (whether or not specifically incorporated by reference in the Contract Documents) shall change the duties and responsibilities of OWNER, CONTRACTOR or ENGINEER, or any of their agents or employees from those set forth in the Contract Documents. Clarifications and interpretations of the Contract Documents shall be issued by the ENGINEER as provided in the section titled "ENGINEER'S Status During Construction - Clarifications and Interpretations". The Contract Documents will be governed by the law of the place of the project.

It is the intent of these Specifications and Drawings to describe a complete project (or part thereof) to be constructed in accordance with the Contract Documents. Any work that may reasonably be inferred from the Specifications or Drawings as being required to produce the intended result shall be supplied whether or not



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it is specifically called for. When words which have a well-known technical or trade meaning are used to describe work, materials or equipment, such words shall be interpreted in accordance with such meaning.

Reuse of These Documents: Neither CONTRACTOR nor Subcontractor, manufacturer, fabricator, supplier or distributor shall have or acquire title to or ownership rights in any Drawings, Specifications or other documents (or copies of any thereof) prepared by or bearing the seal of the ENGINEER; and they shall not reuse any of them.

Assignment Of This Contract: Neither party to the Contract shall assign the Contract or sublet it as a whole without the written consent of the other, nor shall the CONTRACTOR assign any monies due him hereunder, without the prior written consent of the OWNER.

I. Contract Time of Completion

Bidders are advised that time of completion is of the essence and shall be taken into account, by the Bidders, in the preparation of the proposals.

The CONTRACTOR shall begin work within ten (10) days of the Notice to Proceed and this project shall be completed by the date, or within the number of days, indicated in the "Agreement Between Owner and Contractor". The number of days within which, or the dates by which, the work is to be substantially complete, and also completed and ready for final payment (the Contract Time), are set forth and clearly listed in the Summary of Work.

The number of days, or finish date, may be extended without penalty by the CONTRACTOR with written approval of OWNER under exceptional circumstances or adverse weather conditions as set forth in the contract documents in the sections entitled "Change To The Contract Time" or "Change in the Work" that are included in the portion of these specifications entitled "Construction Requirements".

J. Definitions

Whenever used in the Contract Documents, the following terms have the meanings indicated which are applicable to both the singular and plural thereof:

Addenda	Written or graphic instruments issued prior to the opening of Bids which clarify, correct or change the bidding documents or the Contract Documents.
Agreement	The written agreement between the OWNER and CONTRACTOR covering the Work to be performed; other Contract Documents are attached to the Agreement and made a part thereof as provided therein.
Application for Payment	The form accepted by the ENGINEER which is to be used by CONTRACTOR in requesting progress or final payment and which is to include such supporting documentation as is required by the Contract Documents.
Bid	The offer or proposal of the Bidder submitted on the prescribed form setting forth the prices for the work to be performed.
Bonds	Bid, performance and payment bond and other instruments of security.
Change Order	A written order to the CONTRACTOR signed by the OWNER, ENGINEER and the CONTRACTOR authorizing an addition, deletion or revision in the work, or an adjustment in the Contract Price or the Contract Time issued after the effective date of the Agreement.



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Contract Documents

The Agreement, Addenda (which pertain to the Contract Documents), CONTRACTOR'S Bid (including documentation accompanying the bid and any post-Bid documentation submitted prior to the Notice of Award) when attached as an exhibit to the Agreement, the Bonds, these General Provisions, the Specific Project Provisions, the Specifications, the Drawings, together with all Modifications issued after execution of the Agreement.

Contract Price The monies payable by OWNER to CONTRACTOR under the Contract Documents as stated in the Agreement.

Contract Time The number of days computed as provided in the section title "Miscellaneous--Computation of Time" or the date stated in the agreement for the completion of the work.

CONTRACTOR The person, firm or corporation with whom OWNER has entered into the agreement.

County The County of Schenectady, New York, a municipal corporation.

Day A calendar day of twenty-four hours measured from midnight to the next midnight.

Defective An adjective which when modifying the word "work" refers to work that is unsatisfactory, faulty or deficient or does not conform to the Contract Documents or does not meet the requirements of any inspection, test or approval deferred to in the Contract Documents, or has been damaged prior to recommendation of final payment.

Designated Representative

That person, named by the OWNER to oversee and/or administer the contract provisions. During construction, or in the absence of a duly named person, the ENGINEER. The duties and responsibilities of the Designated Representative will be as specified in these Contract Documents.

Drawings The drawings which show the character and scope of the work to be performed and which are referred to in the Contract Documents.

ENGINEER The County staff member or consultant who is responsible for the Drawings and Specifications assigned as the design professional by the Director of Facilities or the County Manager.

General Requirements

All sections of the section of these Contract Documents titled "General Construction Contract Provisions".

Modification A written amendment of the Contract Documents signed by all parties. A Change Order.

Notice of Award The written notice by OWNER to the apparent successful Bidder stating that upon compliance by the apparent successful Bidder with the conditions precedent enumerated therein, within the time specified, OWNER will sign and deliver the Agreement.



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Notice to Proceed	A written notice given by the OWNER to CONTRACTOR fixing the date on which to perform his obligation under the Contract Documents.
OWNER	The County of Schenectady, New York, a municipal corporation.
Project	The total construction of which the work to be provided under the Contract Documents may be the whole or a part as indicated elsewhere in the Contract Documents.
Project Representative	The authorized representative of the OWNER who is assigned to the site or any part thereof for the purpose of observing construction to better assure compliance with the Drawings and Specifications.
Shop Drawings	All drawings, diagrams, illustrations, schedules and other data which are specifically prepared by the CONTRACTOR, a Subcontractor, manufacturer, fabricator, supplier or distributor to illustrate some portion of the work and all illustrations, brochures, standard schedules, performance charts, instructions, diagrams and other information prepared by a manufacturer, fabricator, supplier or distributor and submitted by CONTRACTOR to illustrate material and equipment for some portion of the work.
Specifications	Those portions of the Contract Documents consisting of written technical descriptions of materials, equipment, construction systems, standards and workmanship as applied to the work and certain administrative details applicable thereto.
Subcontractor	An individual, firm or corporation having a direct contract with the CONTRACTOR or with any other Subcontractor for the performance of work at the site.
Substantial Completion	The work (or a specified part thereof) has progressed to the point where, in the opinion of the ENGINEER as evidenced by his definitive certificate of Substantial Completion, it is sufficiently complete, in accordance to the Contract Documents, so that the work (or specified part) can be utilized for the purposes for which it was intended; or if there be no such certificate issued, when final payment is due in accordance with the section titled "Payment to Contractor And Completion - Final Application for Payment". The terms "substantially complete" and "substantially completed" as applied to any work refer to Substantial Completion thereof.
Work	The entire completed construction or the various separately identifiable parts thereof required to be furnished under the Contract Documents. Work is the result of performing services, furnishing labor and furnishings and incorporating materials and equipment into the construction, all as required by the Contract Documents.

K. Discrimination Prohibited

1. The Contractor specifically agrees, as required by the provisions of the Labor Law, Section 220-3, as amended that:
 - (a) In hiring of employees for the performance of Work under this Contract or any subcontract hereunder for the manufacture, sale or distribution of materials, equipment or supplies hereunder, no Contractor, Subcontractor nor any other person acting on behalf of such contractor or Subcontractor shall by any reason of race, creed, color, sex or national origin, discriminate against any citizen of the State of New York who is qualified and available to perform the work to which the employment relates.



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- (b) No Contractor, Subcontractor, nor any person on his behalf shall in any manner discriminate against or intimidate any employee hired for the performance of Work under this Contract on account of race, creed, color, sex or national origin.
 - (c) There may be deducted from the amount payable to the Contractor by the County under this Contract a penalty of five dollars for each person for each calendar day during which such person was discriminated against or intimidated in violation of the terms or conditions of this section of the Contract, and;
 - (d) This Contract may be cancelled or terminated by the County or municipality and all monies due or to become due hereunder may be forfeited for a second or any subsequent violation of the terms or conditions of this section of the Contract, and;
 - (e) The aforesaid provisions of this section covering every contract for or on behalf of the County or a municipality for the manufacture, sale or distribution of materials, equipment or supplies shall be limited to operations performed within the territorial limits of the State of New York.
2. The CONTRACTOR will comply with the provisions of Section 291-299 of the Executive Law and the Civil Rights Law and the Governor's Code of Fair Practice, and any amendments and rules and regulations pursuant thereto, will furnish all information and reports deemed necessary by the State Division of Human Rights under the law, and will permit access to its books, records and accounts by the State Division of Human Rights, the Attorney General and the Industrial Commissioner for the Purpose of investigation to ascertain compliance with the non- discrimination clauses, the Executive Law and Civil Rights Law.

L. Examination of Contract Documents and Site

Before submitting a Bid, each Bidder must:

- 1. Thoroughly examine and be familiar with all portions of the Contract Documents.
- 2. Be familiar with all ordinances, rules, regulations, as well as all federal, State, and local laws that may affect cost, progress, or performance of the work in any manner whatsoever.
- 3. Should the Bidder choose to not visit the site to become familiar with local conditions: acknowledge and accept responsibility for any of these conditions that may affect cost, progress or performance of work in any manner whatsoever.
- 4. Should the Bidder choose to visit the site to become familiar with local conditions: Any discrepancies in the Bidder's observation with the Contract Documents must be submitted in writing prior to the bid date in accordance with the Instructions to Bidders.

Before submitting his bid, each Bidder will, at his own expense, make such additional investigations and tests as the Bidder may deem necessary to determine his bid for performance of work in accordance with the time, price and other terms and conditions of the Contract Documents. On request, in advance, OWNER will provide each Bidder access to the site to conduct such investigations and tests as each Bidder deems necessary for submission of his Bid. Bidder shall restore the site to its former condition upon completion of such tests or explorations.

The submission of a Bid will constitute an incontrovertible representation by the Bidder that he has complied with every requirement of the Contract Documents, that without exception the Bid is premised upon performing and furnishing the Work required by the Contract Documents and such means, methods, techniques, sequences or procedures of construction as may be indicated in or required by the Contract Documents, and that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.



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M. Hazardous Wastes

It shall be the responsibility of all Contractors and subcontractors to strictly adhere to all Federal, State and local regulations pertaining to use, transportation and disposal of hazardous wastes. These are to include, but not be limited to, the following:

1. Asbestos-containing materials
2. Contamination of the atmosphere
3. Contamination of soil surface or subsurface
4. Contamination of water, groundwater or water courses
5. Contamination of objects or any other intangible matter
6. Lead containing materials

N. Hours and Wages - Minimum Wage Schedule

No laborer, workman or mechanic in the employ of the Contractor, Subcontractor or other person doing or contracting to do the whole or part of the work contemplated by this Contract shall be permitted or required to work more than eight hours in any one calendar day or more than five days in any one week except in cases of extraordinary emergency, including fire, flood or danger to life or property.

Each laborer, workman or mechanic employed by the Contractor, Subcontractor or other person doing or contracting to do the whole or part of the work contemplated by this Contract shall be paid no less than the prevailing rate of wages and shall be provided supplements not less than the prevailing supplements as determined by the New York State Department of Labor, Bureau of Public Work. The prevailing wage rate schedule as determined by New York State is affixed and made part of these Contract Documents.

New wage rates may be determined during the course of work under this contract by the State Department of Labor; Contractors shall use the predetermined Wage Rates when applicable and shall compensate for this increase in their bid proposal. The contract will not be changed nor will the OWNER pay for any Wage Rate increase after the bid proposals have been submitted.

O. Interpretations and Addenda

All questions about the meaning or intent of the Contract Documents shall be submitted to the Owner's Representative listed herein in writing, in accordance with the Instructions to Bidders. Replies will be issued by Addenda delivered to all parties recorded by OWNER as having received the Bidding Documents. Only questions answered by formal written Addenda will be binding. Oral or other interpretations or clarifications will be without legal effect. Questions received less than (3) days prior to the date of Bid opening may not be answered.

P. Liquidated Damages Provisions

Provisions for liquidated damages, if any, are set forth in these Contract Documents.

Q. Modification and Withdrawal of Bids

Bids may be modified or withdrawn by an appropriate document duly executed (in the manner that a Bid must be executed) and delivered to the County Purchasing Agent at any time prior to the opening of Bids. If, within 24 hours after Bids are opened, and Bidder files a duly signed, written notice with the County Purchasing Agent and promptly thereafter demonstrates to the reasonable satisfaction of Engineer that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid and the Bid security will be returned. Thereafter, that Bidder will be disqualified from further bidding on the Work to be provided under these Contract Documents.

R. Obligation of Bidder

At the time of the opening of bids each bidder will be presumed to have inspected the site and to have read and be thoroughly familiar with the drawings and contract documents including all Addenda. The failure or



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omission of any bidders to receive or examine any form, instrument, or document shall in no way relieve any bidder from any obligation in respect to his bid.

S. Post Bid Information

Within 96 hours of the Bid Opening the apparent low bidder shall furnish in writing, the following information to the ENGINEER if so requested.

1. Statement that project can be completed within established time.
2. Preliminary progress schedule showing dates for major elements of construction and dates by which major subcontracts will be awarded.
3. List of proposed subcontractors and material suppliers.

T. Security for Faithful Performance

Simultaneously with his delivery of the executed contract, the successful bidder must deliver to OWNER three (3) copies of an executed bond in the amount of 100% of the accepted bid as security for faithful performance of the contract and for the payment of all persons performing labor or furnishing materials in connection therewith, prepared on the standard form of Performance Bond, Labor and Materials Payment Bond, AIA Form 312 and having as surety thereon such surety company or companies as area acceptable to and approved by the OWNER, and as are authorized to transact business in New York State.

U. State Laws and Regulations

1. The Contractor and each and every sub-contractor performing the work at the site of the project to which this contract relates shall comply with the applicable provisions of the "Labor Law", as amended, of New York State and all other applicable laws and regulations governing such activities.
2. Workman's Compensation: This Contract shall be void and of no effect unless the person or corporation making or performing such contract shall secure compensation for the benefit of, and keeping insured during the life of such contract, such employees, in compliance with the provisions of Worker's Compensation Law and General Municipal Law Section 108.
3. Lien Law: The attention of the Contractor is invited to the provisions of the Lien Law of New York State, wherein funds received by a contractor for a public improvement are declared to constitute trust funds in the hands of such contractor to be applied first to the payment of certain claims.
4. State Fire Prevention and Building Code: Under the requirements of the NYS Uniform Fire Prevention and Building Code, Title 19 NYCRR, Part 442, the County inspects and certifies renovations and new construction built for the County. The OWNER through the ENGINEER shall have all rights under State Law for the inspection, Code compliance and certification of work where required by the code. Further, where electrical work is included as part of this contract, the CONTRACTOR shall be responsible for securing inspection, the cost of any inspection fee and electrical work certification from a New York State recognized electrical underwriter. In such case underwriters' certification shall be provided by the Contractor prior to final project payment or release of retainage.

V. Subcontractors, Suppliers, And Others, Etc.

If these Contract Documents require the identity of certain Subcontractors and other persons and organizations (including those who are furnishing principal items of material and equipment) to be submitted to the OWNER in advance of the day of the Notice of Award, the apparent successful Bidder, and any Bidder so requested, will within four (4) days after the day of the Bid opening submit to the OWNER a list of all Subcontractors, Suppliers, and other such persons and organizations proposed for those portions of the work as to which such identification is so required.



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Such list shall be accompanied by an experience statement with pertinent information as to similar projects and other evidence of qualification for each Subcontractor, person and organization if requested by ENGINEER. If ENGINEER after due investigation, has reasonable objection to any proposed Subcontractor, other person or organization, he may, before giving Notice of Award, request the apparent successful Bidder to submit an acceptable substitute without an increase in Bid price.

If the apparent successful Bidder declines to make any such substitution, the contract shall not be awarded to such Bidder and may be awarded to another Bidder. His declining to make any such substitution will not constitute grounds for sacrificing his Bid Security. Any Subcontractor, other person or organization so listed and to whom ENGINEER does not make written objection prior to the giving of the Notice of Award will be deemed acceptable to the OWNER and ENGINEER.

No Contractor shall be required to employ any Subcontractor, other person or organization against whom the Contractor has a reasonable objection.

W. Substitution Material and Equipment

The Contract, if awarded, will be on the basis of material and equipment described in the Drawings or specified in the Specifications without consideration of possible substitute of "or equal" items.

Whenever it is indicated in the Drawings or specified in the Specifications that a substitute or "or equal" item of material or equipment may be furnished or used by Contractor if acceptable to ENGINEER, application for such acceptance will not be considered until after the "effective date of the Agreement". The procedure for submittal of any such application by Contractor and consideration by ENGINEER is set forth in these Contract Documents.

II. Acceptance of Bid

A. Preliminary Matters

Award of Contract after Approval: Where application may have been made for approval of plans, grant award or similar approval from a higher level of government or the County Legislature, the award of contract will not be made prior to receipt of the approval.

Award of Separate Contracts: Where separate prime contracts are awarded for different trades within the work (typically called the "General Contractor", "Electrical Contractor", "Plumbing Contractor" and "Heating or Mechanical Contractor") the term "CONTRACTOR" in the Contract Documents in each case shall mean the CONTRACTOR who executes each separate Agreement. The General Contractor shall be primarily responsible for setting the schedule and rate of construction with other prime contractors coordinating their work.

Award of Contracts: The award of a Contract, if it is to be awarded, shall be made within forty-five (45) calendar days of the date specified for publicly opening proposals, unless otherwise specified herein. Award of the Contract shall be made by the Owner to the lowest, qualified bidder whose proposal conforms to the cited requirements of the Owner. Where alternates or add-on items are included in the bid, the lowest qualified bidder will be determined by comparison of the base bid, alternate bid or combination of base bid or alternate bid plus add-on items to be actually awarded by the Owner. The Bidder must be prepared, if requested by the Schenectady County Purchasing Agent, to present evidence, ability and financial standing, as well as a statement as to plant and machinery.

The OWNER may consider the qualifications and experience of Subcontractors, Suppliers and other persons and organizations proposed for those portions of the Work as to which the identity of Subcontractors, Supplies and other persons and organizations must be submitted as provided in the Supplementary Conditions. Owner also may consider the operating costs, maintenance requirements, performance data and



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guarantee of major items of materials and equipment proposed for incorporation in the Work when such data is required to be submitted prior to the Notice of Award.

The OWNER may conduct such investigations as OWNER deems necessary to assist in the evaluation of any bid and to establish the responsibility, qualifications, and financial ability of Bidders, proposed Subcontractors, Suppliers and other Persons and organizations to perform and furnish the Work in accordance with the Contract Documents to OWNER'S satisfaction within the prescribed time.

If the contract is awarded, it will be awarded to the lowest responsible bidder for the alternate(s) selected, whose evaluation by OWNER indicates that the award will be in the best interests of the project.

Consideration of Proposals (Unit Price Bids): After the bids are publicly opened and read, they will be compared on the basis of the summation of the products obtained by multiplying the estimated quantities shown in the proposal by the unit bid prices. If a bidder's proposal contains a discrepancy between unit bid prices written in words and unit bid prices written in numbers, the unit price written in words shall govern. Discrepancies in the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

In addition, until the award of a Contract is made, the Owner reserves the right to reject any or all proposals, to award only the Base Bid, to award only an Alternate Bid, or to award either the Base Bid or the Alternate Bid plus any or all Add-On Bids; waive technicalities, if such waiver is in the best interest of the Owner and is in conformance with applicable State and local laws or regulations pertaining to the letting of construction contracts; advertise for new proposals; or proceed with the work otherwise. The Owner reserves the right to reject the bid of any Bidder if Owner believes that it would not be in the best interest of the Project to make an award to that Bidder, whether because the bid is not responsive or the Bidder is unqualified or of doubtful financial ability or fails to meet any other pertinent standard or criteria established by the Owner.

Delivery of Bonds and Insurance Certificates: When CONTRACTOR delivers the executed Agreements to OWNER, CONTRACTOR shall also deliver to OWNER such Bonds as CONTRACTOR may be required to furnish in accordance with the section "Bonds and Insurance". CONTRACTOR shall also deliver to OWNER, certificates of insurance (and other evidence of insurance requested by OWNER) for the insurance coverage which CONTRACTOR is required to purchase and maintain in accordance with the requirements set forth in the section titled "Bonds and Insurance".

Commencement of Contract Time; Notice to Proceed: The Contract Time will commence to run on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within thirty (30) days after the effective date of the Agreement. Distribution of signed contracts may constitute said Notice to Proceed.

Commencement of the Project: CONTRACTOR shall start to perform the work on the date when the Contract Time commences to run, but no work shall be done at the site prior to the date on which the Contract Time commences to run.

Before Starting Construction: Before undertaking each part of the work, CONTRACTOR shall carefully study and compare the Contract Documents and check and verify pertinent figures shown thereon and all applicable field measurements.

CONTRACTOR shall promptly report in writing to ENGINEER any conflict, error, or discrepancy which the CONTRACTOR may discover; however, CONTRACTOR shall not be liable to OWNER or ENGINEER for failure to report any conflict, error or discrepancy in the Drawings or Specifications, unless CONTRACTOR had actual knowledge thereof or should reasonably have known thereof.



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Within ten (10) days after the effective date of the Agreement (unless otherwise specified in the General Provisions), CONTRACTOR shall submit to OWNER/ENGINEER for review and acceptance an estimated progress schedule indicating the starting and completion dates of the various stages of the work, preliminary schedule of Shop Drawing submissions, a preliminary schedule of values of the work, a list of subcontractors and a list of suppliers.

Preconstruction Conference: Prior to the commencement of work, a preconstruction conference may be required by OWNER that includes the OWNER, ENGINEER and CONTRACTORS. Prime contractors must be accompanied by major Subcontractors if requested by the OWNER. All parties shall have thoroughly reviewed the Specifications prior to this meeting. The purposes of the meeting include, but are not limited to, the following:

1. To conduct review and acceptance of the schedules referred to in the section titled "Before Starting Construction".
2. To establish procedures for handling Shop Drawings and other submittals and for processing Applications for Payment.
3. To establish a working understanding among parties as to the work and to exchange the names and phone numbers of responsible persons, including off-hour emergency contacts.
4. To thoroughly discuss with the Contractor or Subcontractor the schedule and coordination of work.
5. To discuss other items as may be appropriate to the timely and efficient conduct of the work.

B. Payments to Contractor

Contractor shall submit Application for Payment in Accordance with the section titled "Payments to Contractor and Completion". Applications for Payment will be processed by the ENGINEER and OWNER as provided for in these Contract Documents.

The Contractor shall, as soon as practicable after the completion of the work, submit an application and certificate of the amount of work done and the value thereof which shall be reviewed and certified by the OWNER/ENGINEER for payment. The County of Schenectady shall, within thirty days thereafter pay the entire sum so found to be due after deducting therefrom all previous payments, except, that in case any portion of the completed work is unsatisfactory to the Engineer, no final payment shall be made to the Contractor until same has been properly repaired. A retainage of five percent (5%) of the value of work shall be withheld until completion and acceptance of work by OWNER/ENGINEER.

The Application and Certificate for Payment form, AIA Form G702, both sheets, or equivalent, properly executed and notarized, shall be accompanied by the Contractor's detail invoice, Partial Waiver of Liens, NYS Certified Payroll Reports, and a properly executed Schenectady County Payment Claim Voucher, Form No. "Dept. H-1-3".

C. Signing of Agreements:

When OWNER gives Notice of Award to the successful Bidder, it will be followed by at least five (5) unsigned counterparts of the Agreement and all other Contract Documents (or reference thereto). Within seven (7) days thereafter Contractor shall sign and deliver the aforesaid counterparts of the Agreement to OWNER with all other Contract Documents attached. Within a reasonable time, but not normally more than twenty-one (21) days thereafter, OWNER will deliver one fully signed counterpart to Contractor.

III. Construction Requirements

A. Availability of Land, Physical Conditions, Reference Points

Availability of Lands: OWNER shall furnish, as indicated in the Contract Documents, the land upon which the work is to be performed, rights-of-way for access thereto, and such other lands which are designed for



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the use of CONTRACTOR. Easements for permanent structures or permanent changes in existing facilities will be obtained and paid for by OWNER, unless otherwise provided in the Contract Documents.

If the CONTRACTOR believes that any delay in OWNER'S furnishing these lands or easements entitles him to an extension of the Contract Time, CONTRACTOR may make a claim therefor as provided in the section titled "Change of Contract Time". CONTRACTOR shall provide for additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

Physical Conditions-Investigations and Reports: Reference is made to the Specific Contract Provisions for identification of those reports of investigations and tests of subsurface and latent physical conditions at the site or otherwise affecting cost, progress or performance of work which have been relied upon by ENGINEER or OWNER in preparation of the Contract Documents, Drawings and Specifications. Such reports are not guaranteed as to accuracy or completeness and are not part of the Contract Documents.

Such data is offered in good faith for the purpose of placing the CONTRACTOR in receipt of all information available. The CONTRACTOR must interpret such data according to his own judgment and acknowledges that he is not relying upon the same as accurately describing the subsurface conditions which may be found to exist. The CONTRACTOR further acknowledges that he assumes all risk contingent upon the nature of the subsurface conditions to be actually encountered by him in performing the work covered by the CONTRACTOR performing more or less work than he originally anticipated.

Unforeseen Physical Conditions: CONTRACTOR shall promptly notify OWNER and ENGINEER in writing of any subsurface or latent physical conditions at the site or in an existing structure differing materially from those indicated or referred to in the Contract Documents. ENGINEER will promptly review those conditions and advise OWNER in writing if further investigations or tests are necessary. Promptly thereafter, OWNER shall obtain the necessary investigations and tests and furnish copies to ENGINEER and CONTRACTOR.

If ENGINEER finds that the results of such investigations or tests indicate that there are subsurface or latent physical conditions which differ materially from those intended in the Contract Documents, and which could not reasonably have been anticipated by CONTRACTOR, a Change Order shall be issued incorporating the necessary revisions.

Reference Point Provided: OWNER shall provide engineering surveys for construction to establish reference points which in his judgment are necessary to enable CONTRACTOR to proceed with the work. CONTRACTOR shall be responsible for laying out work (unless otherwise specified in the Specific Contract Provisions), and shall protect and preserve the established reference points and shall make no changes or relocations without the prior written approval of ENGINEER. CONTRACTOR shall report to ENGINEER whenever any reference point is lost or destroyed or requires relocation because of necessary changes in grades or location, and shall be responsible for replacement or relocation of such points by professionally qualified personnel.

B. Change of Contract Price

The Contract Price constitutes the total compensation (subject to authorized adjustments) payable to CONTRACTOR for performing the Work. All duties, responsibilities and obligations assigned to or undertaken by CONTRACTOR shall be at his expense without change to the Contract Price.

Appropriation: It is expressly understood and agreed by the parties hereto that all claims for payment by the CONTRACTOR hereunder are expressly made subject to monies available to the OWNER, therefore, by appropriation or otherwise and that the OWNER shall incur no liability to the CONTRACTOR for any such payments beyond the monies so appropriated, or otherwise made available to it.



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Changes: The Contract Price may only be changed by a Change Order. Any claim for an increase in the Contract Price shall be based on written notice delivered to the ENGINEER and OWNER. No extra work is authorized without a duly executed change order approved by the ENGINEER and signed by the County Manager. Such Change Order may also be subject to authorization by the County Legislature under the Resolution #65-81. Any change in the Contract Price resulting from any such claim shall be incorporated in a Change Order.

The value for any work covered by a Change Order or of any claim for an increase or decrease in the Contract Price shall be determined in one of the following ways:

1. Where the work involved is covered by unit prices contained in the Contract Documents, by application of unit prices to the quantities of items involved (subject to the provisions of "Adjustment of Unit Prices" below).
2. By mutual acceptance of a lump sum.
3. On the basis of the cost of the work (determined as provided in "Cost of the Work" below) plus a Contractor's fee for overhead and profit (determined as provided in "Contractor's Fee" below).
4. Time and Material in instances where appropriate and approved by the OWNER.

Costs Involved With The Work: The term Cost of the Work means the sum of all costs necessarily incurred and paid by the CONTRACTOR in the proper performance of the Work. Except as otherwise may be agreed to in writing by OWNER, such costs shall be in amounts no higher than those prevailing in the locality of the project, shall include only the following items and shall not include any of the costs itemized later on in this section.

Payroll costs for employees in the direct employ of CONTRACTOR in the performance of the work under schedules of job classifications conforming with those of the New York State Department of Labor and agreed upon by OWNER and CONTRACTOR. Payroll costs for employees not employed full time on the work shall be apportioned on the basis of their time spent on the work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits which shall include social security, unemployment, excise and payroll taxes, workmen's compensation, health and retirement benefits, and leave pay applicable thereto.

Such employees shall include the foreman at the site. The expenses of performing work after regular working hours, on Sunday or Legal Holidays shall be included in the above only to the extent authorized by the OWNER.

Costs of all materials and equipment furnished and incorporated in the work, including costs of transportation and storage thereof, and manufacturer's field services required in connection therewith. All trade discounts, rebates and refunds, and all returns from sales of surplus equipment shall accrue to OWNER and CONTRACTOR shall make provision so that they may be obtained.

Payments made by CONTRACTOR to the Subcontractor for work performed by Subcontractors. If required by OWNER, CONTRACTOR shall obtain competitive bids from Subcontractors acceptable to CONTRACTOR and shall deliver such bids to OWNER, who will then determine with the ENGINEER, which bids will be accepted. If a Subcontractor provides that the Subcontractor is to be paid on the basis of Cost of the Work Plus a Fee, the Subcontractor's Cost of the work shall be determined in the same manner as the CONTRACTOR'S Cost of the Work. All Subcontractors shall be subject to the other provisions of the Contract Documents insofar as applicable.

Supplemental costs include the following:

1. The proportion of necessary transportation, travel and subsistence expenses of CONTRACTOR'S employees incurred in discharge of duties connected with the work.



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2. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office and temporary facilities at the site and hand tools not owned by the workmen, which are consumed in the performance of the work, and cost less market value of such items used but not consumed which remain property of CONTRACTOR.
3. Costs of special consultants (including, but not limited to, surveyors, engineers, architects and testing laboratories) employed for services specifically related to the work with prior approved of the OWNER/ENGINEER.
4. Deposits lost for causes other than CONTRACTOR'S negligence, royalty payments and fees for permits and licenses.
5. Use, excise and similar taxes related to the work, and for which the CONTRACTOR is liable, imposed by any governmental authority.
6. Losses and damages (and related expenses), not compensated by insurance or otherwise, to the work, or otherwise sustained by CONTRACTOR in connection with the execution of the work, provided they have resulted from uses other than the negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of OWNER. No such losses, damages and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee. If, however, any such loss or damage requires reconstruction and CONTRACTOR is placed in charge thereof, CONTRACTOR shall be paid for services at a fee proportional to that stated in the following section "Contractor's Fee".
7. The cost of utilities, fuel and sanitary facilities at the site.
8. Minor expenses such as long-distance telephone communications, telephone service at the site, postage and similar petty cash items connected with the work.
9. Cost of premiums for additional Bonds and insurance required because of changes in the work.

The term Cost of the Work shall not include any of the following:

1. Payroll costs and other compensation of CONTRACTOR's officers, executives, principals (of partnership and sole proprietorships), general managers, engineers, architects, estimators, lawyers, auditors, accountants, purchasing and contracting agents, shippers, timekeepers, clerks, superintendents and other personnel employed by CONTRACTOR whether at the site or in his principal or a branch office for general administration of the work and not specifically included in the agreed upon schedule of job classifications referred to above - all of which are to be considered administrative costs covered by the Contractor's Fee.
2. Expenses of CONTRACTOR'S principal and branch offices other than CONTRACTOR'S office at the site.
3. Any part of CONTRACTOR'S capital expenses, including interest on CONTRACTOR's capital employed for the work and charges against CONTRACTOR for delinquent payments.
4. Costs of premiums for all Bonds and for all insurance whether or not CONTRACTOR is required by the Contract Documents to purchase and maintain same (except for additional bonds and insurance required because of the changes in the work).
5. Costs due to the negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective work, disposal of materials or equipment wrongly supplied and making good any damage to property.
6. Other overhead or general expense cost of any kind and the costs of any item not specifically and expressly included above.

Contractor's Fee Determination:

The Contractor's Fee allowed to the CONTRACTOR for overhead and profit shall be determined in one of the following ways:



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1. A mutually acceptable fixed fee.
2. The allowance for overhead and profit combined, included in the total cost to the OWNER, shall be based on the following schedules:
 - a) For the contractor, for any work performed by the contractor's own forces, 15% of the cost.
 - b) For the contractor, for work performed by his subcontractor, 5% of the amount due the subcontractor.
 - c) For each subcontractor, or subcontractor involved, for any work performed by that subcontractor's own forces, 15% of the cost.
 - d) For each subcontractor, for work performed by his sub-subcontractors, 5% of the amount due the sub-subcontractor.
 - e) No fee shall be payable on the basis of costs itemized under the previous paragraphs concerning special consultants, supplemental costs, and those costs specifically excluded from the Cost of Work.

The amount of credit to be allowed by CONTRACTOR to OWNER for any such change which results in a net decrease in cost will be the amount of the actual net decrease. When both additions and credits are involved in any one change, the combined overhead and profit shall be figured on the net increase, if any.

Adjustment to Unit Prices: Whenever the cost of any work is to be determined, CONTRACTOR will submit in form acceptable to OWNER/ENGINEER an itemized cost breakdown together with supporting data. Whenever the quantity of work with respect to any item that is covered by a unit price differs materially and significantly from the quantity of such work indicated in the Contract Documents, an appropriate Change Order may be issued on recommendation of the ENGINEER to adjust the unit price.

Additional Cash Allowances: It is understood that CONTRACTOR has included in the Contract Price all allowances so named in the Contract Documents and shall cause the work so covered to be done by such Subcontractors, manufacturers, fabricators, suppliers or distributors and for such sums within the limit of the allowances as may be acceptable to ENGINEER.

Unless otherwise provided in the Contract Documents:

1. Use of contingency allowances shall only be as directed by OWNER/ENGINEER and only by Allowance Authorization form that indicates amounts to be charged to the allowance.
2. CONTRACTOR'S overhead, profit, and related costs for products and equipment provided under the allowance shall be included in the Contract Price but not in the allowance.
3. Upon project completion any unused amounts remaining in the contingency allowances shall be returned to the OWNER by credit Change Order.

C. Changes to the Contract Time

The Contract Time may only be changed by a Change Order. Any claim for an extension in the Contract Time shall be based on written notice delivered to ENGINEER within fifteen (15) days of occurrence of the event giving rise to the claim. Notice of the extent of the claim with supporting data shall be delivered within forty-five (45) days of such occurrence unless ENGINEER allows an additional period of time to ascertain more accurate data. All claims for adjustment in the Contract Time shall be determined by ENGINEER if OWNER and CONTRACTOR cannot otherwise agree. Any change in the Contract Time resulting from any such claim shall be incorporated in a Change Order.

The Contract Time will be extended in an amount equal to time lost due to delays beyond the control of CONTRACTOR if a claim is made and approved as provided in the paragraph above. Such delays shall include, but not be limited to, acts of neglect by OWNER or others performing additional work as contemplated in the section titled "Work By Others", or to fires, floods, labor disputes, epidemics, abnormal weather conditions, or acts of God. All time limits stated in the Contract Documents are of the essence of the Agreement. The provisions of this section shall not exclude recovery for damages for delay by either party.



D. Changes in the Work

Without invalidating the Agreement, OWNER may, at any time or from time to time, order additions, deletions or revisions to the work; these will be authorized by Change Order. Upon receipt of a Change Order, CONTRACTOR shall proceed with the work involved. All such work shall be executed under the applicable conditions of the Contract Documents. If any Change Order causes any increase or decrease in the Contract Price or an extension or shortening of the Contract Time, an equitable adjustment will be made as provided in the sections titled "Change Of Contract Price", and "Change of Contract Time" on the basis of a claim made by either party. Additional work performed without authorization of a Change Order will not entitle CONTRACTOR to an increase in the Contract Price or an extension of the Contract Time.

ENGINEER may authorize minor changes in the work not involving an alteration of the Contract Price or the Contract Time, which are consistent with the overall intent of the Contract Documents. These may be accomplished by a Field Order and shall be binding on the OWNER and also on the CONTRACTOR who shall perform the change promptly.

If CONTRACTOR believes that a Field Order justifies an increase in the Contract Price or Contract Time, CONTRACTOR may make a claim therefor as provided in the sections titled "Change of Contract Price", and "Change of Contract Time".

Consistent with the Rule and regulations of Schenectady County, OWNER shall execute appropriate Change Orders prepared by ENGINEER covering changes in the work which are required by OWNER, or required because of unforeseen physical conditions or emergencies, or because of uncovering work found not to be defective, or as provided in the section titled "Change In Contract Price - Adjustment Of Unit Price" and "Cash Allowances", or because of any other claim of CONTRACTOR for a change in the Contract Time or the Contract Price which is recommended by the ENGINEER. If notice of any change affecting the general scope of the Work or change in the Contract Price is required by the provisions of any Bond to be given to the Surety, it will be the CONTRACTOR'S responsibility to notify the Surety, and the amount of each applicable Bond shall be adjusted accordingly. CONTRACTOR shall furnish proof of such adjustment to OWNER.

E. Cleaning Up

The CONTRACTOR will at all times keep the premises free from accumulations of waste material and rubbish caused by employees and Subcontractors. At the completion of the work he will remove all rubbish so caused from the work and all temporary structures, tools, scaffolding and surplus materials, supplies and equipment which he or any of his Subcontractors may have used in performance of the work. CONTRACTOR shall perform a "Final Clean" of all areas affected by his work which brings the areas back to the level of clean noted prior to the start of the project. In case of dispute, the OWNER may remove the rubbish and clean the area and charge the cost of such to the CONTRACTOR.

F. Contractor's Responsibilities

Continuation of Work: Contractor shall carry on the work and maintain the progress schedule during all disputes or disagreements with OWNER. No work shall be delayed or postponed pending resolution of any disputes or disagreements, except as CONTRACTOR and OWNER may otherwise agree in writing.

Contractor Responsible for Permits: Under the requirements of the NYS Uniform Fire Prevention and Building Code, Title 19 NYCRR the County is responsible for State Code enforcement and administration. The CONTRACTOR shall obtain and pay for all other construction permits and licenses including the cost of any electrical underwriters' certification. CONTRACTOR shall pay all charges of utility service companies for connection of work and meters.

Contractor's Use of Premises: CONTRACTOR shall confine construction equipment, storage of materials and equipment and the operations of workmen to areas permitted by law, ordinances, permits or the



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requirements of the Contract Documents and shall not unreasonably encumber the premises with construction equipment, employee vehicles or other materials or equipment.

Materials stored upon streets or roads shall be so placed as to cause minimum obstruction to traffic, vehicle sight distance, and to the public. Materials shall not be placed within thirty (30) feet of fire hydrants. Gutters and drop inlets shall be kept unobstructed at all times. The Contractor shall not store materials or encroach upon private property without the written consent of the owners of such private property.

During the progress of the work, Contractor shall keep the premises free from accumulations of waste material and rubbish caused by employees and Subcontractors. At the completion of the work he will remove all rubbish so caused from the work and all temporary structures, tools, scaffolding and surplus materials, supplies and equipment which he or any of his Subcontractors may have used in performance of the work. Contractor shall leave the site clean and ready for occupancy by OWNER. CONTRACTOR shall restore to their original condition those portions of the site not designated for alteration by the Contract Documents.

Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall CONTRACTOR subject any part of the work of adjacent property to stresses or pressures that will endanger it.

Emergencies at Project Site: In emergencies affecting the safety or protection of persons or the work or property at the site or adjacent thereto, CONTRACTOR, without special instruction or authorization from OWNER, is obligated to act to prevent threatened damage, injury or loss. CONTRACTOR shall give OWNER prompt written notice of any significant changes in work or deviations from the Contract Documents caused thereby.

Equivalent Materials and Equipment: Whenever materials or equipment are specified or described in these Drawings or Specifications by using the name of a proprietary item or the name of a particular manufacturer, fabricator, supplier or distributor, the naming of the item is intended to establish the type, function and quality required. Materials or equipment of other manufacturers, fabricators, suppliers or distributors may be considered by ENGINEER if sufficient information is submitted by CONTRACTOR to allow ENGINEER to evaluate whether or not the proposed materials or equipment are equivalent or superior to those named in these documents.

Requests for review of substitute items of material and equipment will not be accepted by ENGINEER from anyone other than CONTRACTOR. All variation of the proposed substitute from that specified shall be identified in the application and available maintenance, repair and replacement service will be indicated. The ENGINEER shall be sole judge of the qualifications of the offerings and shall accept or reject said offerings in writing. OWNER and ENGINEER may require engineering certification, or performance guarantee or other surety with respect to any substitution.

Indemnification By Contractor: To the fullest extent permitted by law, CONTRACTOR shall indemnify and hold harmless OWNER and ENGINEER and their agents and employees from and against all claims, damages, losses and expenses including but not limited to attorney's fees, arising out of or resulting from the performance of the work, provided that any such claim, loss, damage or expense caused in whole or in part by any negligent act or omission of CONTRACTOR, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder.

The CONTRACTOR'S obligations under this section shall not be limited in any manner by any provision in the Contract Documents requiring CONTRACTOR as to maintain specific insurance coverage's.

In any and all claims against OWNER or ENGINEER or any of their agents or employees by any employee of CONTRACTOR, any Subcontractor, anyone directly or indirectly employed by any of them, or anyone



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for whose acts any of them may be liable, the indemnification obligation under this section shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for CONTRACTOR or Subcontractor under workers' or workmen' compensation acts, disability benefit acts or other employee benefit acts.

The obligation of CONTRACTOR under this section shall not extend to the liability of ENGINEER, their agents, or employees, arising out of the preparation of maps, drawings, opinions, reports, surveys and designs.

Labor Materials and Equipment: CONTRACTOR shall provide competent, suitably qualified personnel to survey and lay out the work and perform construction as required by the Contract Documents. CONTRACTOR shall at all times maintain good discipline and order at the site.

Each laborer, workman or mechanic employed by the Contractor, Subcontractor or other person doing or contracting to do the whole or part of the work contemplated by this Contract shall be paid no less than the prevailing rate of wages and shall be provided supplements not less than the prevailing supplements as determined by the New York State Department of Labor, Bureau of Public Work. The prevailing wage rate schedule as determined by New York State is affixed and made part of these Contract Documents.

CONTRACTOR shall furnish all materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, heat, light, telephone, water and sanitary facilities and all other facilities and incidentals necessary for the execution, testing, initial operation and completion of the work. All materials and equipment shall be of first quality and new, except as otherwise provided in the Contract Documents. If required by OWNER, CONTRACTOR shall furnish satisfactory evidence (including reports of required tests) as to the kind and quality of materials and equipment.

All materials or equipment delivered to the site shall be accompanied by manufacturers certifications guaranteeing that the materials or equipment conform to specification requirements. Such certifications shall immediately be turned over to the OWNER. Materials or equipment delivered to the site without such certificates will be subject to rejection.

Each unit of equipment shall have the manufacturer's name or trademark on a corrosion-resistant nameplate securely affixed in a conspicuous place. Each unit of equipment shall be fully warranted against defects in materials and workmanship by the CONTRACTOR and manufacturer for a period of not less than one (1) year beginning at the date of final payment and acceptance by the OWNER. All materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the instructions of the applicable manufacturer, fabricator, supplier or distributor, except as otherwise provided in the Contract Documents.

Laws and Regulations: CONTRACTOR shall give all notices and comply with all laws, ordinances, rules and regulations applicable to the work. If CONTRACTOR observes that the Specifications or Drawings are at variance therewith, CONTRACTOR shall give ENGINEER prompt written notice thereof, and any necessary changes shall be adjusted by an appropriate modification.

OSHA And Other Safety Related Regulations and Equipment: Contractor shall provide certification that all personnel involved with this work are suitably trained to comply with all applicable OSHA, NYS Department of Labor and other regulatory regulations, including, but not limited to "right-to-know", climbing, excavations, painting, welding and entry into confined spaces. The Contractor must have all required safety and other related equipment at the job site the entire time that this work is in progress. It is the responsibility of the CONTRACTOR to insure that this equipment is available at the job site the entire time that this work is in progress. It is the responsibility of the CONTRACTOR to insure that this equipment is available at all times, that it is used each and every time it is needed, and that the equipment is in good condition, has any required inspections or certifications, and is safe for use.



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Failure of the CONTRACTOR to follow this requirement will result in stoppage of the work and possible termination of the contract.

Patent Fees and Royalties: It is mutually understood and agreed that contract prices are to include all royalties and costs arising from patents, trademarks, software use licenses and copyrights in any way involved in the work. Whenever the CONTRACTOR is required or desires to use any design, device, material or process covered by letters patent or copyright, the Contractor shall indemnify and save harmless the OWNER from any and all claims from infringement by reason of the use of any such patented design, device, material or process, to be performed under the Contract, and shall indemnify the said OWNER for any costs, expenses, and damages which it may be obliged to pay, by reason of any such infringement, at any time during the prosecution or after the completion of the work.

Record Documents At Job Site: CONTRACTOR shall keep one record copy of all Specifications, Drawings, Addenda, Modifications, Change Orders and Shop Drawings at the site, in good order and annotated to show all changes made during the construction process. These shall be available to the OWNER and ENGINEER for examination at the site.

Safety and Protection: CONTRACTOR shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the work. CONTRACTOR shall take all necessary precautions and programs in connection with the work. Where more than one prime contractor is performing the work, the General Contractor shall have responsibility for coordination of safety and protection among the prime Contractors. CONTRACTOR shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, and loss to:

1. All employees on the work including representatives of the OWNER and ENGINEER, and other persons who may be affected thereby.
2. All the work and all materials and equipment to be incorporated therein, whether in storage on or off the site.
3. Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

CONTRACTOR shall comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction for safety of persons or property or to protect them from damage, injury or loss, and shall erect and maintain all necessary safeguards for such safety and protection. CONTRACTOR shall notify owners of adjacent property and utilities when performance of work may affect them.

CONTRACTOR'S duties and responsibilities for the safety and protection of work shall continue until such time as all the work is completed and the ENGINEER has issued a notice to the CONTRACTOR in accordance with the section titled "Payments To Contractor And Completion - Final Application For Payment" that the work is acceptable.

Accidents: The Contractor shall provide at the site, such equipment and medical facilities as are necessary to provide first aid service to any of his personnel who may be injured in connection with the work. The Contractor shall promptly report in writing to the ENGINEER all accidents whatsoever arising out of, or in connection with, the performance of the work, whether on or adjacent to the site, which cause death, personal injury or property damage, giving full details and statements of witnesses. In addition, if death or serious injuries or serious damages are caused, the accident shall be reported immediately by telephone to both the ENGINEER and the Schenectady County Attorney. If any claim is made by anyone against the CONTRACTOR or a Subcontractor on account of an accident, the CONTRACTOR shall promptly report the facts in writing to the ENGINEER giving full details of the claim.



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The CONTRACTOR shall comply with all provisions of OSHA and NYS Department of Labor the investigating and reporting of Accidents and in job related illness and similar reporting requirements.

The Contractor shall designate a responsible member of his organization at the site whose duties shall be the prevention of accidents and conformance with safety regulations and standards. This person shall be the CONTRACTOR'S superintendent unless otherwise designated in writing by CONTRACTOR to OWNER.

Shop Drawings and Samples: After checking and verifying all field measurements, CONTRACTOR shall submit to ENGINEER for review, in accordance with the accepted schedule for Shop Drawing submissions, five (5) copies (unless otherwise specified in Contract Documents) of all shop drawings, which have been checked by and stamped with the approval of the CONTRACTOR and identified as the ENGINEER may require.

The data shown on the Shop Drawings will be complete with respect to dimensions, design criteria, materials of construction and like information to enable ENGINEER to review the information as required.

CONTRACTOR shall also submit to ENGINEER for review with such promptness as to cause no delay in work, all samples required by the Contract Documents. All samples will have been checked by and stamped with the approval of CONTRACTOR, identified clearly as to material, manufacturer, any pertinent catalog numbers, and the uses for which it is intended.

At the time of each submission, CONTRACTOR shall in writing call ENGINEER'S attention to any deviations that the shop drawings or samples may have from the requirements of the Contract Documents.

ENGINEER will review, with reasonable promptness, Shop Drawings and samples, but ENGINEER'S review shall be only for conformance with the design concept of the project, and for compliance with the information given in the contract documents, and shall not extend to means, methods, sequences, techniques, or procedures of construction, or to safety precautions, or programs thereto. The review of a separate item as such will not indicate review of the assembly in which the item functions. CONTRACTOR shall make any corrections required by ENGINEER and shall return the required number of corrected copies of Shop Drawings. CONTRACTOR'S stamp of approval on any Shop Drawings or sample shall constitute a representation to OWNER and ENGINEER that CONTRACTOR has either determined and verified all quantities, dimensions, field construction criteria, materials, catalog numbers and similar data or assumes full responsibility for doing so, and that CONTRACTOR has reviewed or coordinated each Shop Drawing or sample with the requirements of the work and the Contract Documents.

Where a Shop Drawing or sample is required by the Specifications, no related work shall be commenced until the submittal has been reviewed by the ENGINEER.

Subcontractors: CONTRACTOR shall submit all Subcontractors to ENGINEER for approval prior to the start of work. CONTRACTOR shall not employ any Subcontractor or other person or organization, whether initially or as a substitute, against whom OWNER may have a reasonable objection. Acceptance of any Subcontractor, other person or organization by OWNER shall not constitute a waiver of any right of OWNER or ENGINEER to reject defective work. If OWNER after due investigations has reasonable objection to any Subcontractor, other person or organization proposed by CONTRACTOR, CONTRACTOR shall submit an acceptable substitute Subcontractor. CONTRACTOR shall not be required to employ any Subcontractor, other person, or organization against whom the CONTRACTOR has reasonable objection.

CONTRACTOR shall be fully responsible for all acts and omissions of his Subcontractors and of persons and organizations directly or indirectly employed by them and of persons and organizations for whose acts any of them may be liable to the same extent that CONTRACTOR is responsible for the acts and omissions of persons directly employed by CONTRACTOR.



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Nothing in the Contract Documents shall create any contractual relationship between OWNER and any Subcontractor or other person or organization having a direct contact with CONTRACTOR, nor shall it create any obligation on the part of the OWNER or ENGINEER to pay or to see to the payment of any monies due any Subcontractor or other person or organization, except as may otherwise be required by law.

All work performed for CONTRACTOR by a Subcontractor will be pursuant to an appropriate agreement between CONTRACTOR and the Subcontractor which specifically binds the Subcontractor to the applicable terms and conditions of the Contract Documents for the benefit of OWNER.

Supervision and Superintendence: CONTRACTOR shall supervise and direct the work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the work in accordance with the Contract Documents. CONTRACTOR shall be solely responsible for the means, methods, techniques, sequences and procedures of construction, but CONTRACTOR shall not be solely responsible for the negligence of others in design or selection of a specific means, methods, techniques, sequences and procedures of construction which is indicated in and required by the Contract Documents. CONTRACTOR shall be responsible to see that the finished work complies accurately with the Contract Documents.

CONTRACTOR shall keep on work at all times during its progress a competent English-speaking resident superintendent, who shall not be replaced without written notice to OWNER except in extraordinary circumstances.

The superintendent will be the CONTRACTOR'S representative at the site and shall have authority to act on behalf of CONTRACTOR. All communications given to the superintendent shall be as binding as if given to CONTRACTOR.

G. ENGINEER'S Status During Construction

OWNER'S Representative: ENGINEER will be OWNER'S representative during the construction period unless such representation is to be provided by a Designated Representative. The duties and responsibilities and limitations of authority of ENGINEER as OWNER'S representative during construction are set forth herein.

Project Site Visitation and Inspection: ENGINEER will make visits to the site at intervals appropriate to the various stages of construction to observe the progress and quality of the executed work and to determine, in general, if the work is proceeding in accordance with the Contract Documents.

ENGINEER'S efforts will be directed toward providing for OWNER a greater degree of confidence that the completed work will conform to the Project Documents. On the basis of such visits and on-site observations as an experienced and qualified design professional, ENGINEER will keep OWNER informed of the progress of work and will endeavor to guard OWNER against defects and deficiencies in the work.

Clarifications And Interpretations: ENGINEER will issue with reasonable promptness such written clarifications or interpretations of the Contract Documents as the ENGINEER may deem necessary, which shall be consistent with or may be inferred from the overall intent of the Contract Documents.

If CONTRACTOR believes that a written clarification or interpretation justifies an increase in the Contract Price or Contract Time, CONTRACTOR may make a claim therefore as provided in the sections titled "Change in Contract Price" or "Change in Contract Time" as may be applicable.

Rejecting Defective Work: ENGINEER will have the authority to disapprove or reject work which is defective, and will also have authority to require special inspection or testing of work as provided in the section titled "Warranty: Tests, Inspections, etc." whether or not the work is fabricated, installed or completed.



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Shop Drawings, Change Orders and Payments: In connection with ENGINEERS responsibility for Shop Drawings and Samples, see section titled "Contractor's Responsibilities - Shop Drawings and Samples"

In connection with ENGINEERS responsibilities as to Change Orders, see the section titled "Changes in the Work" and "Change of Contract Price", and "Change of the Contract Time".

In connection with ENGINEERS responsibility in respect to applications for payment, etc. see the section titled "Payments To Contractor and Completion".

Project Representation: OWNER may furnish a Resident Project Representative to assist ENGINEER in observing the performance of the work. The duties, responsibilities and limitations of authority of any such Resident Project Representative will be as provided in the Contract Documents.

Decisions on Disagreements: ENGINEER will be the initial interpreter of the requirements of the Contract Documents and judge the acceptability of the work thereunder. Claims, disputes and other matters related to the acceptability of the work or the interpretation of the requirements of the Contract Documents pertaining to the execution and progress of the work shall be referred initially to ENGINEER in writing with a request for a formal decision in accordance with this paragraph, which the ENGINEER will render in writing within a reasonable time.

Written notice of each such claim dispute and other matters shall be delivered by claimant to ENGINEER and the other party to the Agreement within fifteen (15) days of the occurrence of the event giving rise thereto, and written supporting data will be submitted to ENGINEER and the other party within forty-five (45) days of such occurrence unless ENGINEER allows an additional period of time to ascertain more accurate data. In his capacity as interpreter and judge ENGINEER will not show partiality to OWNER or CONTRACTOR and will render any decision or interpretation in good faith and consistent with the intent of the Contract Documents.

The rendering of a decision by ENGINEER pursuant to the above paragraph with respect to any such claim, dispute or other matter (except any which have been waived by making or acceptance of final payment as provided in the section titled "Payments to Contractor And Completion - CONTRACTOR'S Continuing Obligations") will be a condition precedent to any exercise by OWNER or CONTRACTOR of such rights or remedies as either may otherwise have under the Contract Documents or at law in respect of any such claim, dispute or other matter.

Limitations on ENGINEER Responsibilities: Neither ENGINEER'S authority to act under this section or elsewhere in the Contract Documents nor any decision made by ENGINEER in good faith either to exercise or not exercise such authority shall give rise to any duty or responsibility of ENGINEER to CONTRACTOR, any Subcontractor, any manufacturer, fabricator, supplier or distributor, or any agents or employees or any other person performing any of the work.

Whenever in the Contract Documents the terms "as ordered", "as directed", "as required", "as allowed", or terms of like effect or import are used, or the adjectives "reasonable", "suitable", "acceptable", "proper", "satisfactory", or adjectives of like effect or similar import are used, to describe the requirements, directions, review, or judgment of ENGINEER as to the work, it is intended that such requirements, directions, review, or judgment will be solely to evaluate the work for compliance with the Contract Documents (unless there is a specific statement indicating otherwise).

ENGINEER will not be responsible for CONTRACTOR'S means, methods, techniques, sequences or procedures of construction, or safety precautions, (including temporary support of structures, frames or building components), or safety precautions and programs incidental thereto and ENGINEER will not be responsible for CONTRACTOR's failure to perform the work in accordance with the Contract Documents.



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ENGINEER will not be responsible for the acts or omissions of CONTRACTOR or any Subcontractors, or of the agents or employees of any CONTRACTOR or Subcontractor, or of any other persons at the site or otherwise performing any of the work.

Inspection: ENGINEER and OWNER and their representatives shall at all times have access to the work wherever it is in preparation or progress. The Contractor shall provide adequate notice to the County Engineer before entering the site or beginning work or beginning a new phase of work. Wherever or whenever the Engineer shall consider it necessary to remove any portion of the work executed under this Contract for inspection or for any other purpose no payment shall be made for such removal or for replacement of the work to satisfactory condition in case such inspection shows that the work was not constructed in accordance with the terms of this Contract; nor shall payment be made for the removal or replacement of any work which may itself be satisfactory, but the removal of which is necessary for the replacement of unsatisfactory work.

H. Materials

Government Entity Exemption from Taxes: The OWNER is exempt from payment of sales and compensating use taxes of the State and of localities on all materials separately sold to OWNER pursuant to this Contract. Also exempt from such taxes are purchases by the Contractor and his Subcontractors of materials, equipment and supplies to be sold to OWNER pursuant to this Contract, including tangible personal property to be incorporated in any structure, building or other real property forming part of the Project. These taxes are not to be included in the Bid. This exemption does not, however, apply to tools, machinery, equipment or other property purchased by, leased by or to the CONTRACTOR or a Subcontractor or to supplies or materials not incorporated into the completed project. The cost of all other taxes under the Contract shall be included in the Bid price(s) of this Contract.

Transfer of Title to Material Delivered To Site: Title to all materials sold by the CONTRACTOR to the OWNER pursuant to the provisions of the Contract Documents shall immediately vest in and become the sole property of the OWNER upon delivery of such materials to the site. Notwithstanding such transfer of title, the CONTRACTOR shall have the sole continuing responsibility to install such materials, protect them from damage, loss, or theft, maintain them in proper condition and forthwith repair, replace and make good any damage or loss thereto, without cost to the OWNER until such time as the work covered by the Contract is fully accepted by the OWNER. Such transfer in title shall in no way affect any of the CONTRACTOR'S obligations under the Contract. In the event that after such title has passed to the OWNER, if any such materials are rejected as being defective or otherwise unsatisfactory, the CONTRACTOR must then replace said defective or unsatisfactory materials with other acceptable materials at no additional cost to OWNER.

Purchase of Materials by the Contractor: The purchase by the CONTRACTOR and his Subcontractors of the materials sold hereunder will be a purchase or procurement for resale and, therefore, not subject to state sales or compensating use taxes or any such local taxes. The sale of such materials by the CONTRACTOR to the OWNER may not be subject to the aforesaid sales or compensating use taxes. With respect to such materials sold hereunder, the CONTRACTOR, if requested by the OWNER, shall furnish to the OWNER such bills of sale and other instruments as may be required by it, properly executed, acknowledged and delivered, assuring to it title to such materials free of encumbrances and the CONTRACTOR shall mark or otherwise identify all such materials as property of the OWNER.

Materials Delivery, Storage and Handling: All materials will be brought to the job site as new and where appropriate, in the original sealed and labeled packaging and will be subject to inspection by the ENGINEER or OWNER. Materials will be stored in full compliance with producer or manufacturers requirements and recommendation, and in full compliance with the State Fire Prevention and Building Code. Storage areas are to be kept clean and neat. All waste and trash must be removed from the site on a weekly basis and every precaution taken to avoid the danger of fire.

I. Miscellaneous:



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Giving Written Notice: Whenever any provision of the Contract Documents requires the giving of written notice it shall be deemed to have been validly given if delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or if delivered at or sent by registered mail, postage prepaid, to the last business address known to the giver of the notice.

Computation of Time: When any period of time is referred to in the Contract Documents by days, it shall be computed to exclude the first and include the last day of the period. If any last day of any such period falls on a Saturday or Sunday or on any day made a legal holiday by State Law, such day shall be omitted from the computation.

Misc. General Provisions: Should OWNER or CONTRACTOR suffer injury or damage to his person or property because of any error, omission or act of the other party or of any of the other party's employees or agents or others for whose acts the other party is legally liable, claim shall be made in writing to the other party within a reasonable time of the first observance of such injury or damage.

The duties and obligations imposed by these Contract Documents and the rights and remedies available hereunder to the parties hereto, and, in particular but without limitation, the warranties, guarantees and obligations imposed upon the CONTRACTOR by sections titled "Contractor's Responsibilities", "Warranty and Guarantee, etc.", "Payment to Contractor and Completion - CONTRACTOR'S Warranty of Title", and "suspension of Work and Termination" and all rights and remedies available to OWNER and ENGINEER thereunder, shall be in addition to, and shall not be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by law or contract, by special warranty or guarantee or by other provisions of the Contract Documents.

The provisions of these paragraphs shall be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right and remedy to which they apply. All representations, warranties, guarantees made in the Contract Documents shall survive final payment and termination or completion of this Agreement.

J. OWNER'S Responsibility

OWNER shall issue all communications to CONTRACTOR through ENGINEER or the Designated Representative.

OWNER shall furnish data required of OWNER under the Contract Documents promptly and shall make payments to CONTRACTOR promptly after they are due as provided in the section titled "Payments to Contractor and Completion".

OWNER'S duties in respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in "Availability of Lands". This section also refers to OWNER'S identifying and making available to CONTRACTOR copies of reports of investigations and tests of subsurface and latent physical conditions at the site or otherwise affecting performance of the work which have been relied upon by ENGINEER in preparing the Drawings and Specifications.

In connection with OWNER'S rights to request changes in the work in accordance with the section titled "Changes In the Work", OWNER is obligated to approve or disapprove Change Orders.

In connection with OWNER'S right to stop work or suspend work, see sections titled "Warranty and Guarantee, etc. - OWNER May Stop Work" and also in the sections titled "Suspension of Work and Termination - OWNER May Suspend Work". Also, the section titled "Suspension of Work and Termination - OWNER May Terminate" deals with OWNER'S right to terminate services of CONTRACTOR under certain circumstances.

K. Partial Utilization of Project:



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Use by OWNER of completed portions of the work may be accomplished prior to Substantial Completion of all the work subject to the following:

1. OWNER at any time may request CONTRACTOR in writing to permit OWNER to use any part of the work which OWNER believes to be substantially complete and which may be so used without significant interference with construction in other parts of the work. If CONTRACTOR agrees, CONTRACTOR will certify to OWNER and ENGINEER that said part of the work is substantially complete and request ENGINEER to issue a Certificate of Substantial Completion for that part of the work. Within a reasonable time thereafter OWNER, CONTRACTOR and ENGINEER shall make an inspection of that work to determine the status of completion. If ENGINEER does not consider that part of the work to be substantially complete, ENGINEER will notify OWNER and CONTRACTOR in writing giving his reasons therefore. If ENGINEER considers that part of the work to be substantially complete, ENGINEER will execute and deliver to OWNER and CONTRACTOR a certificate to that effect, fixing the date of Substantial Completion as to that part of the work, attaching thereto a tentative list of items to be completed or corrected before final payment.

Prior to issuing a Certificate of Substantial Completion, as part of the work, ENGINEER will deliver to OWNER and CONTRACTOR a written recommendation as to the division of responsibilities pending final payment between OWNER and CONTRACTOR with respect to security, operation, safety, maintenance, utilities and insurance for that part of the work which shall become binding upon the OWNER and CONTRACTOR at the time of issuing the definitive Certificate of Substantial Completion.

2. In lieu of the issuance of a Certificate of Substantial Completion as to part of the work, OWNER may take over operation of a facility constituting part of the work whether or not it is substantially complete if such facility is functionally and separately usable; provided that prior to such takeover, OWNER and CONTRACTOR have agreed as to the division of responsibilities between the OWNER for security, operation, safety, maintenance, heat, utilities and insurance with respect to such facility.
3. No occupancy of part of the work or taking over of operations of a facility will be accomplished prior to compliance with the requirements of the section titled "Bonds and Insurance" with respect to property insurance.

Required Safety Precautions: All pertinent safety regulations that would apply to the procedures described in these specifications shall be rigidly adhered to. These safety regulations shall include, but not be limited to, OSHA standards for workmen safety and working conditions, NYS Department of Labor requirements including "Right-to-Know" product data and other state and local regulations pertaining to workmen safety and other working conditions. All safety precautions and precautionary statements noted on the Manufacturer's Product Data Sheet and containers will be observed.

Temporary Sanitary Facilities: Sanitary conveniences, complying with NYS Health Department regulations, will be provided by the CONTRACTOR, if such facilities are not located conveniently to the job site and available for use by all the workmen. At the completion of the project, any temporary facilities will be removed and the area cleaned in a satisfactory manner. Where there is more than one prime contractor the general contractor shall so provide these facilities for the use of all site workers.

L. Warranty: Tests, Inspections, and Defective Work

Acceptance of Defective Work: If, instead of requiring correction or removal and replacement of defective work, OWNER prefers to accept it, OWNER may do so. In such case a Change Order shall be issued incorporating the necessary revisions in the Contract Documents, including appropriate reduction in the Contract Price by a mutually acceptable negotiated amount.



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Correction or Removal of Defective Work: If required by ENGINEER, CONTRACTOR shall promptly begin within seven (7) days without cost to OWNER and as specified by ENGINEER to either correct any defective work, whether or not fabricated, installed or completed, or, if the work has been rejected by ENGINEER, to remove it from the site and replace it with non-defective work.

Inclement Weather Provision: Unless otherwise specifically permitted, all work that would be subjected to damage shall be stopped during inclement weather. Only such work as will not suffer injury to workmanship or materials will be permitted. CONTRACTOR shall carefully protect his work against damage or injury from the weather, and when work is permitted to proceed during colder or freezing weather, he shall provide and maintain approved facilities for heating the materials and for protecting the finished work.

One Year Correction Period: If within one (1) year after the date of Substantial Completion, or other longer period of time as may be prescribed by law or by the terms of any applicable special guarantee required by the Contract Documents or by any specific provision of the Contract Documents, any work is found to be defective, CONTRACTOR shall promptly begin within seven (7) days, without cost to OWNER and in accordance with OWNER'S written instructions, either correct such defective work, or, if it has been rejected by OWNER, remove it from the site and replace it with non-defective work. If CONTRACTOR does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, OWNER may have the defective work corrected or the rejected work removed and replaced, and all direct and indirect costs of such removal, replacement or correction shall be paid by CONTRACTOR. The guarantee of the performance for any remedied work will be provided by the Performance Bond or a separate Maintenance Bond as specified.

OWNER May Correct Defective Work: If CONTRACTOR fails within a reasonable time after written notice of ENGINEER to proceed to correct defective work or to remove and replace rejected work as required by ENGINEER in accordance with the section titled "Correction Or Removal of Defective Work", or if CONTRACTOR fails to perform work in accordance with the Contract Documents (including any requirements of the progress schedule), OWNER may, after seven day's written notice to CONTRACTOR, correct and remedy any such deficiency. In exercising his rights under this paragraph OWNER shall proceed expeditiously. To the extent necessary to complete corrective or remedial action, OWNER may exclude CONTRACTOR from all parts of the site, take possession of all or part of the work and suspend CONTRACTOR'S services related thereto, and incorporate in the work all materials and equipment stored at the site or for which OWNER has paid CONTRACTOR but which are stored elsewhere. CONTRACTOR shall allow OWNER, OWNER'S representatives, agents and employees such access to the site as may be necessary to enable OWNER to exercise his rights under this paragraph. All direct and indirect costs of OWNER in exercising such rights shall be charged against CONTRACTOR in an amount verified by ENGINEER and a Change Order shall be issued incorporating the necessary revisions in the Contract Documents and a reduction in the Contract Price. Such direct and indirect costs shall include, in particular but without limitation, compensation for additional professional services required and all costs of replacement of work of others destroyed or damaged by correction, removal or replacement of work of others destroyed or damaged by correction, removal or replacement of CONTRACTOR'S defective work. CONTRACTOR shall not be allowed an extension of the Contract Time because of any delay in performance of the work attributable to exercise by OWNER of OWNER'S rights hereunder.

OWNER May Stop Work: If the work is defective or the CONTRACTOR fails to supply sufficient skilled workmen or suitable materials and equipment, OWNER may order CONTRACTOR to stop work, or any portion thereof, until the cause for such order has been eliminated; however, this right of OWNER to stop work shall not give rise to any duty on the part of OWNER to exercise this right for the benefit of CONTRACTOR or any other party.

Provide Access to Work: ENGINEER and ENGINEER'S representatives, other interested representatives of OWNER, testing agencies and governmental agencies with jurisdictional interests will have access to the



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work at reasonable times for their observation, inspection and testing. CONTRACTOR shall provide proper and safe conditions for such access.

Tests and Inspections: CONTRACTOR shall give ENGINEER timely notice of readiness of work for all required inspections, tests or approvals.

If any law, ordinance, rule, regulation, code or order of any public body having jurisdiction requires any work (or part thereof) to specifically be inspected, tested or approved, CONTRACTOR shall assume full responsibility therefore, pay all costs in connection therewith and furnish ENGINEER the required certificates of inspection, testing or approval.

The OWNER through the ENGINEER shall have all rights under State Law for the inspection, Code compliance and certification of work where required by the NYS Fire Prevention and Building Code. Further, where electrical work is included as part of this contract, the Contractor shall be responsible for securing inspection, the cost of any inspection fee and electrical work certification from a New York State recognized electrical underwriter. In such case underwriter's certification shall be provided by the Contractor prior to final project payment or release of retainage.

CONTRACTOR shall also be responsible for and shall pay all costs in connection with any inspection or testing required in connection with OWNER'S or ENGINEER'S acceptance of a manufacturer, fabricator, supplier or distributor of materials or equipment proposed to be incorporated in the work, or of materials or equipment submitted for approval prior to CONTRACTOR'S purchase thereof for incorporation in the work.

The OWNER reserves the right to independently perform, at his own expense, laboratory tests on random samples of material or performance tests on equipment delivered to the site. These tests, if made, will be conducted in accordance with the appropriate reference standards or specification requirement. The entire shipment represented by a given sample, samples or piece of equipment may be rejected on the basis of the failure of samples or pieces of equipment to meet specified test requirements.

All rejected materials or equipment shall be removed from the site, whether stored or installed in the work and the required replacements shall be made all at no additional cost to the OWNER. All inspections, tests or approvals other than those required by law, ordinance, rule, regulation, code or order of any public body having jurisdiction shall be performed by organizations acceptable to ENGINEER and CONTRACTOR.

If any work that is to be inspected, tested or approved is covered without written concurrence of ENGINEER it must, if requested by ENGINEER, be uncovered for observation. Such uncovering shall be at CONTRACTOR'S expense unless CONTRACTOR has given ENGINEER timely notice of CONTRACTOR'S intention to cover such work and ENGINEER has not acted with reasonable promptness in response to such notice. Neither observations by ENGINEER, nor inspections, tests, or approvals by others, shall relieve CONTRACTOR from his obligations to perform the work in accordance with the Contract Documents.

If ENGINEER considers it necessary or advisable that covered work be observed by ENGINEER or inspected or tested by others, CONTRACTOR, at ENGINEER'S request, shall uncover, expose or otherwise make available for observation, inspection or testing as ENGINEER may require, that portion of the work in question, furnishing all necessary labor, material and equipment. If it is found that such work is defective, CONTRACTOR shall bear all the expenses of such uncovering, exposure, observation, inspection, and testing and of satisfactory reconstruction, and an appropriate deductive Change Order shall be issued. If, however, such work is not found to be defective, CONTRACTOR shall be allowed an increase in the Contract Price or an extension in Contract Time, or both, directly attributable to such uncovering, exposure, observation, inspection, testing or reconstruction if he makes a claim therefor as provided in the sections titled "Change of Contract Price" or "Change of the Contract Time".



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Warranty and Guarantee: CONTRACTOR warrants and guarantees to OWNER that all work will be in accordance with the Contract Documents and will not be defective. Prompt notice of all defects shall be given to CONTRACTOR. All defective work, whether or not in place, may be rejected, corrected or accepted as provided in this section.

M. Work by Others

Owner may perform additional work related to the project by himself, or have additional work performed by utility service companies, or let other direct contracts therefor which shall contain General Provisions similar to these. CONTRACTOR shall afford the utility service companies and the other contractors who are parties to such direct contracts (or OWNER, if OWNER is performing the additional work with OWNER'S employees) reasonable opportunity for introduction and storage of materials and equipment and the execution of work, and shall properly connect and coordinate his work with theirs.

If any such part of CONTRACTOR'S work depends for proper execution or results upon the work of any such other contractor or utility service company (or OWNER), CONTRACTOR shall inspect and promptly report to OWNER in writing any patent or apparent defects or deficiencies in such work that render it unsuitable for such proper execution and results. CONTRACTOR'S failure to report shall constitute an acceptance of the other work as fit and proper for integration with CONTRACTOR'S work except for latent or non-apparent defects and deficiencies in the other work.

Extra cost caused by defective or ill-timed work or by the neglect or refusal of the CONTRACTOR to provide or complete any portion of his work at the proper time and in the proper manner, shall be borne by the CONTRACTOR and at no additional cost to OWNER.

CONTRACTOR shall do all cutting, fitting and patching of his work that may be required to make its several parts come together properly and integrate with such other work. CONTRACTOR shall not endanger any work of others by cutting, excavating or otherwise altering their work and will only cut or alter their work within the written consent of ENGINEER and the others whose work will be affected.

If the performance of additional work by other contractors or utility service companies or OWNER was not noted in the Contract Documents, written notice thereof shall be given to CONTRACTOR prior to starting any such additional work. If CONTRACTOR believes that the performance of such additional work by OWNER or others involves additional expense to CONTRACTOR or requires an extension of Contract Time, CONTRACTOR may make a claim therefor as provided in sections titled "Change of the Contract Time" and "Change of Contract Price".

IV. Contract Completion & Work Acceptance

A. Arbitration

Any claims, disputes and other matters in question between the OWNER and CONTRACTOR arising out of, or related to the Contract Documents or breach thereof, except for claims which have been waived by making or acceptance of final payment as provided in the section titled "Payments To Contractor And Completion - Waiver of Claims" may, if acceptable to both sides, be decided by arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association then pertaining subject to the limitations of this section. This agreement so to arbitrate and any other agreement of consent to arbitration in accordance herewith as provided in this section will be specifically enforceable under the prevailing arbitration law of any court having jurisdiction. No demand for arbitration of any claim, dispute or other matter that is required to be referred to ENGINEER initially for decision in accordance with the section titled "ENGINEER'S Status During Construction - Decisions On Disagreements" shall be made until the earlier of:



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1. The date on which ENGINEER has rendered a decision.
2. The tenth day after the parties have presented their evidence to ENGINEER if a written decision has not been rendered by ENGINEER before that date.

No demand for arbitration of any such claim, dispute or other matter shall be made later than thirty (30) days after the date on which ENGINEER has rendered a written decision in respect thereof in accordance with the sections titled "ENGINEER'S Status During Construction - Decisions on Disagreements", and the failure to demand arbitration within said thirty day period shall result in ENGINEER'S decision being final and renders a decision after arbitration proceedings, have been initiated, such decision may be entered as evidence but shall not supersede proceedings, except where the decision is acceptable to the parties concerned.

Notice of demand for arbitration shall be filed in writing with the other party to the Agreement and with the American Arbitration Association, and a copy shall be sent to the ENGINEER. The demand for arbitration shall be made within said thirty (30) day period specified in the preceding paragraph where applicable, and in all other cases within a reasonable time after the claim, dispute or other matter in question has arisen, and in no event shall any such demand be made after institution of legal or equitable proceedings based on such claim, dispute or other matter in question would be barred by the applicable statute of limitations.

The award rendered by the arbitrators will be final, judgment may be entered upon it in any court having jurisdiction thereof and will not be subject to modification or appeal except to the extent permitted by Section 10 and 11 of the Federal Arbitration Act (9 U.S.C. SS 10,11).

B. Payment to Contractor and Completion

Schedule to be Submitted: At least ten (10) days prior to the start of work, CONTRACTOR shall submit to OWNER/ENGINEER a progress schedule, a final schedule of Shop Drawing submissions and, a schedule of values showing separate labor and material costs of the work. These schedules shall be satisfactory in form and substance to Engineer. The schedule of values shall include quantities and unit prices (where so bid), and shall subdivide the work into component parts in sufficient detail to serve as the basis for progress payments during construction. Upon acceptance of the schedule of values by OWNER/ENGINEER, it shall be incorporated into a form of application for payment acceptable to Engineer.

Application for Progress Payment: At an interval not less than one month CONTRACTOR shall submit to OWNER/ENGINEER for review an application for Payment filled out and signed by CONTRACTOR covering the work completed as of the date of the application and subject to all the retainages, etc. as applicable and spelled out in the Contract Documents and accompanied by such supporting documentation as is required by the Contract Documents and also as OWNER/ENGINEER may reasonably request. Application shall normally be made upon AIA form G702 duly signed and notarized and accompanied by a signed County voucher.

If payment is requested on the basis of materials and equipment not incorporated in the work but delivered and suitably stored at the site or at another location agreed to in writing, the Application for Payment shall also be accompanied by such data satisfactory to OWNER, as will establish OWNER'S title to the materials and equipment and protect OWNER'S interest therein, including applicable insurance.

Each subsequent Application for Payment shall include an affidavit of CONTRACTOR stating that all previous progress payments received on account of the work have been applied to discharge in full all of CONTRACTOR'S obligations reflected in prior Application for Payment. The amount of retainage with respect to progress payments will be as stipulated in the section titled "Payments to Contractor and Completion - Retainages". OWNER may request and CONTRACTOR shall transmit a certified list of indebtedness prior to issuance of any partial payment.



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Contractor's Warranty of Title: CONTRACTOR warrants and guarantees that title to all work, materials, and equipment covered by any Application for Payment, whether incorporated in the project or not, will pass to OWNER at the time of payment free and clear of all liens, claims, interests and encumbrances (hereafter in the contract documents referred to as "Liens").

Review of Application for Progress Payment: ENGINEER will, within ten (10) days after receipt of each application for payment, either indicate in writing a recommendation of payment and present the application to OWNER, or return the application to CONTRACTOR indicating in writing ENGINEER'S reasons for refusing to recommend payment. In the latter case, CONTRACTOR may make the necessary corrections and resubmit the Application. OWNER shall, after presentation to him of the Application for Payment with the ENGINEER'S recommendation pay CONTRACTOR the amount recommended at his next regularly scheduled opportunity.

ENGINEER's recommendation of any payment requested in an application for Payment will constitute a representation by ENGINEER to OWNER, based on ENGINEER'S or Designated Representative's on-site observations of the work in progress as an experienced and qualified design professional and on ENGINEER'S review of the Application for Payment and the accompanying data and schedules that the work has progressed to the point indicated; that, to the best of ENGINEER'S knowledge, belief and information, the quality of the work is in accordance with the Contract Documents (subject to an evaluation of the work as a functioning project upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents and any qualifications stated in the recommendation) and that CONTRACTOR is entitled to the payment of the amount recommended. However, by recommending any such payment ENGINEER will not thereby be deemed to have represented for what purpose CONTRACTOR has used the moneys paid or to be paid to CONTRACTOR on account of Contract Price, or that title to any work, material or equipment has passed to the OWNER free and clear of any liens.

ENGINEER'S recommendation of final payment will constitute an additional representation by ENGINEER to OWNER that the conditions precedent to CONTRACTOR'S being entitled to final payment as set forth in the section titled "Payments To Contractor and Completion - Final Application for Payment" have been fulfilled.

ENGINEER may refuse to recommend the whole or any part of any payment if, in his opinion, it would be incorrect to make such representations to OWNER. He may also refuse to recommend any such payment, or, because of subsequently discovered evidence or the results of subsequent inspections or tests, nullify any such payment previously recommended to such extent as may be necessary in ENGINEER'S opinion to protect OWNER from loss because:

1. The work is defective, or completed work has been damaged requiring correction or replacement.
2. Written claims have been made against OWNER or liens have been filed in connection with the work.
3. The Contract Price has been reduced because of modifications.
4. OWNER has been required to correct defective work or complete the work in accordance with the section titled " Warranty: Tests, etc. - Acceptance of Defective Work".
5. CONTRACTOR'S unsatisfactory prosecution of the work in accordance with the Contract Documents.
6. CONTRACTOR'S failure to make payment to Subcontractors, or for labor, materials or equipment.

Retainage As Security: The OWNER will retain five percent (5%) of the amount of each such estimate, provided that the CONTRACTOR is making satisfactory progress and there is no specific cause for greater withholding. When the project is substantially completed (operational or beneficial occupancy), the retained amount may be further reduced below five percent (5%) to an amount equal to two times the value of any remaining items to be completed, as determined by the ENGINEER, as security for the performance of the guaranteed work as set forth in the specifications and an amount necessary to satisfy any claims, liens or



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judgments against the CONTRACTOR which have not been suitably discharged. The OWNER may accept a Bond if offered in lieu of the cash retainages above.

Substantial Completion: When the CONTRACTOR considers the entire work ready for its intended use, CONTRACTOR shall, in writing to OWNER and ENGINEER, certify the entire work is substantially complete and request the ENGINEER issue a Certificate of Substantial Completion. Within reasonable time thereafter, OWNER, CONTRACTOR and ENGINEER shall make an inspection of the work to determine the status of completion. If ENGINEER does not consider the work substantially complete, ENGINEER will notify contractor in writing giving reasons therefor. If ENGINEER and OWNER consider the work substantially complete, ENGINEER will prepare a tentative Certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the Certificate a tentative list of items to be completed or corrected before final payment.

At the time of delivery of the tentative Certificate of Substantial Completion ENGINEER will deliver to OWNER and CONTRACTOR a written recommendation as to division of responsibilities pending final payment between OWNER and CONTRACTOR with respect to security, operation, safety, maintenance, heat, utilities and insurance. Unless OWNER and CONTRACTOR agree otherwise in writing prior to his issuing the definitive certificate of Substantial Completion ENGINEER'S aforesaid recommendation will be binding on OWNER and CONTRACTOR until final payment.

OWNER shall have the right to exclude CONTRACTOR from the work after the date of Substantial Completion, but OWNER shall allow CONTRACTOR reasonable access to complete or correct items on the tentative list.

Final Review of Project: Upon written notice from CONTRACTOR that the work is complete, ENGINEER will conduct a final review with OWNER and CONTRACTOR and will notify CONTRACTOR in writing of all particulars in which this review reveals that the work is incomplete or defective. CONTRACTOR shall immediately take such measures as are necessary to remedy such deficiencies.

Final Application for Payment: After CONTRACTOR has completed all such corrections to the satisfaction of ENGINEER and delivered all maintenance and operating instructions, schedules, guarantees, Bonds, shop drawings, satisfaction of all road bonds, permits, releases from properties occupied, certificates of inspection, as-built drawings, marked-up record documents and other documents - all as required by the Contract Documents, and after the ENGINEER has indicated that the work is acceptable, CONTRACTOR may make application for final payment following the procedure for progress payments.

The final Application for Payment shall be accompanied by all documentation called for in the Contract Documents and such other data and schedules as ENGINEER may reasonably require, together with complete and legally effective releases or waivers (satisfactory to OWNER) of all liens arising out of or filed in connection with the work.

In lieu thereof and as approved by OWNER, CONTRACTOR may furnish receipts or releases in full (an affidavit of CONTRACTOR) that the releases and receipts include all labor, services, material and equipment for which a Lien could be filed and that all payrolls, materials and equipment bills and other indebtedness connected with the work for which OWNER or his property might in any way be responsible, have been paid or otherwise satisfied; and consent of Surety to final payment. If any Subcontractor, manufacturer, fabricator, supplier or distributor fails to furnish a release or receipt in full, CONTRACTOR may furnish a Bond or other collateral satisfactory to OWNER to indemnify OWNER against any Lien.

Final Payment and Acceptance: If, on the basis of ENGINEER'S observation of work during construction and final inspection, and ENGINEER'S review of the final Application for Payment and accompanying documentation - all as required by the Contract Documents, ENGINEER is satisfied that the work has been completed and CONTRACTOR has fulfilled all his obligations under the Contract Documents, ENGINEER



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will recommend within ten (10) days after receipt of the final Application for Payment, indicating in writing his recommendation for payment and present the Application to OWNER for payment. Thereupon ENGINEER will give written notice to OWNER and CONTRACTOR that the work is acceptable subject to the provision of this section and the section titled "Waiver of Claims At Final Payment". Otherwise, ENGINEER will return Application to CONTRACTOR, indicating in writing the reasons for refusing recommendation for final payment, in which case CONTRACTOR shall make the necessary corrections and resubmit the Application. If the Application and accompanying documentation are appropriate as to form and substance, OWNER shall, within forty-five (45) days after receipt thereof pay Contractor the amount recommended by ENGINEER.

If, through no fault of CONTRACTOR final completion of the work is significantly delayed and if ENGINEER so confirms, OWNER shall, upon receipt of CONTRACTOR'S final Application for Payment and recommendation of ENGINEER, and without terminating agreement, make payment of the balance due for that portion of the work fully completed and accepted.

If the remaining balance to be held by OWNER for work not fully completed or corrected is less than the retainage stipulated and where performance bonds have been furnished the written consent of the Surety to the payment of the balance due for that portion of the work fully completed and accepted shall be submitted by CONTRACTOR to ENGINEER with the application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of claim.

Contractor's Continuing Obligation: CONTRACTOR'S obligation to perform and complete the work in accordance with the Contract Documents shall be absolute. Neither recommendation of any progress or final payment by ENGINEER, nor the issuance or a certificate of Substantial Completion, nor any payment by OWNER to CONTRACTOR under the Contract Documents, nor any use or occupancy of the work or any part thereof by OWNER, nor any act of acceptance by OWNER nor any failure to do so, nor the issuance of a notice of acceptability by ENGINEER pursuant to the section of this section titled "Final Application For Payment", nor any correction of defective work by OWNER shall constitute an acceptance of work not in accordance with the Contract Documents or a release of the CONTRACTOR'S obligations to perform the work in accordance with the Contract Documents.

Waiver of Claims at Final Payment: The making and acceptance of final payment shall constitute:

1. A waiver of claims by OWNER against CONTRACTOR except claims arising from unsettled Liens, from defective work appearing after final inspection or from failure to comply with the Contract Documents or the terms of any special guarantees specified therein: however it shall not constitute a waiver by OWNER of any rights in respect of CONTRACTOR'S continuing obligations under the Contract Documents.
2. A waiver of all claims by CONTRACTOR against OWNER other than those previously made in writing and still unsettled.

C. Suspension of Work and Termination

OWNER May Suspend Work: OWNER may, at any time and without cause, suspend the work or any portion thereof for a period of not more than ninety (90) days by notice in writing to CONTRACTOR and ENGINEER which shall fix the date on which work shall be resumed. CONTRACTOR shall resume the work on the date so fixed. CONTRACTOR will be allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to any suspension if he makes a claim therefor as previously provided in those sections.

OWNER May Terminate: Upon the occurrence of any one or more of the following events:

1. If CONTRACTOR is adjudged as bankrupt or insolvent.
2. If CONTRACTOR makes a general assignment for the benefit of creditors.



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3. If CONTRACTOR files a petition to take advantage of any debtor's act, or to reorganize under the bankruptcy law or similar laws.
4. If a trustee or receiver is appointed for CONTRACTOR or for any of CONTRACTOR'S property.
5. If CONTRACTOR repeatedly fails to supply sufficient skilled workmen or suitable materials or equipment.
6. If CONTRACTOR repeatedly fails to make prompt payments to Subcontractors for labor, materials, or equipment.
7. If CONTRACTOR disregards laws, ordinances, rules, regulations or orders of any public body having jurisdiction.
8. If CONTRACTOR disregards the authority of ENGINEER.
9. If CONTRACTOR otherwise violates in any substantial way any provisions of the Contract Documents.

OWNER may after giving CONTRACTOR and his Surety seven (7) days written notice, terminate the services of CONTRACTOR, exclude CONTRACTOR from the site and take possession of the work, incorporate in the work all materials and equipment stored at the site or for which OWNER has paid CONTRACTOR but which are stored elsewhere, and finish the work as the OWNER may deem expedient. In such case CONTRACTOR shall not be entitled to receive any further payment until work is finished. If the unpaid balance of the Contract Price exceeds the direct and indirect cost of completing work, including compensation for additional professional services, such excess shall be paid to CONTRACTOR. If such costs exceed such unpaid balance, CONTRACTOR shall pay the difference to OWNER.

Where the CONTRACTOR'S services have been so terminated by the OWNER, the termination shall not affect any rights of OWNER against CONTRACTOR then existing or which may thereafter accrue. Any retention or payments of monies due CONTRACTOR by OWNER will not release CONTRACTOR from Liability.

Upon seven (7) days written notice to CONTRACTOR and ENGINEER, OWNER may, without cause and without prejudice to any other right or remedy, elect to abandon the work and terminate the Agreement. In such case, CONTRACTOR shall be paid for all work executed and any expense sustained plus reasonable termination expenses.

Contractor May Stop Work or Terminate: If, through no act or fault of CONTRACTOR, the work is suspended for a period of more than ninety (90) days by OWNER or under an order of court or other public authority, then CONTRACTOR may, upon seven (7) days written notice to OWNER and ENGINEER, terminate the Agreement and recover from OWNER payment for all work executed and any expense sustained plus reasonable termination expense. The provisions of this paragraph shall not relieve CONTRACTOR of his obligations under these contract documents to carry on the work in accordance with the progress schedule and without delay during disputes and disagreements with OWNER.

End of General & Supplementary Conditions



Schenectady County Request for Bid
SUNY SCCC ELSTON HALL – LOBBY AND MOHAWK ROOM RENOVATION
RFB-2024-20

Bid Form: Contract 1 – (GC) General Contractor Bidder Name/Stamp:_____

A. PROJECT IDENTIFICATION:

RFB-2024-20: SUNY SCCC Elston Hall - Lobby and Mohawk Room Renovation

CONTRACT NO. 1: (GC) GENERAL CONTRACTOR

THIS BID IS SUBMITTED TO:

Schenectady County Purchasing
620 State Street, 2nd Floor
Schenectady, New York 12305-2114
(518) 388-4240

The undersigned BIDDER proposes and agrees, if this BID is accepted, to enter into an Agreement with COUNTY in the form included in the Contract Documents to complete all work as specified or indicated in the Contract Documents for the Contract Price and by the completion date indicated in the Agreement and in accordance with the Contract Documents.

BIDDER accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid Security. This Bid will remain open for forty-five (45) days after the day of Bid opening. BIDDER will sign the Agreement and submit the Contract Security and other documents required by the Contract Documents within fifteen (15) days after the date of COUNTY'S Notice of Award.

In submitting this BID, BIDDER represents that:

- (a) BIDDER has examined the site and locality where the work is to be performed, the legal requirements (federal, state, and local laws, ordinances, rules and regulations) and the conditions affecting cost, progress or performance of the work and has made such independent investigations as BIDDER deems necessary;
- (b) This BID is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any Agreement or rules of any group, association, organization or corporation; BIDDER has not directly or indirectly induced or solicited or induced any person, firm or a corporation to refrain from bidding; and BIDDER has not sought by collusion to obtain for himself any advantage over any other BIDDER or over COUNTY;
- (c) BIDDER will complete the work for the bid submitted below.
- (d) BIDDER HAS EXAMINED COPIES OF ALL THE CONTRACT DOCUMENTS.
- (e) BIDDER acknowledges the receipt of the following addenda and has included these requirements in the Bid. (If none, so state and affix signature).

Addendum #	Date



Schenectady County Request for Bid
SUNY SCCC ELSTON HALL – LOBBY AND MOHAWK ROOM RENOVATION
RFB-2024-20
Bid Form: Contract 1 – (GC) General Contractor Bidder Name/Stamp:_____

SUNY SCCC ELSTON HALL LOBBY AND MOHAWK ROOM RENOVATION:

CONTRACT #1 - (GC) GENERAL CONTRACTOR

\$ _____ + \$20,000 = \$ _____
BASE BID Allowance Total Bid Amount

(TOTAL WRITTEN AMOUNT)

ADD ALTERNATE #1(GC) – MOHAWK ROOM WORK

Remove, and repair existing finishes at walls and doors. Prep and Clean existing floor and provide new sealer. Provide new stair finish with wall panel trim as detailed in the contracted drawings. This alternate includes a new skim coat plaster ceiling. New lighting by electrical contractor. See all associated contract documents for full and detailed scope of work.

\$ _____ + \$5,000 = \$ _____
Add Alternate #1 Allowance Total Bid Amount

(Add Alternate: #1(GC) WRITTEN AMOUNT)

UNIT PRICING(GC):

- A. Additional work (see contract documents) as approved by owner, for existing stone terrazzo floor and base cleaning, stripping, and resealing.

(\$ per square feet) \$ _____



Schenectady County Request for Bid
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RFB-2024-20

Bid Form: Contract 1 – (GC) General Contractor Bidder Name/Stamp:_____

The following documents are attached to and made a part of this bid:

- a) Certified Copy of Resolution of Board of Directors
- b) Non-Collusion Bid Certification
- c) Iranian Divestment Form
- d) Disclosure of Prior Non-Responsibility Determinations
- e) Certification for the Prevention of Sexual Harassment
- f) Subcontractors Listing
- g) Bidder's Qualifications
- h) Apprenticeship Form (if required)
- i) MWBE Documents (if required)
- j) Bid Bond
- k) W-9



Schenectady County Request for Bid
SUNY SCCC ELSTON HALL – LOBBY AND MOHAWK ROOM RENOVATION
RFB-2024-20

Bid Form: Contract 1 – (GC) General Contractor Bidder Name/Stamp:_____

BIDDER:

Legal Name of Person, Partnership, or Corporation

Authorized Signature

Type or Print Name

Date Submitted

BIDDER ADDRESS:

Street

City

State

Zip Code

Telephone Number

Facsimile Number

Email Address

Website

Federal Employer Identification Number



Schenectady County Request for Bid
SUNY SCCC ELSTON HALL – LOBBY AND MOHAWK ROOM RENOVATION
RFB-2024-20

Bid Form: Contract 2 – (MC) Mechanical Contractor Bidder Name/Stamp:_____

A. PROJECT IDENTIFICATION:

RFB-2024-20: SUNY SCCC Elston Hall – Lobby and Mohawk Room Renovation

CONTRACT NO. 2: (MC) MECHANICAL CONTRACTOR

THIS BID IS SUBMITTED TO:

Schenectady County Purchasing
620 State Street, 2nd Floor
Schenectady, New York 12305-2114
(518) 388-4240

The undersigned BIDDER proposes and agrees, if this BID is accepted, to enter into an Agreement with COUNTY in the form included in the Contract Documents to complete all work as specified or indicated in the Contract Documents for the Contract Price and by the completion date indicated in the Agreement and in accordance with the Contract Documents.

BIDDER accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid Security. This Bid will remain open for forty-five (45) days after the day of Bid opening. BIDDER will sign the Agreement and submit the Contract Security and other documents required by the Contract Documents within fifteen (15) days after the date of COUNTY'S Notice of Award.

In submitting this BID, BIDDER represents that:

- (a) BIDDER has examined the site and locality where the work is to be performed, the legal requirements (federal, state, and local laws, ordinances, rules and regulations) and the conditions affecting cost, progress or performance of the work and has made such independent investigations as BIDDER deems necessary;
- (b) This BID is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any Agreement or rules of any group, association, organization or corporation; BIDDER has not directly or indirectly induced or solicited or induced any person, firm or a corporation to refrain from bidding; and BIDDER has not sought by collusion to obtain for himself any advantage over any other BIDDER or over COUNTY;
- (c) BIDDER will complete the work for the bid submitted below.
- (d) BIDDER HAS EXAMINED COPIES OF ALL THE CONTRACT DOCUMENTS.
- (e) BIDDER acknowledges the receipt of the following addenda and has included these requirements in the Bid. (If none, so state and affix signature).

Addendum #	Date



Schenectady County Request for Bid
SUNY SCCC ELSTON HALL – LOBBY AND MOHAWK ROOM RENOVATION
RFB-2024-20

Bid Form: Contract 2 – (MC) Mechanical Contractor Bidder Name/Stamp:_____

SUNY SCCC-ELSTON HALL LOBBY AND MOHAWK ROOM RENOVATION:

CONTRACT #2 - (MC) MECHANICAL CONTRACTOR

\$ _____ + \$2,000 = \$ _____
BASE BID Allowance Total Bid Amount

(TOTAL WRITTEN AMOUNT)

ADD ALTERNATE #1(MC) – MOHAWK ROOM WORK

Remove existing floor grills. Clean and prepare existing floor duct opening. Provide and install new floor registers sized to fit existing floor openings (V.I.F.) See all associated contract documents for full and detailed scope of work.

\$ _____ + \$1,000 = \$ _____
Add Alternate #1 Allowance Total Bid Amount

(Add Alternate: #1(MC) WRITTEN AMOUNT)

The following documents are attached to and made a part of this bid:

- a) Certified Copy of Resolution of Board of Directors
- b) Non-Collusion Bid Certification
- c) Iranian Divestment Form
- d) Disclosure of Prior Non-Responsibility Determinations
- e) Certification for the Prevention of Sexual Harassment
- f) Subcontractors Listing
- g) Bidder's Qualifications
- h) Apprenticeship Form (if required)
- i) MWBE Documents (if required)
- j) Bid Bond
- k) W-9



Schenectady County Request for Bid
SUNY SCCC ELSTON HALL – LOBBY AND MOHAWK ROOM RENOVATION
RFB-2024-20

Bid Form: Contract 2 – (MC) Mechanical Contractor Bidder Name/Stamp:_____

BIDDER:

Legal Name of Person, Partnership, or Corporation

Authorized Signature

Type or Print Name

Date Submitted

BIDDER ADDRESS:

Street

City

State

Zip Code

Telephone Number

Facsimile Number

Email Address

Website

Federal Employer Identification Number



Schenectady County Request for Bid
SUNY SCCC ELSTON HALL – LOBBY AND MOHAWK ROOM RENOVATION
RFB-2024-20

Bid Form: Contract 3 – (EC) Electrical Contractor Bidder Name/Stamp:_____

A. PROJECT IDENTIFICATION:

RFB-2024-20: SUNY SCCC Elston Hall - Lobby and Mohawk Room Renovation

CONTRACT NO. 3: (EC) ELECTRICAL CONTRACTOR

THIS BID IS SUBMITTED TO:

Schenectady County Purchasing
620 State Street, 2nd Floor
Schenectady, New York 12305-2114
(518) 388-4240

The undersigned BIDDER proposes and agrees, if this BID is accepted, to enter into an Agreement with COUNTY in the form included in the Contract Documents to complete all work as specified or indicated in the Contract Documents for the Contract Price and by the completion date indicated in the Agreement and in accordance with the Contract Documents.

BIDDER accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid Security. This Bid will remain open for forty-five (45) days after the day of Bid opening. BIDDER will sign the Agreement and submit the Contract Security and other documents required by the Contract Documents within fifteen (15) days after the date of COUNTY'S Notice of Award.

In submitting this BID, BIDDER represents that:

- (a) BIDDER has examined the site and locality where the work is to be performed, the legal requirements (federal, state, and local laws, ordinances, rules and regulations) and the conditions affecting cost, progress or performance of the work and has made such independent investigations as BIDDER deems necessary;
- (b) This BID is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any Agreement or rules of any group, association, organization or corporation; BIDDER has not directly or indirectly induced or solicited or induced any person, firm or a corporation to refrain from bidding; and BIDDER has not sought by collusion to obtain for himself any advantage over any other BIDDER or over COUNTY;
- (c) BIDDER will complete the work for the bid submitted below.
- (d) BIDDER HAS EXAMINED COPIES OF ALL THE CONTRACT DOCUMENTS.
- (e) BIDDER acknowledges the receipt of the following addenda and has included these requirements in the Bid. (If none, so state and affix signature).

Addendum #	Date



Schenectady County Request for Bid
SUNY SCCC ELSTON HALL – LOBBY AND MOHAWK ROOM RENOVATION
RFB-2024-20

Bid Form: Contract 3 – (EC) Electrical Contractor Bidder Name/Stamp:_____

SUNY SCCC ELSTON HALL LOBBY AND MOHAWK ROOM RENOVATION:

CONTRACT #3 - (EC) ELECTRICAL CONTRACTOR

\$ _____ + \$ 7,500 + \$ 45,000 = \$ _____
(EC) BASE BID Contingency Allowance (F20, F20A) Fixture Allowance Total Bid Amount

(TOTAL WRITTEN AMOUNT)

ADD ALTERNATE #1(EC) – MOHAWK ROOM WORK

Remove, and replace existing lighting as detailed on the documents. This alternate includes a new lighting allowance for fixture type F12. Provide new room power and switching. See all associated contract documents for full and detailed scope of work.

\$ _____ + \$ 5,000 + \$ 10,000 = \$ _____
(EC) Add Alternate #1 Alt. #1 Allowance (F12) Fixture Allowance Total Bid Amount

(Add Alternate: #1(EC) WRITTEN AMOUNT)

The following documents are attached to and made a part of this bid:

- a) Certified Copy of Resolution of Board of Directors
- b) Non-Collusion Bid Certification
- c) Iranian Divestment Form
- d) Disclosure of Prior Non-Responsibility Determinations
- e) Certification for the Prevention of Sexual Harassment
- f) Subcontractors Listing
- g) Bidder's Qualifications
- h) Apprenticeship Form (if required)
- i) MWBE Documents (if required)
- j) Bid Bond
- k) W-9



Schenectady County Request for Bid
SUNY SCCC ELSTON HALL – LOBBY AND MOHAWK ROOM RENOVATION
RFB-2024-20

Bid Form: Contract 3 – (EC) Electrical Contractor Bidder Name/Stamp:_____

BIDDER:

Legal Name of Person, Partnership, or Corporation

Authorized Signature

Type or Print Name

Date Submitted

BIDDER ADDRESS:

Street

City

State

Zip Code

Telephone Number

Facsimile Number

Email Address

Website

Federal Employer Identification Number



Schenectady County Request for Bid
SUNY SCCC ELSTON HALL – LOBBY AND MOHAWK ROOM RENOVATION
RFB-2024-20
Schenectady County Standard Forms-Board of Directors Resolution

FOR CORPORATE BIDDERS ONLY

RESOLVED, that _____ be authorized to sign and submit

(Name of Corporation)

the bid or proposal of this corporation for the following project:

And to include in such bid or proposal the certificate as to non-collusion required by action one hundred three-dollars of the General Municipal Law as the act or deed of such corporation, and for any inaccuracies or misstatements in such certificate this corporate bidders shall be liable under penalties of perjury.

The foregoing is a true and correct copy of the resolution adopted by

_____ Corporation at a meeting of its Board of Directors
held on the _____ day of _____, 20____.

(SECRETARY)

(SEAL)



**Non-Collusive Bidding Certificate pursuant to Section 103-D of the
NEW YORK STATE GENERAL MUNICIPAL LAW**

- 1.) By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid, each party thereto certifies as to its own organization, under penalty of perjury, that to the best of his knowledge and belief:
 - a.) The prices in this bid have been arrived at independently without collusion, consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor;
 - b.) Unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder prior to opening, directly or indirectly, to any other bidder or to any competitor; and
 - c.) No attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.
- 2.) A bid shall not be considered for award nor shall any award be made where (a), (b), and (c) above have not been complied with; provided, however, that in any case the bidder cannot make the foregoing certification, the bidder shall so state and shall furnish with the bid a signed statement which sets forth in detail the reasons thereof. Where (a), (b), and (c) above have not been complied with, the bid shall not be considered for any award nor shall any award be made unless the head of the Purchasing Department, or his designee, to the political subdivision, public department, agency, or official thereof to which the bid is made determines that such disclosure was not made for the purpose of restricting competition.
- 3.) The fact that a bidder has published price lists, rates, or tariffs covering items being procured, has informed prospective customer of proposed or pending publication of new or revised price lists for such items, or has sold the same items to other customers at the same prices being bid, does not constitute, without more, a disclosure within the meaning of paragraph 1 above.
- 4.) Any bid hereafter made to any political subdivision of the state or any public department, agency, or official thereof by a corporate bidder for work or services performed or to be performed or goods sold or to be sold, where competitive bidding is required by statute, rule, regulation, local law, and where such bid contains the certification referred to in paragraph 1 of this section, shall be deemed to have been authorized by the Board of Directors of the bidder, and such authorization shall be deemed to include the submission of the bid and the inclusion therein of the certificate as to non-collusion as the act and deed of the corporation.

Signature

Title

Company Name

Date



**Certification Pursuant to Section 103-g
Of the New York State
General Municipal Law
Iranian Energy Sector Divestment**

- 1.) By submission of this bid/proposal, each bidder/proposer and each person signing on behalf of any bidder/proposer certifies, and in the case of a joint bid, each party thereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and belief that each bidder is not on the list created pursuant to paragraph(b) of subdivision 3 of Section 165-a of the New York State Finance Law.
- 2.) A Bid/Proposal shall not be considered for award, nor shall any award be made where the condition set forth in Paragraph A above has not been complied with; provided, however, that in any case the bidder/proposer cannot make the foregoing certification set forth in Paragraph A above, the bidder/proposer shall so state and shall furnish with the bid a signed statement which sets forth in detail the reasons therefor. Where Paragraph 1 above cannot be complied with, the Purchasing Unit to the political subdivision, public department, agency or official thereof to which the bid/proposal is made, or his designee, may award a bid/proposal, on a case by case business under the following circumstances:
 1. The investment activities in Iran were made before April 12, 2012, the investment activities in Iran have not been expanded or renewed after April 12, 2012, and the Bidder/Proposer has adopted, publicized and is implementing a formal plan to cease the investment activities in Iran and to refrain from engaging in any new investments in Iran; or
 2. The political subdivision makes a determination that the goods or services are necessary for the political subdivision to perform its functions and that, absent such an exemption, the political subdivision would be unable to obtain the goods or services for which the contract is offered. Such determination shall be made in writing and shall be a public document.

Signature

Title

Company Name

Date



Schenectady County Request for Bid
SUNY SCCC ELSTON HALL – LOBBY AND MOHAWK ROOM RENOVATION
RFB-2024-20
Disclosure of Prior Non-Responsibility Determinations

INSTRUCTIONS FOR COMPLETING THE DISCLOSURE OF PRIOR NON-RESPONSIBILITY DETERMINATIONS

Background

New York State Finance Law §139-k(2) obligates a Governmental Entity to obtain specific information regarding prior non-responsibility determinations with respect to State Finance Law §139-j. In accordance with State Finance Law §139-k, an Offeror must be asked to disclose whether there has been a finding of non-responsibility made within the previous four (4) years by any Governmental Entity due to: (a) a violation of State Finance Law §139-j or (b) the intentional provision of false or incomplete information to a Governmental Entity. The terms “Offeror” and “Governmental Entity” are defined in State Finance Law § 139-k(1). State Finance Law §139-j sets forth detailed requirements about the restrictions on Contacts during the procurement process. A violation of State Finance Law §139-j includes, but is not limited to, an impermissible Contact during the restricted period (for example, contacting a person or entity other than the designated contact person, when such contact does not fall within one of the exemptions).

As part of its responsibility determination, State Finance Law §139-k(3) mandates consideration of whether an Offeror fails to timely disclose accurate or complete information regarding the above non-responsibility determination. In accordance with law, no Procurement Contract shall be awarded to any Offeror that fails to timely disclose accurate or complete information under this section, unless a finding is made that the award of the Procurement Contract to the Offeror is necessary to protect public property or public health safety, and that the Offeror is the only source capable of supplying the required Article of Procurement within the necessary timeframe. *See State Finance Law §§139-j (10)(b) and 139-k(3).*

Instructions:

Schenectady County includes this disclosure request regarding prior non-responsibility determinations in accordance with State Finance Law §139-k in its solicitation of Proposals or Bid documents or specifications or contract documents, as applicable, for procurement contracts. The attached form is to be completed and submitted by the individual or entity seeking to enter into a Procurement Contract, Supplement or Change Order. It shall be submitted with your Bid or Proposal to the Purchasing Department. This following disclosure form must accompany each Bid Form, Letter of Interest, or Proposal submitted by all Offerors.



DISCLOSURE OF PRIOR NON-RESPONSIBILITY DETERMINATIONS

Name of Individual or Entity Seeking to Enter into the Procurement Contract:

Address: _____

Name and Title of Person Submitting this Form:

1. Has any Governmental Entity made a finding of non-responsibility regarding the individual or entity seeking to enter into the Procurement Contract in the previous four years?

(Please circle): No Yes

If Yes, please answer the next questions:

2. Was the basis for the finding of non-responsibility due to a violation of State Finance Law §139-j

(Please circle): No Yes

3. Was the basis for the finding of non-responsibility due to the intentional provision of false or incomplete information to a Governmental Entity?

(Please circle): No Yes

4. If you answered yes to any of the above questions, please provide details regarding the finding of non-responsibility below and attach additional pages as necessary.

Governmental Entity: _____

Date of Finding of Non-Responsibility: _____

Basis of Finding of Non-Responsibility: _____

5. Has any Governmental Entity or other governmental agency terminated or withheld a Procurement Contract with the above-named individual or entity due to the intentional provision of false or incomplete information?

(Please circle): No Yes

6. If yes, please provide details below and attach additional pages as necessary.

Governmental Entity: _____

Date of Termination or Withholding of Contract: _____

Basis of Termination or Withholding: _____

Offeror certifies that all information provided to the Governmental Entity with respect to State Finance Law §139- k is complete, true and accurate.

By:

Date:

Signature



**CERTIFICATION OF COMPLIANCE FOR THE
PREVENTION OF SEXUAL HARASSMENT**

Pursuant to State Finance Law §139-l of the State of New York, effective January 1, 2019, where competitive bidding is required for certain public contracts, every bid must contain the following statement affirming that the bidder has implemented a written policy addressing sexual harassment prevention and that the bidder provides annual sexual harassment prevention training, which statement must be signed by the bidder and affirmed by such bidder under the penalty of perjury:

[Please Check One]

BIDDER’S CERTIFICATION

- ☐ By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that the bidder has and has implemented a written policy addressing sexual harassment prevention in the workplace and provides annual sexual harassment prevention training to all of its employees. Such policy shall, at a minimum, meet the requirements of section two hundred one-g of the labor law.

- ☐ I am unable to certify that I, or my employer, have implemented a written policy addressing sexual harassment prevention in the workplace. The reason(s) why neither I nor my employer can make such certification is/are:

_____.

Additionally, I hereby certify that I have received a copy of Schenectady County’s Sexual Harassment Policy.

The undersigned states: (a) I am duly authorized to execute this Certification and (b) I hereby certify, under penalty of perjury, that the forgoing Certification is in all respects true and accurate.

Signature

Printed Name

Title

Date



Introduction:

The County of Schenectady is committed to maintaining a workplace free from sexual harassment. Sexual harassment is a form, of workplace discrimination. All employees are required to work in a manner that prevents sexual harassment in the workplace. This Policy is one component of The County of Schenectady's commitment to a discrimination-free work environment. Sexual harassment is against the law¹ and all employees have a legal right to a workplace free from sexual harassment and employees are urged to report sexual harassment by filing a complaint internally with The County of Schenectady's Human Resources Department. Employees can also file a complaint with a government agency or In court under federal, state or local antidiscrimination laws.

Policy:

1. The County of Schenectady's policy applies to all employees, applicants for employment, interns, whether paid or unpaid, contractors and persons conducting business, regardless of Immigration status, with The County of Schenectady. In the remainder of this document, the term "employees" refers to this collective group.
2. Sexual harassment will not be tolerated. Any employee or individual covered by this policy who engages in sexual harassment or retaliation will be subject to remedial and/or disciplinary action (e.g., counseling, suspension, termination).
3. Retaliation Prohibition: No person covered by this Policy shall be subject to adverse action because the employee reports an incident of sexual harassment, provides information, or otherwise assists in any Investigation of a sexual harassment complaint. The County of Schenectady will not tolerate such retaliation against anyone who, in good faith, reports or provides information about suspected sexual harassment. Any employee of The County of Schenectady who retaliates against anyone Involved in a sexual harassment investigation will be subjected to disciplinary action, up to and including termination. All employees paid or unpaid interns or non-employees working in the workplace who believe they have been subject to such retaliation should inform a supervisor, manager or The County of Schenectady Human Resources Department. All employees paid or unpaid interns or non-employees who believe they have been a target of such retaliation may also seek relief In other available forums, as explained below in the section on Legal Protections. Adoption of this policy does not constitute a conclusive defense to charges of unlawful sexual harassment. Each claim of sexual harassment will be determined in accordance with existing legal standards, with due consideration of the particular facts and circumstances of the claim, including but not limited to the existence of an effective anti-harassment policy and procedure

¹ While this policy specifically addresses sexual harassment, harassment because of and discrimination against persons of all protected classes is prohibited. In New York State, such classes include age, race, creed, color, national origin, military status, sex, disability, marital status, domestic violence victim status, gender identity and criminal history.

² A non-employee is someone who is (or is employed by) a contractor, subcontractor, vendor, consultant, or anyone providing services in the workplace. Protected non-employees include persons commonly referred to as independent contractors, "gig" workers and temporary workers. Also included are persons providing equipment repair, cleaning services or any other services provided pursuant to a contract with the employer.



4. Sexual harassment is offensive, is a violation of our policies, is unlawful, and may subject The County of Schenectady to liability for harm to targets of sexual harassment. Harassers may also be individually subject to liability. Employees of every level, who engage in sexual harassment, including managers and supervisors who engage in sexual harassment or who allow such behavior to continue, will be penalized for such misconduct.
5. The County of Schenectady will conduct a prompt and thorough investigation that ensures due process for all parties, whenever management receives a complaint about sexual harassment, or otherwise knows of possible sexual harassment occurring. The investigation will be performed by the Human Resources Department or County Attorney's Office, at the direction of the County Manager. The County of Schenectady will keep the investigation confidential to the extent possible. Effective corrective action will be taken whenever sexual harassment is found to have occurred. All employees including managers and supervisors are required to cooperate with any internal investigation of sexual harassment.
6. All employees are encouraged to report any harassment or behaviors that violate this policy. The County of Schenectady will provide all employees a complaint form for employees to report harassment and file complaints.
7. Managers and supervisors are **required** to report any complaint that they receive, or any harassment that they observe or become aware of, to The County of Schenectady Human Resources Department.
8. This policy applies to all employees, paid or unpaid interns, and non-employees and all must follow and uphold this policy. This policy must be provided to all employees and should be posted prominently in all work locations to the extent practicable (for example, in a main office, not an offsite work location) and be provided to employees upon hiring.

What Is "Sexual Harassment"?

Sexual harassment is a form of sex discrimination and is unlawful under federal state, and (where applicable) local law. Sexual harassment includes harassment on the basis of sex, sexual orientation, self-identified or perceived sex, gender expression, gender identity and the status of being transgender.

Sexual harassment Includes unwelcome conduct which is either of a sexual nature, or which is directed at an individual because of that individual's sex when:

- Such conduct has the purpose or effect of unreasonably interfering with an individual's work performance or creating an intimidating, hostile or offensive work environment, even if the reporting individual is not the intended target of the sexual harassment.
- Such conduct is made either explicitly or implicitly a term or condition of employment; or
- Submission to or rejection of such conduct is used as the basis for employment decisions affecting an Individual's employment.



A sexually harassing hostile work environment includes, but is not limited to, words, signs, jokes, pranks, intimidation or physical violence which are of a sexual nature, or which are directed at an individual because of that individual's sex. Sexual harassment also consists of any unwanted verbal or physical advances, sexually explicit derogatory statements or sexually discriminatory remarks made by someone which are offensive or objectionable to the recipient, which cause the recipient discomfort or humiliation, which interfere with the recipient's job performance.

Sexual harassment also occurs when a person in authority tries to trade job benefits for sexual favors. This can include hiring, promotion, continued employment or any other terms, conditions or privileges of employment. This is also called "quid pro quo" harassment.

Any employee who feels harassed should report so that any violation of this policy can be corrected promptly. Any harassing conduct, even a single incident, can be addressed under this policy.

Examples of Sexual Harassment

The following describes some of the types of acts that may be unlawful sexual harassment and that are strictly prohibited:

- ☐ Physical acts of a sexual nature, such as:
 - Touching, pinching, patting, kissing, hugging, grabbing, brushing against another employee's body or poking another employee's body;
 - Rape, sexual battery, molestation or attempts to commit these assaults.
- ☐ Unwanted sexual advances or propositions, such as:
 - Requests for sexual favors accompanied by implied or overt threats concerning the target's job performance evaluation, a promotion or other Job benefits or detriments
 - Subtle or obvious pressure for unwelcome sexual activities.
- ☐ Sexually oriented gestures, noises, remarks or jokes, or comments about a person's sexuality or sexual experience, which create a hostile work environment.
- ☐ Sex stereotyping occurs when conduct or personality traits are considered inappropriate simply because they may not conform to other people's ideas or perceptions about how individuals of a particular sex should act or look.
- ☐ Sexual or discriminatory displays or publications anywhere in the workplace, such as:
 - Displaying pictures, posters, calendars, graffiti, objects, promotional material, reading materials or other materials that are sexually



demeaning or pornographic. This includes such sexual displays on workplace computers or cell phones and sharing such displays while in the workplace.

- ☐ Hostile actions taken against an individual because of that individual's sex, sexual orientation, gender identity and the status of being transgender such as:
 - Interfering with, destroying or damaging a person's workstation, tools or equipment or otherwise interfering with the individual's ability to perform the job;
 - Sabotaging an individual's work;
 - Bullying, yelling, name-calling.

Who can be a target of sexual harassment?

Sexual harassment can occur between any Individuals, regardless of their sex or gender. New York Law protects employees, paid or unpaid interns, and non-employees, including independent contractors, and those employed by companies contracting to provide services in the workplace. Harassers can be a superior, a subordinate, a coworker or anyone in the workplace Including an independent contractor, contract worker, vendor, client, customer or visitor.

Where can sexual harassment occur?

Unlawful sexual harassment is not limited to the physical workplace itself. It can occur while employees are traveling for business or at employer sponsored events or parties. Calls, texts, emails, and social media usage by employees can constitute unlawful workplace harassment, even if they occur away from the workplace premises, on personal devices or during non-work hours.

Retaliation

Unlawful retaliation can be any action that could discourage a worker from coming forward to make or support a sexual harassment claim. Adverse action need not be job-related or occur in the workplace to constitute unlawful retaliation (e.g., threats of physical violence outside of work hours).

Such retaliation is unlawful under federal, state, and (where applicable) local law. The New York State Human Rights Law protects any individual who has engaged in "protected activity." Protected activity occurs when a person has:

- ☐ made a complaint of sexual harassment, either internally or with any anti-discrimination agency;
- ☐ testified or assisted in a proceeding Involving sexual harassment under the Human Rights Law or other anti-discrimination law;



- ☐ opposed sexual harassment by making a verbal or informal complaint to management, or by simply informing a supervisor or manager of harassment;
- ☐ reported that another employee has been sexually harassed; or
- ☐ encouraged a fellow employee to report harassment.

Even if the alleged harassment does not turn out to rise to the level of a violation of law, the Individual is protected from retaliation if the person had a good faith belief that the practices were unlawful.

However, the retaliation provision is not intended to protect persons making intentionally false charges of harassment.

Reporting Sexual Harassment

Preventing sexual harassment is everyone's responsibility. The County of Schenectady cannot prevent or remedy sexual harassment unless it knows about it. Any employee, paid or unpaid intern or non-employee who has been subjected to behavior that may constitute sexual harassment is encouraged to report such behavior to a supervisor, manager or The County of Schenectady Human Resources Department. Anyone who witnesses or becomes aware of potential instances of sexual harassment should report such behavior to a supervisor, manager or The County of Schenectady Human Resources Department.

Reports of sexual harassment may be made verbally or in writing. A form for submission of a written complaint is attached to this Policy, and all employees are encouraged to use this complaint form.

Employees who are reporting sexual harassment on behalf of other employees should use the complaint form and note that it is on another employee's behalf.

Employees, paid or unpaid interns or non-employees who believe they have been a target of sexual harassment may also seek assistance in other available forums, as explained below in the section on Legal Protections.

Supervisory Responsibilities

All supervisors and managers who receive a complaint or information about suspected sexual harassment, observe what may be sexually harassing behavior or for any reason suspect that sexual harassment is occurring, **are required** to report such suspected sexual harassment to The County of Schenectady Human Resources Department.

In addition to being subject to discipline if they engaged in sexually harassing conduct themselves, supervisors and managers will be subject to discipline for failing to report suspected sexual harassment or otherwise knowingly allowing sexual harassment to continue.

Supervisors and managers will also be subject to discipline for engaging in any retaliation.



Complaint and Investigation of Sexual Harassment

All complaints or information about sexual harassment will be investigated, whether that information was reported In verbal or written form. Investigations will be conducted in a timely manner and will be confidential to the extent possible. The investigations will be performed by The County of Schenectady Human Resources Department of County Attorney's Office, at the direction of the County Manager.

An investigation of any complaint, information or knowledge of suspected sexual harassment will be prompt and thorough, commenced immediately and completed as soon as possible. The investigation will be kept confidential to the extent possible. All persons Involved, including complainants' witnesses and alleged harassers will be accorded due process, as outlined below, to protect their rights to a fair and impartial Investigation.

Any employee may be required to cooperate as needed In an investigation of suspected sexual harassment The County of Schenectady will not tolerate retaliation against employees who file complaints, support another's complaint or participate in an investigation regarding a violation of this policy.

While the process may vary from case to case, investigations should be done In accordance with the following steps:

- Upon receipt of complaint, The County of Schenectady Human Resources Department will immediately forward a copy of the complaint to the Director of Human Resources, County Attorney and County Manager. An immediatereview of the allegationswillbe taken, and the County Manager willtakeanyinterim actionsnecessary (e.g., instructing therespondent to refrain from communications with the complainant) If the complaint is verbal, the Human Resources Department will encourage the individual to complete the "Complaint Form·in writing. If he orsherefuses, theHumanResources Department willpreparea Complaint Form basedon theverbal reporting.
- ☐ If documents, emailsorphonerecordsarerelevantto theinvestigation, take stepsto obtain andpreserve them.
- ☐ Request andreview all relevant documents, Including allelectronic communications.
- ☐ Interview allparties involved, includinganyrelevant witnesses;
- ☐ Create a writtendocumentationof theinvestigation(suchasa letter, memoor email), which contains thefollowing:
 - Alist of alldocuments reviewed, alongwitha detailedsummaryof relevant documents;



- ☐ A list of names of those interviewed, along with a detailed summary of their statements;
 - ☐ A timeline of events;
 - ☐ A summary of prior relevant incidents, reported or unreported; and
 - ☐ The basis for the decision and final resolution of the complaint, together with any corrective action(s).
- ☐ Keep the written documentation and associated documents in a secure and confidential location.
- ☐ The investigating entity, either the Human Resources Department, or County Attorney's Office will provide a memorandum to the County Manager outlining the investigation and making a recommendation. The County Manager will make the final determination on the complaint.
- ☐ Promptly notify the individual who reported and the individual(s) about whom the complaint was made of the final determination and implement any corrective actions identified in the written document, to the extent allowed by law.
- ☐ Inform the individual who reported of the right to file a complaint or charge externally as outlined in the next section.

Legal Protections And External Remedies

Sexual harassment is not only prohibited by The County of Schenectady but is also prohibited by state, federal and, where applicable, local law.

Aside from the internal process at The County of Schenectady, employees may also choose to pursue legal remedies with the following governmental entities. While a private attorney is not required to file a complaint with a governmental agency, you may seek the legal advice of an attorney.

In addition to those outlined below, employees in certain industries may have additional legal protections.

State Human Rights Law (HRL)

The Human Rights Law (HRL), codified as N.Y. Executive Law, art. 15, § 290 et seq., applies to all employers in New York State with regard to sexual harassment, and protects employees, paid or unpaid interns and non-employees, regardless of immigration status. A complaint alleging violation of the Human Rights Law may be filed either with the Division of Human Rights (DHR) or in New York State Supreme Court.

Complaints with OHR may be filed any time **within one year** of the harassment. If an individual did



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not file at OHR, they can sue directly in state court under the HRL, **within three years** of the alleged sexual harassment. An individual may not file with DHR if they have already filed a HRL complaint in state court.

Complaining internally to The County of Schenectady does not extend your time to file with OHR or in court. The one year or three years is counted from date of the most recent incident of harassment. You do not need an attorney to file a complaint with DHR, and there is *no* cost to file with DHR.

DHR will investigate your complaint and determine whether there is probable cause to believe that sexual harassment has occurred. Probable cause cases are forwarded to a public hearing before an administrative law judge. If sexual harassment is found after a hearing, DHR has the power to award relief, which varies but may include requiring your employer to take action to stop the harassment, or redress the damage caused, including paying of monetary damages, attorney's fees and civil fines.

DHR's main office contact information is: NYS Division of Human Rights, One Fordham Plaza, Fourth Floor, Bronx, New York 10458. You may call (718) 741-8400 or visit: www.dhr.ny.gov.

Contact DHR at (888) 392-3644 or visit dhr.ny.gov/complaint for more information about filing a complaint. The website has a complaint form that can be downloaded, filled out, notarized and mailed to OHR. The website also contains contact information for DHR's regional offices across New York State.

Civil Rights Act of 1964

The United States Equal Employment Opportunity Commission (EEOC) enforces federal anti-discrimination laws, including Title VII of the 1964 federal Civil Rights Act {codified as 42 U.S.C. § 2000e et seq.}. An individual can file a complaint with the EEOC anytime within 300 days from the harassment. There is no cost to file a complaint with the EEOC. The EEOC will investigate the complaint, and determine whether there is reasonable cause to believe that discrimination has occurred, at which point the EEOC will issue a Right to Sue letter permitting the individual to file a complaint in federal court.

The EEOC does not hold hearings or award relief, but may take other action including pursuing cases in federal court on behalf of complaining parties. Federal courts may award remedies if discrimination is found to have occurred. In general, private employers must have at least 15 employees to come within the jurisdiction of the EEOC.

An employee alleging discrimination at work can file a "charge of Discrimination." The EEOC has district, area, and field offices where complaints can be filed. Contact the EEOC by calling 1-800-669-4000 {TTY: 1-800-669-6820}, visiting their website at www.eeoc.gov or via email at info@eeoc.gov.

If an individual filed an administrative complaint with OHR, OHR will file the complaint with the EEOC to preserve the right to proceed in federal court.

Local Protections



Many localities enforce laws protecting individuals from sexual harassment and discrimination. An individual should contact the county, city or town in which they live to find out if such a law exists. For example, employees who work in New York City may file complaints of sexual harassment with the

New York City Commission on Human Rights. Contact their main office at Law Enforcement Bureau of the NYC Commission on Human Rights, 40 Rector Street, 10th Floor, New York, New York; call 311 or (212) 306-7450; or visit www.nyc.gov/html/cchr/html/home/home.shtml.

Contact the Local Police Department

If the harassment involves unwanted physical touching, coerced physical confinement or coerced sex acts, the conduct may constitute a crime. Contact the local police department.

Sexual harassment is against the law.

All employees have a legal right to a workplace free from sexual harassment, and The County of Schenectady is committed to maintaining a workplace free from sexual harassment.

Per New York State Law, The County of Schenectady has a sexual harassment prevention policy in place that protects you. This policy applies to all employees, paid or unpaid interns and non-employees in our workplace, regardless of immigration status.

If you believe you have been subjected to or witnessed sexual harassment, you are encouraged to report the harassment to a supervisor, manager or The County of Schenectady Human Resources Department so we can take action.

Our complete policy and Complaint Form may be found:

On the County's Intranet website under Policies and Procedures Manual



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If you have questions and to make a complaint, please contact:

The County of Schenectady Human Resources Department
620 State
Street
Second Floor
Schenectady,
NY 12305

(518)388-4233

For more information and additional resources, please visit:

**www.ny.gov/programs/combating-sexual-harassment-workplace County of
Schenectady**

New York State Labor Law requires all employers to adopt a sexual harassment prevention policy that includes a complaint form to report alleged incidents of sexual harassment.

If you believe that you have been subjected to sexual harassment, you are encouraged to complete this form and submit it to The County of Schenectady Human Resources Department. You will not be retaliated against for filing a complaint.

If you are more comfortable reporting verbally or in another manner, your employer should complete this form, provide you with a copy and follow its sexual harassment prevention policy by investigating the claims as outlined at the end of this form.

For additional resources, visit: ny.gov/programs/combating-sexual-harassment-workplace



Model Complaint Form for Reporting Sexual Harassment



Combating
Sexual Harassment

COMPLAINANT INFORMATION

Name: _____

Work Address: _____

Work Phone: _____

Job Title: _____

Email: _____

Select Preferred Communication Method
In person

☐ Email

☐ Phone

☐

SUPERVISORY INFORMATION

Immediate Supervisor's Name: _____

Title: _____

Work Phone: _____ Work

Address: _____

Adoption of this form does not constitute a conclusive defense to charges of unlawful sexual harassment. Each claim of sexual harassment will be determined in accordance with existing legal standards, with due consideration of the particular facts and circumstances of the claim, including but not limited to the existence of an effective anti-harassment policy and procedure.



COMPLAINT INFORMATION

1. Your complaint of Sexual Harassment is made about:

Name: _____

Title: _____

Work Address: _____

Work Phone: _____

Relationship to you: ☐ Supervisor ☐ Subordinate ☐ Co-Worker ☐
Other

2. Please describe what happened and how it is affecting you and your work. Please use additional sheets of paper if necessary and attach any relevant documents or evidence.
3. Date(s) sexual harassment occurred: _____
4. Please list the name and contact information of any witnesses or individuals who may have information related to your complaint.



Instructions for Employers

If you receive a complaint about alleged sexual harassment, follow your sexual harassment prevention policy.

An investigation involves:

- Speaking with the employee
- Speaking with the alleged harasser
- Interviewing witnesses
- Collecting and reviewing any related documents

While the process may vary from case to case, all allegations should be investigated promptly and resolved as quickly as possible. The investigation should be kept confidential to the extent possible.

Document the findings of the investigation and basis for your decision along with any corrective action taken and notify the employee and the individual(s) against whom the complaint was made. This may be done via email.



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Subcontractors Listing

Company Name/Stamp_____

Subcontractor's List

This form must accompany Bid Form

In the space provided below the Bidder shall list any and all Subcontractors planned for work on this project. Any change in these contractors shall be made known, in writing, to the Schenectady County Office of Facilities before work is started. **If no subcontractors are planned, please write "NONE" in space below.**

Name of Company	Address	Telephone Number



BIDDER'S QUALIFICATIONS

The undersigned guarantees the accuracy of all statements and answers herein contained. (Please print in ink).

1. How many years has your firm been in business as a Contractor?_____ Years.
2. List up to three (3) projects of this nature that you have completed in the last three (3) years and give the name, address and telephone number of a reference from each. Also, give the completion date, the original contract bid price and the completed cost of each project listed.

3. List projects presently under construction by your firm, the dollar volume of the contract and the percentage completion of the contract.

4. Have you ever failed to complete work awarded to you? If so, state where and why.

5. Do you plan to sublet any part of this work? If so, give details.

6. What equipment do you own that is available for this work?



Schenectady County Request for Bid
SUNY SCCC ELSTON HALL – LOBBY AND MOHAWK ROOM RENOVATION
RFB-2024-20

Bidder's Qualifications

Company Name/Stamp_____

7. What equipment do you plan to rent or purchase for this work?

8. Have you ever performed work under the direction of a Professional Engineer or registered Architect? If so, list up to three (3) such firms giving the name of the firm, its address, telephone number and the name of the project. (List most recent projects).

9. Give the name, address and telephone number of an individual who represents each of the following and whom the Owner may contact to investigate your financial responsibility; a surety, a bank and a major material supplier.

10. Give a summary of your financial statement. List assets and liabilities; use an insert sheet, if needed. Only three (3) lowest bidders shall submit this information to the Owner within forty-eight (48) hours of the opening of the Bids.



Schenectady County Request for Bid
SUNY SCCC ELSTON HALL – LOBBY AND MOHAWK ROOM RENOVATION
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Bidder's Qualifications

Company Name/Stamp_____

11. State the true, exact, correct and complete name of the partnership, corporation or trade name under which you do business and the address of the place of business. (If a corporation, state the name of all partners. If a trade name, state the names of the individuals who do business under the trade name). It is absolutely necessary that this information be furnished.

CORPORATION NAME OF BIDDER

- a. The business is a _____
- b. The address of the principal place of business is:
- _____
- _____
- _____
- c. The names of the corporate officers, or partners, or individuals doing business under a trade name, are as follows:

Signature



Schenectady County Request for Bid
SUNY SCCC ELSTON HALL – LOBBY AND MOHAWK ROOM RENOVATION
RFB-2024-20
APPRENTICESHIP CERTIFICATION

Schenectady County Contracts
This form is required for all public works/service contracts over \$200,000.

I _____ do hereby certify that I am authorized to sign a contract on behalf of _____ and that we currently have a New York State Certified Apprenticeship program. As the prime contractor for the public works contract entitled _____ we also certify that the listing below constitutes all the subcontractors we have hired for work on this public works contract. Each of the subcontractors listed below attests that they currently have a New York State Certified Apprenticeship program.

Prime Contractor _____ Date _____
Signature

<u>Subcontractor Name</u>	<u>Address</u>	<u>Telephone Number</u>

Signature _____	Date _____	Title _____

Signature _____	Date _____	Title _____

Signature _____	Date _____	Title _____

Signature _____	Date _____	Title _____



MINORITY AND WOMEN-OWNED BUSINESS UTILIZATION

It is the policy of Schenectady County that Minority Business Enterprises (MBE) and Women Business Enterprises (WBE) are afforded maximum opportunities to participate in the performance of contracts let by the County and its agencies. The Schenectady County Equal Employment Opportunity and Affirmative Action Plan is dedicated to ensuring that MBE and WBE qualifications are considered in awarding County contracts for public works and construction. It is the policy of Schenectady County that contractors and subcontractors utilize minority and female labor in performance of County public works contracts, to the extent possible, as set forth herein.

Bid Specification Levels and Requirements

Bid specifications prepared by the Schenectady County Purchasing Department for construction contracts in excess of \$100,000 will be subject to Affirmative Action performance targets.

Some federally-assisted and/or state-assisted County projects may include workforce participation goals for minorities and females that differ from the County goals above. In such cases Schenectady County will strive to reach the higher of the workforce participation goals.

Funding for this project is provided by:

☒ County ☒ State ☐ Federal

Please see attachment for further participation goals.

Bid specifications prepared by the Schenectady County Purchasing Department in excess of \$200,000 also carry a requirement for utilization of apprenticeship programs as set forth in County Resolution. The County encourages bidders to facilitate the participation of minority and female workforces in apprenticeship programs. Bid specifications requiring apprenticeship requirements will be designated as such in the bid.

For plan purposes, state certified MBEs and WBEs are defined as those certified as such by the New York State Empire Development Agency (ESD).



Vendor Compliance

Schenectady County will monitor vendor compliance with the Plan via monitoring provisions such as:

- Regular submission of employment and payroll reports
- MBE and WBE participation forms
- Subcontract utilization and participation reports

The County MBE and WBE goals will be included in all County construction contracts greater than \$100,000. Contract solicitations will specify that the successful bidder is required to submit MBE and WBE participation information and that as a condition of receiving the contract the bidder must meet the County MBE and WBE goals or demonstrate to the County that it made good faith efforts to do so.

In the event that a successful bidder is a state-certified MBE or WBE it is deemed that the appropriate minority (for MBEs) or female (for WBEs) project participation goal has been met. If the successful bidder is not a state-certified MBE or WBE then the bidder shall provide the County the following information regarding MBE and WBE participation in the project:

- Name and address of each participating MBE and WBE
- Description of the work to be performed by each MBE and WBE firm
- Contracted dollar value of the work to be performed by each MBE and WBE firm

MBE and WBE participation information will be required prior to committing the County to award the contract to the apparent successful bidder.

If the contracted goals are not met the bidder must demonstrate to the County that it made good faith efforts to meet the County goals. These efforts may include:

- Whether the bidder contacted the County Affirmative Action Manager regarding certified MBE and WBE firms
- Whether the bidder advertised subcontracting opportunities in general circulation, trade association, or minority-focused media
- Whether the bidder provided written notice to MBE and WBE firms soliciting these firms' interest in participation prior to contract implementation
- Whether the bidder provided interested MBEs and WBEs with adequate information about the plans, specifications, and requirements of the contract
- Whether the bidder negotiated in good faith with interested MBE and WBE firms
- Whether the bidder engaged in community outreach with local organizations in a position to recruit and provide assistance to MBE and WBE firms

Successful bidders will be required to submit subcontractor utilization and participation reports and employment and payroll reports to the County on a regular basis. The County may also engage in other activities it deems appropriate to ensure bidder compliance with respect to meeting targeted MBE and WBE goals. For example, the County may utilize desk audits, on-site reviews, and/or subcontractor interviews.



Schenectady County Request for Bid
SUNY SCCC ELSTON HALL – LOBBY AND MOHAWK ROOM RENOVATION
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MINORITY AND WOMEN OWNED BUSINESS UTILIZATION

Should the County find that successful bidders have not complied with County MBE and WBE requirements, including failure to make a good faith effort at meeting these requirements, the bidder will be promptly notified that it has been found noncompliant with details of the noncompliance made available. In such cases, the County reserves the right to take actions to remedy the situation that may include withholding of future contract payments, disqualification from future contracting opportunities, or cancellation of the contract and declaration of forfeiture of any performance bond.

Waivers

In certain instances, it may be impossible or impracticable for a bidder to comply with County MBE and WBE requirements. In such cases a successful bidder may submit a MBE/WBE Waiver Request to the County Purchasing Agent asking to be released from County MBE and WBE requirements.

Included are the goals related to the Schenectady County the project, instructions and reporting requirements are also included:

Affirmative Action performance targets for County Funded Projects are:

- 5% of the dollar value of the contract will be awarded to state-certified MBEs
- 5% of the workforce participation on the project will be minority
- 5% of the dollar value of the contract will be awarded to state-certified WBEs
- 5% of the workforce participation on the project will be female

Schenectady County Request for Bid
SUNY SCCC ELSTON HALL – LOBBY AND MOHAWK ROOM RENOVATION
RFB-2024-20
MINORITY AND WOMEN OWNED BUSINESS UTILIZATION

FORM A1

Schenectady County Workforce Utilization Report

Compliance with minority group employment levels shall mean hiring and maintaining a minimum of 5% minority workforce on County construction projects; and compliance with women group employment levels shall mean hiring and maintaining a minimum of 5% female workforce on County construction projects. Failure to include MWBE Participation Report will render the entire proposal not reasonably susceptible of being selected for award and cause the County to withhold further consideration.

Prime Contractor:	Contact Person:
Sub Contractor:	Contact Person:
Address:	E-Mail:
City/State/Zip	
Telephone:	Fax Number:
Project Name:	
Contract #:	Contract Name:
Contact Person:	E-mail:
Report Date:	

***Workforce to be utilized on the approved contract

Trade or Job Category	Overall Totals (Sum of A thru E)		White (A) Not of Hispanic Origin		Black (B) Not of Hispanic Origin		Hispanic (C)		Asian (D) Pacific Islander		Amer. Indian or (E) Alaskan Native	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Executive/Senior Level Officials and Managers												
First/Mid Level Officials and Managers												
Professionals												
Technicians												
Workers:												
Administrative Support Workers												
Craft Workers												
Operators												
Laborers and Helpers												
Service Workers												
Total												

I certify that the information submitted on this report is in fact true and correct to the best of my knowledge.

Information Provided By:	Signature:	Title:	Date:

PRIME CONTRACTOR PROJECT DETAIL
Workforce Utilization Report

COMPANY NAME:							PROJECT #		
ADDRESS:					TOTAL DOLLAR AMOUNT AWARDED TO YOUR FIRM				
EMAIL ADDRESS:					PHONE:			FAX:	
PROJECT NAME:	Contract #:				CERTIFICATION STATUS	MBE			
	Contact Name:					WBE			

DESCRIPTION OF THE SCOPE OF SERVICES AND/OR TYPE OF MATERIALS TO BE SUPPLIED BY MWBE FIRM ON THIS PROJECT							
M/WBE Firm(s) Participating on the Project (Name, Address, Phone)	(Name,	Date	Amount	Description of Work	Anticipated Start Date	End Date	% of Contract

I _____, representative of _____ declare that the information provided is true and represents accurately my firm's efforts to comply with the Affirmative Action Policy. We shall continue to make every effort to ensure that M/WBE firms have the maximum opportunity to compete for, and perform contracts let by the County of Schenectady.

I certify that the information submitted in this report is in fact true and correct to the best of my knowledge.			
SIGNATURE		TITLE	DATE

Monthly Workforce Utilization Report												
This report must be completed by each firm working on the site and submitted on a monthly basis. Report all permanent full-time or part-time employees, including apprentice and on-the-job trainees for this project. Attach copies of your firms monthly certified payroll reports. The General Contractor forwards all reports to the County of Schenectady, Affirmative Action Office, 620 State Street, 2nd Floor, Schenectady, NY 12305. Fax (518)388-4235. For assistance call 518-388-4233xt 4171 or 4168												
Prime Contractor:						Contact Person:						
Address:												
City/State/Zip						E-Mail:						
Telephone:						Fax Number:						
Federal ID No:												
Project Name:												
Contract #:						Contract Name:						
Contact Person:						E-mail:						
***Workforce to be utilized on the approved contract												
Trade or Job Category	Overall Totals (Sum of A thru E)		White (A) Not of Hispanic Origin		Black (B) Not of Hispanic Origin		Hispanic (C)		Asian (D) Pacific Islander		Amer. Indian or (E) Alaskan Native	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Total	0	0	0	0	0	0	0	0	0	0	0	0
I certify that the information submitted on this report is in fact true and correct to the best of my knowledge.												
Information Provided By:			Signature:			Title:			Date:			

Monthly Workforce Utilization Report

This report must be completed by each firm working on the site and submitted to the General Contractor on a monthly basis. Report all permanent full-time or part-time employees, including apprentice and on-the-job trainees for this project. Attach copies of your firms monthly certified payroll reports. The General Contractor forwards all reports to the County of Schenectady, Affirmative Action Office, 620 State Street, 2nd Floor, Schenectady, NY 12305. Fax (518)388-4235. For assistance call 518-388-4233xt 4171 or 4168

Prime Contractor:						Contact Person:				
Address:						E-Mail:				
City/State/Zip										
Telephone:						Fax Number:				
Project Name:						Project Number:				
Sub-Contractor's Name:						Contact Person:				
Sub-Contractor's Federal ID No:						E-mail:				
Address:						Please Check:	MBE		WBE	
City/State/Zip										
***Workforce to be utilized on the approved contract						Report Date:				

[illegible]

I certify that the information submitted on this report is in fact true and correct to the best of my knowledge.									

Information Provided By:	Signature:	Title:	Date:

MWBE SUBCONTRACTOR PROJECT DETAIL REPORT

Workforce Utilization Report

COMPANY NAME:						PROJECT #	
ADDRESS:				TOTAL DOLLAR AMOUNT AWARDED TO YOUR FIRM			
EMAIL ADDRESS:				PHONE:		FAX:	
PROJECT NAME:		Contract #:				CERTIFICATION STATUS	
		Contact Name:				MBE	
						WBE	
DESCRIPTION OF THE SCOPE OF SERVICES AND/OR TYPE OF MATERIALS TO BE SUPPLIED BY MWBE FIRM ON THIS PROJECT							
M/WBE Firm(s) Participating on the Project		Payments made this Month			Payments made to Date		% of Contract
I certify that the information submitted in this report is in fact true and correct to the best of my knowledge.							
SIGNATURE				TITLE		DATE	

										FORM C2		
MWBE SUBCONTRACTOR PROJECT DETAIL REPORT Workforce Utilization Report												
COMPANY NAME:										PROJECT #		
ADDRESS:								TOTAL DOLLAR AMOUNT AWARDED TO YOUR FIRM				
EMAIL ADDRESS:								PHONE:		FAX:		
PROJECT NAME:				Contract #:				CERTIFICATION STATUS		MBE		
				Contact Name:						WBE		
DESCRIPTION OF THE SCOPE OF SERVICES AND/OR TYPE OF MATERIALS TO BE SUPPLIED BY MWBE FIRM ON THIS PROJECT												
EST. START DATE												
EST. COMPLETION DATE												
AMOUNT OF CONTRACT												
% OF BID												
I certify that the information submitted in this report is in fact true and correct to the best of my knowledge.												
SIGNATURE						TITLE		DATE				



Schenectady County Request for Bid
SUNY SCCC ELSTON HALL – LOBBY AND MOHAWK ROOM RENOVATION
RFB-2024-20
Prevailing Wage

PREVAILING WAGE

The County has applied for and been granted PRC#2024000536

PRC#: 2024000536		Acceptance Status: Accepted Article 8	
Type of Contracting Agency: County			
Contracting Agency		Send Reply To	
Schenectady County Thomas Bellick Purchasing Agent 620 State St SCHENECTADY NY 12305 (518) 388-4240 purchasing@schenectadycountyny.gov		Erin Reich Assistant Facilities Director 612 State St Schenectady NY 12305 (518) 388 -4566 erin.reich@schenectadycountyny.gov	
Project Information			
Project Title SUNY SCCC Elston Hall Lobby			
Description of Work Renovation of the Elston Lobby, Van Curler, and Mohawk Room. Complete refresh of flooring, ceiling, lights, paint, and renovated demo work to restore and reconfigure the spaces.			
Contract Id No. RFB-2024-20			
Project Location(s) SCCC			
Route No / Street Address 78 Washington Ave			
Village / City SCHENECTADY			
Town SCHENECTADY			
State / Zip NY 12305			
Nature of Project Other Reconstruction, Maintenance, Repair or Alteration			
Approximate Bid Date 03/31/2024			
Checked Occupation(s) Construction (Building, Heavy & Highway, Sewer, Water, Tunnel)			
Applicable Counties			
Schenectady			



SECTION 01 01 00

SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

- A. Project Identification: SUNY SCCC Elston Hall - Lobby and Mohawk Room Renovation
1. Project Location: SUNY SCCC Elston Hall Building at 78 Washington Avenue, *Schenectady, NY 12305*.
- B. Project Contact's
1. Owner's Representative:

Stephen Luciano, Director of Facilities
Erin Reich, Facilities Engineer
Robert Lewis, Project Manager
Jill Roark, Assistant Project Manager

Schenectady County Office of Facilities
612 State Street
Schenectady, NY 12305

stephen.luciano@schenectadycountyny.gov
erin.reich@schenectadycountyny.gov
robert.lewis@schenectadycountyny.gov
Jill.roark@schenectadycountyny.gov
- C. Type of Contract:
1. Project will contain Three prime contracts:
- D. Summary of Work:
1. **Contract No. 1:** General Contractor (GC)-Renovation of Elston Hall Lobby and Security Office space. Add alternate #1 includes renovation to the Mohawk room. See all bid documents for complete scope of work.
 2. **Contract No. 2:** Mechanical (MC) New work for the Lobby Office and Mohawk room spaces as required. This contract includes all HVAC and plumbing systems. See all bid documents for complete scope of work.
 3. **Contract No. 3:** Electrical (EC) support for the building scope areas as required. This contract includes all power, lighting, and fire alarm. See all bid documents for complete scope of work.
- E. Project Conditions:



Schenectady County Request for Bid
SUNY SCCC ELSTON HALL – LOBBY AND MOHAWK ROOM RENOVATION
RFB-2024-20
Specifications

1. Bidders shall make themselves fully familiar with the nature and location of work. They may tour the Facility by contacting the Engineer and arranging access to the buildings. The bid advertisement may designate a time and date for contractor examination of the workspace.
2. Owner will occupy portions of the building throughout construction. Conduct all work, removals, and/or demolition as to not disrupt day to day operations as much as possible.

F. The Work consists of the following:

1. The work of the proposed Contract shall comprise the furnishing of all labor, materials, equipment, and incidentals as necessary to complete ALL the work specified herein and shown on the Contract Drawings. References to codes, specifications and standards called for in the specification sections and on the drawings mean, the latest edition, amendment, and revision of such referenced standard in effect on the date of these contract documents. All materials and equipment shall be installed in accordance with the manufacturer's recommendations.
2. Contractors will be required to prepare, submit, and actively implement a proper safety program throughout the duration of the project. Provide all necessary safety equipment for his own work at all individual locations as may be applicable.
3. Contractors to provide all submittals, drawings, coordination drawings, and samples as required.
4. Contractors to provide all necessary permits, inspections, approvals, testing, and pay all required fees to complete this scope of work.
5. Existing Facility will be in full operation during the progression of this project.
6. Contractors to provide temporary toilet facilities at general locations throughout the project site as to provide convenience and accessibility to all craft and for the use of all bid packages.
7. Contractors to provide all dumpsters for all work. Contractor is responsible for the provision of containers and the removal of all waste, non-returned surplus materials, and rubbish from the site. Each subcontractor shall be responsible for collecting, sorting, and depositing in designated areas, their waste, non-returned surplus materials, and rubbish.
8. Contractor is expected to review all the plans and specifications as it may affect their work and/or trade jurisdiction and to include in their proposal all costs necessary to make connections with or coordinate with those requirements whether expressly stated therein or implied. This is to include but not be limited to tie-ins to existing construction, etc.
9. Contractors to comply with ASSE A10.6 and NFPA 241 for all demolition and removals required as set forth in the project drawings.
10. Contractor shall restore all lawn, sidewalks, blacktop, concrete, curbs, and planting areas disrupted in the performance of work.
11. Daily cleaning as directed by the Owner's representative will be a mandatory requirement.
12. Contractor to provide protection, repair all damage, and final cleaning of all work of this scope as laid out in the project documents until owner acceptance.
13. Contractors shall clean up their own debris daily and remove it from the site each Friday as a minimum.
14. Broom clean paved surfaces: rake clean other surfaces and grounds.
15. Clean all floors, walls, glass, and finish surfaces at construction areas. All areas shall be vacuum cleaned and dust free. Equipment and furniture shall be free of construction dust and stains.



Schenectady County Request for Bid
SUNY SCCC ELSTON HALL – LOBBY AND MOHAWK ROOM RENOVATION
RFB-2024-20
Specifications

END OF SECTION 01 01 00



SECTION 01 02 00

ALLOWANCES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements governing allowances.
 - 1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.
- B. Types of allowances include the following:
 - 1. Contingency allowances.
 - 2. Lump – sum allowances.
 - Fixed amount for lighting fixtures

1.3 INFORMATIONAL SUBMITTALS

- A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.
- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.4 CONTINGENCY ALLOWANCES

- A. Use the contingency allowance only as directed by Architect for Owner's purposes and only by allowance disbursement form that indicate amounts to be charged to the allowance.



- B. First two paragraphs below provide an equitable way to reimburse Contractor for unknown costs associated with contingency allowances. Retain first paragraph because contingency allowances differ from lump-sum and unit-cost allowances. Contractor does not know what Owner will use contingency allowances for when preparing the bid. See Evaluations.
- C. Contractor's overhead, profit, and related costs for products and equipment provided under the allowance shall be included in the Contract Price but not in the allowance, which is stipulated in the General and Supplementary Conditions – Office of Facilities V2017.1.
- D. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

1.5 LUMP-SUM ALLOWANCES

- A. Use the Lump-sum allowance only as directed by Architect for Owner's purposes and only by allowance disbursement form that indicate amounts to be charged to the allowance.
- B. First two paragraphs below provide an equitable way to reimburse Contractor for unknown costs associated with lump-sum allowances. Retain first paragraph because lump-sum allowances differ from contingency and unit-cost allowances. Contractor does not know what Owner will use this allowance for when preparing the bid. See Evaluations.
- C. Contractor's overhead, profit, and related costs for products and equipment provided under the allowance shall be included in the Contract Price but not in the allowance, which is stipulated in the General and Supplementary Conditions – Office of Facilities V2017.1.
- D. At Project closeout, credit unused amounts remaining in the lump-sum allowance to Owner by Change Order.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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



3.3 SCHEDULE OF ALLOWANCES

A. Include the following allowances within the base bid:

1. Contract #1 (GC).....\$20,000
2. Contract #2 (MC).....\$2,000
3. Contract #3 (EC)\$7,500 + \$45,000 (F20) (F20A) Fixtures allowance

B. Include the following allowances within the Add Alternate #1 bid:

1. Contract #1 (GC).....\$5,000
2. Contract #2 (MC).....\$1,000
3. Contract #3 (EC)\$5,000 + \$10,000 (F12) Fixture allowance

SECTION 01 15 00

MASTER PROJECT SCHEDULE

On site Walkthrough:	Thursday, May 16 th , 2024 at 10:00am.
Submission of bid questions:	On or before Thursday, May 30 th , 2024 at 2:00pm.
Bid Due/Opening:	Wednesday, June 5 th at 2:00 PM, 2024 Schenectady Office Building 620 State Street, 2 nd Floor.
Notice to Proceed:	Friday, June 28 th , 2024
Production of shop drawings:	3 weeks
Review of Shop drawings:	3 weeks
Total project Renovation work:	Based on Alternates accepted.
Substantial Completion:	Based on Alternates accepted.
Punch List Completion:	(Date TBD) Prior to Substantial Completion of each Contract

END OF PROJECT MASTER SCHEDULE 01 15 00

SECTION 01 22 00
UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for unit prices.

1.3 DEFINITIONS

- A. Unit price is an amount incorporated in the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- D. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

- A. Additional work (see contract documents) as approved by owner, for existing stone terrazzo floor and base cleaning, stripping, and resealing. Price per square foot.

END OF SECTION 01 22 00

ALTERNATES

SECTION 01 23 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
 - 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

Add Alternate #1(GC) – Mohawk Room Work

Remove, and repair existing finishes at walls and doors. Prep and Clean existing floor and provide new sealer. Provide new stair finish with wall panel trim as detailed in the contracted drawings. This alternate includes a new skim coat plaster ceiling. New lighting systems by electrical contractor. See all associated contract documents for full and detailed scope of work.

Add Alternate #1(MC) – Mohawk Room Work

Remove existing floor grills. Clean and prepare existing floor duct opening. Provide and install new floor registers sized to fit existing floor openings (V.I.F.) See all associated contract documents for full and detailed scope of work.

Add Alternate #1(EC) – Mohawk Room Work

Remove, and replace existing lighting as detailed on the documents. This alternate includes a new lighting allowance for fixture type F12. Provide new room power and switching. See all associated contract documents for full and detailed scope of work.

END OF SECTION 01 23 00

SECTION 01 25 00

SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.

1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
 - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use form provided in Project Manual.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
 - b. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - c. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - d. Samples, where applicable or requested.
 - e. Certificates and qualification data, where applicable or requested.

- f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - h. Research reports evidencing compliance with building code in effect for Project, from Building Code of New York.
 - i. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - j. Cost information, including a proposal of change, if any, in the Contract Sum.
 - k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
 - l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
- 3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
 - a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
 - 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

- a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Requested substitution provides sustainable design characteristics that specified product provided.
 - c. Substitution request is fully documented and properly submitted.
 - d. Requested substitution will not adversely affect Contractor's construction schedule.
 - e. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - f. Requested substitution is compatible with other portions of the Work.
 - g. Requested substitution has been coordinated with other portions of the Work.
 - h. Requested substitution provides specified warranty.
 - i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Architect will consider requests for substitution if received within 30 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.
- 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 - b. Requested substitution does not require extensive revisions to the Contract Documents.
 - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - d. Requested substitution provides sustainable design characteristics that specified product provided.
 - e. Substitution request is fully documented and properly submitted.
 - f. Requested substitution will not adversely affect Contractor's construction schedule.
 - g. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - h. Requested substitution is compatible with other portions of the Work.
 - i. Requested substitution has been coordinated with other portions of the Work.
 - j. Requested substitution provides specified warranty.
 - k. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 25 00

SECTION 01 26 00

CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

1.3 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions."

1.4 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
 - 2. Within m20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - e. Quotation Form: Use forms acceptable to Architect.
- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 01 25 00 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Proposal Request Form: Use form acceptable to Architect.

1.5 ADMINISTRATIVE CHANGE ORDERS

- A. Allowance Adjustment: See Section 01 21 00 "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.
- B. Unit-Price Adjustment: See Section 01 22 00 "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

1.6 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Work Changes Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.7 CONSTRUCTION CHANGE DIRECTIVE

- A. Work Change Directive: Architect may issue a Work Change Directive on AIA Document G714. Work Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 1. Work Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Work Change Directive.
 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 26 00

SECTION 01 29 00

PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.3 DEFINITIONS

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
 - 1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms with continuation sheets.
 - b. Submittal schedule.
 - c. Items required to be indicated as separate activities in Contractor's construction schedule.
 - 2. Submit the schedule of values to Architect at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
- B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
 - 1. Identification: Include the following Project identification on the schedule of values:
 - a. Project name and location.
 - b. Name of Architect.
 - c. Architect's project number.
 - d. Contractor's name and address.
 - e. Date of submittal.

2. Arrange schedule of values consistent with format of AIA Document G703.
3. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division.
 - b. Description of the Work.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that affect value.
 - g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
 - 1) Labor.
 - 2) Materials.
 - 3) Equipment.
4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
 - a. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
6. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.
7. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
8. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
9. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.
10. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
 - 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Times: Submit Application for Payment to Architect by the last of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.
 - 1. Submit draft copy of Application for Payment seven days prior to due date for review by Architect.
- D. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.
- E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
 - 1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
 - 2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
 - 3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
 - 4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.
- F. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
 - 1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
 - 2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
 - 3. Provide summary documentation for stored materials indicating the following:
 - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
 - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
 - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

- G. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- H. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 2. When an application shows completion of an item, submit conditional final or full waivers.
 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.
- I. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 2. When an application shows completion of an item, submit conditional final or full waivers.
 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 5. Waiver Forms: Submit executed waivers of lien on forms, acceptable to Owner.
- J. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
 2. Schedule of values.
 3. LEED submittal for project materials cost data.
 4. Contractor's construction schedule (preliminary if not final).
 5. Products list (preliminary if not final).
 6. Schedule of unit prices.
 7. Submittal schedule (preliminary if not final).
 8. List of Contractor's staff assignments.
 9. List of Contractor's principal consultants.
 10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 11. Initial progress report.
 12. Report of preconstruction conference.
 13. Certificates of insurance and insurance policies.
 14. Performance and payment bonds.
 15. Data needed to acquire Owner's insurance.

- K. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
 - 1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 - 2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- L. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
 - 1. Evidence of completion of Project closeout requirements.
 - 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 - 3. Updated final statement, accounting for final changes to the Contract Sum.
 - 4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
 - 5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
 - 6. AIA Document G707, "Consent of Surety to Final Payment."
 - 7. Evidence that claims have been settled.
 - 8. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 29 00

SECTION 01 31 00

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Coordination drawings.
 - 3. Requests for Information (RFIs).
 - 4. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

1.3 DEFINITIONS

- A. RFI: Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.
- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

- A. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 2. Coordinate installation of different components with other contractors to ensure maximum performance and accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 1. Preparation of Contractor's construction schedule.
 2. Preparation of the schedule of values.
 3. Installation and removal of temporary facilities and controls.
 4. Delivery and processing of submittals.
 5. Progress meetings.
 6. Pre-installation conferences.
 7. Project closeout activities.
 8. Startup and adjustment of systems.
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

1.6 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop

Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Use verified field dimensions as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
 - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
 - f. Indicate required installation sequences.
 - g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
4. Mechanical and Plumbing Work: Show the following:
 - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
 - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
 - c. Fire-rated enclosures around ductwork.
5. Electrical Work: Show the following:
 - a. Runs of vertical and horizontal conduit 1-1/4 inches (32 mm) in diameter and larger.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.

- c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
 - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
- 6. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.
- C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
 - 1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings.
 - 2. File Preparation Format: DWG, Version 24.1, operating in Microsoft Windows operating system.
 - 3. File Submittal Format: Submit or post coordination drawing files using format same as file preparation format.
 - 4. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.
 - a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
 - b. Digital Data Software Program: Drawings are available in AutoCad 2020.
 - c. Contractor shall execute a data licensing agreement in the form of Agreement included in this Project Manual.

1.7 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
 - 1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
 - 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
 - 1. Project name.
 - 2. Project number.
 - 3. Date.
 - 4. Name of Contractor.
 - 5. Name of Architect.
 - 6. Contract Number and RFI number, numbered sequentially.
 - 7. RFI subject.
 - 8. Specification Section number and title and related paragraphs, as appropriate.
 - 9. Drawing number and detail references, as appropriate.
 - 10. Field dimensions and conditions, as appropriate.

11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 12. Contractor's signature.
 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: Form bound in Project Manual.
1. Attachments shall be electronic files in Adobe Acrobat PDF format.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
1. The following Contractor-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Architect's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 01 26 00 "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log bi-weekly.
1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Architect.
 4. RFI number including RFIs that were returned without action or withdrawn.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Architect's response was received.
- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

1.8 PROJECT MEETINGS

- A. General: Architect will Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
- B. Preconstruction Conference: Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
 1. Conduct the conference to review responsibilities and personnel assignments.
 2. Attendees: Authorized representatives of Owner Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing and long-lead items.
 - d. Designation of key personnel and their duties.
 - e. Lines of communications.
 - f. Procedures for processing field decisions and Change Orders.
 - g. Procedures for RFIs.
 - h. Procedures for testing and inspecting.
 - i. Procedures for processing Applications for Payment.
 - j. Distribution of the Contract Documents.
 - k. Submittal procedures.
 - l. Preparation of record documents.
 - m. Use of the premises and existing building.
 - n. Work restrictions.
 - o. Working hours.
 - p. Owner's occupancy requirements.
 - q. Responsibility for temporary facilities and controls.
 - r. Procedures for moisture and mold control.
 - s. Procedures for disruptions and shutdowns.
 - t. Construction waste management and recycling.
 - u. Parking availability.
 - v. Office, work, and storage areas.
 - w. Equipment deliveries and priorities.
 - x. First aid.
 - y. Security.
 - z. Progress cleaning.
 4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Review of mockups.
 - i. Possible conflicts.
 - j. Compatibility requirements.
 - k. Time schedules.
 - l. Weather limitations.
 - m. Manufacturer's written instructions.
 - n. Warranty requirements.
 - o. Compatibility of materials.
 - p. Acceptability of substrates.
 - q. Temporary facilities and controls.
 - r. Space and access limitations.
 - s. Regulations of authorities having jurisdiction.
 - t. Testing and inspecting requirements.
 - u. Installation procedures.
 - v. Coordination with other work.
 - w. Required performance results.
 - x. Protection of adjacent work.
 - y. Protection of construction and personnel.
 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Progress Meetings: progress meetings at biweekly intervals.
1. Coordinate dates of meetings with preparation of payment requests.
 2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

- a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Progress cleaning.
 - 10) Quality and work standards.
 - 11) Status of correction of deficient items.
 - 12) Field observations.
 - 13) Status of RFIs.
 - 14) Status of proposal requests.
 - 15) Pending changes.
 - 16) Status of Change Orders.
 - 17) Pending claims and disputes.
 - 18) Documentation of information for payment requests.
4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
 - a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

SECTION 01 32 00

CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Startup construction schedule.
 - 2. Contractor's construction schedule.
 - 3. Construction schedule updating reports.
 - 4. Daily construction reports to be emailed to Owner and Architect.
 - 5. Special reports.

1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
 - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.
- B. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- C. Event: The starting or ending point of an activity.
- D. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
 - 1. Working electronic copy of schedule file, where indicated.
 - 2. PDF electronic file.

- B. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
 - 1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.
- C. Construction Schedule Updating Reports: Submit with Applications for Payment.
- D. Daily Construction Reports: Submit at weekly intervals.
- E. Special Reports: Submit at time of unusual event.

1.5 COORDINATION

- A. Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.
 - 1. Secure time commitments for performing critical elements of the Work from entities involved.
 - 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of final completion.
 - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
 - 1. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
 - 2. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 01 10 00 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 - 3. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 01 10 00 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 - 4. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Uninterruptible services.
 - c. Use of premises restrictions.
 - d. Provisions for future construction.

- e. Seasonal variations.
 - f. Environmental control.
 - 5. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
 - a. Structural completion.
 - b. Temporary enclosure and space conditioning.
 - c. Permanent space enclosure.
 - d. Completion of mechanical installation.
 - e. Completion of electrical installation.
 - f. Substantial Completion.
 - C. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.
 - D. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.
 - 1. See Section 01 29 00 "Payment Procedures" for cost reporting and payment procedures.
 - E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
 - 1. Unresolved issues.
 - 2. Unanswered Requests for Information.
 - 3. Rejected or unreturned submittals.
 - 4. Notations on returned submittals.
 - 5. Pending modifications affecting the Work and Contract Time.
 - F. Recovery Schedule: When periodic update indicates, the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.
 - G. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
- ## 2.2 STARTUP CONSTRUCTION SCHEDULE
- A. Bar-Chart Schedule: Submit startup, horizontal, bar-chart-type construction schedule within seven days of date established for the Notice of Award.
- ## 2.3 REPORTS
- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Accidents.
8. Meetings and significant decisions.
9. Unusual events (see special reports).
10. Stoppages, delays, shortages, and losses.
11. Meter readings and similar recordings.
12. Emergency procedures.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.
15. Work Change Directives received and implemented.
16. Services connected and disconnected.
17. Equipment or system tests and startups.
18. Partial completions and occupancies.
19. Substantial Completions authorized.

- B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:

1. Material stored prior to previous report and remaining in storage.
2. Material stored prior to previous report and since removed from storage and installed.
3. Material stored following previous report and remaining in storage.

- C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.4 SPECIAL REPORTS

- A. General: Submit special reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.
- B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
 - 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 - 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 - 3. As the Work progresses, indicate final completion percentage for each activity.
- B. Distribution: Distribute copies of approved schedule to Architect Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
 - 1. Post copies in Project meeting rooms and temporary field offices.
 - 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 01 32 00

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.
- C. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 ACTION SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.
 - 1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
 - 2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 - 3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.

- a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
4. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal category: Action; informational.
 - d. Name of subcontractor.
 - e. Description of the Work covered.
 - f. Scheduled date for Architect's final release or approval.
 - g. Scheduled date of fabrication.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.
 1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings.
 - a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
 - b. Digital Drawing Software Program: The Contract Drawings are available in AutoCad 2020.
 - c. Contractor shall execute a data licensing agreement in the form of Agreement included in Project Manual.
 - d. The following digital data files will be furnished for each appropriate discipline:
 - 1) Floor plans.
 - 2) Reflected ceiling plans.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow 15 days for review of each resubmittal.
 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
- D. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 2. Name file with submittal number or other unique identifier, including revision identifier.
 - a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., 201 State 06 10 00.01). Resubmittals shall increase numerically (e.g., 201 State 06 10 00.02).
 3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
 4. Transmittal Form for Electronic Submittals: Use Architects form, containing the following information:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name of Construction Manager.
 - e. Name of Contractor.
 - f. Name of firm or entity that prepared submittal.
 - g. Names of subcontractor, manufacturer, and supplier.
 - h. Category and type of submittal.
 - i. Submittal purpose and description.
 - j. Specification Section number and title.
 - k. Specification paragraph number or drawing designation and generic name for each of multiple items.
 - l. Drawing number and detail references, as appropriate.
 - m. Location(s) where product is to be installed, as appropriate.
 - n. Related physical samples submitted directly.
 - o. Indication of full or partial submittal.
 - p. Transmittal number (submittal number see D.2.a above).
 - q. Submittal and transmittal distribution record.
 - r. Other necessary identification.
 - s. Remarks.
- E. Options: Identify options requiring selection by Architect.
- F. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

- G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
 - 1. Note date and content of previous submittal.
 - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 - 3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
- H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
 - 1. Submit electronic submittals via email as PDF electronic files.
 - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
 - 2. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - a. Provide a notarized statement on original paper copy certificates and certifications where indicated. Provide 3 copies.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 - 1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
 - 2. Mark each copy of each submittal to show which products and options are applicable.
 - 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 - 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams showing factory-installed wiring.
 - b. Printed performance curves.

- c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 - 5. Submit Product Data before or concurrent with Samples.
 - 6. Submit Product Data in the following format:
 - a. PDF electronic file.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
 - 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
 - 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least **8-1/2 by 11 inches (215 by 280 mm)**, but no larger than **30 by 42 inches (750 by 1067 mm)**.
 - 3. Submit Shop Drawings in the following format:
 - a. PDF electronic file.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
 - 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 - 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of applicable Specification Section.
 - e. Specification paragraph number and generic name of each item.
 - 3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
 - 4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.

- b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
 - 5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
 - 6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit two sets of Samples. Architect will retain one Sample sets; remainder will be returned.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
 - 1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
 - 2. Manufacturer and product name, and model number if applicable.
 - 3. Number and name of room or space.
 - 4. Location within room or space.
 - 5. Submit product schedule in the following format:
 - a. PDF electronic file.
- F. Coordination Drawing Submittals: Comply with requirements specified in Section 01 31 00 "Project Management and Coordination."
- G. Contractor's Construction Schedule: Comply with requirements specified in Section 01 32 00 "Construction Progress Documentation."
- H. Application for Payment and Schedule of Values: Comply with requirements specified in Section 01 29 00 "Payment Procedures."
- I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 01 40 00 "Quality Requirements."

- J. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 01 77 00 "Closeout Procedures."
- K. Maintenance Data: Comply with requirements specified in Section 01 78 23 "Operation and Maintenance Data."
- L. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- M. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- N. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- O. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- P. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- Q. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- R. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- S. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- T. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - 1. Name of evaluation organization.
 - 2. Date of evaluation.
 - 3. Time period when report is in effect.
 - 4. Product and manufacturers' names.
 - 5. Description of product.
 - 6. Test procedures and results.
 - 7. Limitations of use.
- U. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

- V. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- W. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- X. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Project Closeout and Maintenance Material Submittals: See requirements in Section 01 77 00 "Closeout Procedures."
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

- A. Architects review: Architects review is for general conformance with the design concept of this project and will not be responsible for undetected errors within the submission. The submittal(s)/shop drawing(s) are reviewed by the Architect for general compliance with the contract documents. The contractor retains the responsibility for the fit, detail design of connections, quantities and/or dimensions within the submission as well as the compliance with the contract documents and for information that pertains to the fabrication processes, means and methods of construction, construction techniques, and coordination of the work with all trades and the work which will be affected thereby. Review of separate items does not constitute review of an assembly in which item functions. This review is null and void if the submittal and/or shop drawings deviate from the contract documents and the submission does not clearly indicate or note such deviation(s). Any corrections noted on the submission shall not be construed as an order for additional work.
- B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action, as follows:
 - 1. No Exception Taken – Item can be used for/in the project.
 - 2. Make Corrections Noted – Item can be used for/in the project with the corrections noted.
 - 3. Revise and resubmit – The item submitted needs additional information, or portions of the submittal need revision to show conformance with the project requirements. Do not permit submittals marked "Revise and Resubmit" to be used at the Project site, or elsewhere where work is in progress.
 - 4. Rejected – The item is not suitable for this project and the contractor must resubmit a replacement item that will conform to the project requirements.
- C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- D. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- E. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- F. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION 01 33 00

SECTION 01 35 16

ALTERATION PROJECT PROCEDURES

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 special procedures for alteration work.

1.3 DEFINITIONS

- A. Alteration Work: This term includes remodeling, renovation, repair, and maintenance work performed within existing spaces or on existing surfaces as part of the Project.
- B. Consolidate: To strengthen loose or deteriorated materials in place.
- C. Design Reference Sample: A sample that represents the Architect's prebid selection of work to be matched; it may be existing work or work specially produced for the Project.
- D. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.
- E. Match: To blend with adjacent construction and manifest no apparent difference in material type, species, cut, form, detail, color, grain, texture, or finish; as approved by Architect.
- F. Refinish: To remove existing finishes to base material and apply new finish to match original, or as otherwise indicated.
- G. Repair: To correct damage and defects, retaining existing materials, features, and finishes. This includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials.
- H. Replace: To remove, duplicate, and reinstall entire item with new material. The original item is the pattern for creating duplicates unless otherwise indicated.
- I. Replicate: To reproduce in exact detail, materials, and finish unless otherwise indicated.
- J. Reproduce: To fabricate a new item, accurate in detail to the original, and from either the same or a similar material as the original, unless otherwise indicated.
- K. Retain: To keep existing items that are not to be removed or dismantled.

- L. Strip: To remove existing finish down to base material unless otherwise indicated.

1.4 MATERIALS OWNERSHIP

- A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered or uncovered during the Work, regardless of whether they were previously documented, remain Owner's property.
 - 1. Carefully dismantle and salvage each item or object in a manner to prevent damage and protect it from damage, then promptly deliver it to Owner where directed at Project site.

1.5 QUALITY ASSURANCE

- A. Title X Requirement: Each firm conducting activities that disturb painted surfaces shall be a "Lead-Safe Certified Firm" according to 40 CFR 745, Subpart E, and use only workers that are trained in lead-safe work practices.
- B. Fire-Prevention Plan: Prepare a written plan for preventing fires during the Work, including placement of fire extinguishers, fire blankets, rag buckets, and other fire-control devices during each phase or process. Coordinate plan with Owner's fire-protection equipment and requirements. Include fire-watch personnel's training, duties, and authority to enforce fire safety.
- C. Safety and Health Standard: Comply with ANSI/ASSE A10.6.

1.6 STORAGE AND HANDLING OF SALVAGED MATERIALS

- A. Salvaged Materials:
 - 1. Clean loose dirt and debris from salvaged items unless more extensive cleaning is indicated.
 - 2. Pack or crate items after cleaning; cushion against damage during handling. Label contents of containers.
 - 3. Store items in a secure area until delivery to Owner.
 - 4. Transport items to Owner's storage area on-site designated by Owner.
 - 5. Protect items from damage during transport and storage.
- B. Salvaged Materials for Reinstallation:
 - 1. Repair and clean items for reuse as indicated.
 - 2. Pack or crate items after cleaning and repairing; cushion against damage during handling. Label contents of containers.
 - 3. Protect items from damage during transport and storage.
 - 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment unless otherwise indicated. Provide connections, supports, and miscellaneous materials to make items functional for use indicated.
- C. Existing Materials to Remain: Protect construction indicated to remain against damage and soiling from construction work. Where permitted by Architect, items may be dismantled and taken to a suitable, protected storage location during construction work and reinstalled in their original locations after alteration and other construction work in the vicinity is complete.

- D. Storage: Catalog and store items within a weathertight enclosure where they are protected from moisture, weather, condensation, and freezing temperatures.
 - 1. Identify each item for reinstallation with a nonpermanent mark to document its original location. Indicate original locations on plans, elevations, sections, or photographs by annotating the identifying marks.
 - 2. Secure stored materials to protect from theft.
 - 3. Control humidity so that it does not exceed 85 percent. Maintain temperatures 5 deg F (3 deg C) or more above the dew point.
- E. Storage Space:
 - 1. Owner will arrange for limited on-site location(s) for free storage of salvaged material. This storage space does not include security for stored material.

1.7 FIELD CONDITIONS

- A. Survey of Existing Conditions: Record existing conditions that affect the Work by use of preconstruction photographs.
 - 1. Comply with requirements specified in Section 013233 "Photographic Documentation."
- B. Discrepancies: Notify Architect of discrepancies between existing conditions and Drawings before proceeding with removal and dismantling work.

PART 2 - PRODUCTS - (Not Used)

PART 3 - EXECUTION

3.1 PROTECTION

- A. Protect persons, motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm resulting from alteration work.
 - 1. Use only proven protection methods, appropriate to each area and surface being protected.
 - 2. Provide temporary barricades, barriers, and directional signage to exclude the public from areas where alteration work is being performed.
 - 3. Erect temporary barriers to form and maintain fire-egress routes.
 - 4. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during alteration work.
 - 5. Contain dust and debris generated by alteration work, and prevent it from reaching the public or adjacent surfaces.
 - 6. Provide shoring, bracing, and supports as necessary. Do not overload structural elements.
 - 7. Protect floors and other surfaces along hauling routes from damage, wear, and staining.
- B. Temporary Protection of Materials to Remain:

1. Protect existing materials with temporary protections and construction. Do not remove existing materials unless otherwise indicated.
 2. Do not attach temporary protection to existing surfaces except as indicated as part of the alteration work program.
- C. Comply with each product manufacturer's written instructions for protections and precautions. Protect against adverse effects of products and procedures on people and adjacent materials, components, and vegetation.
- D. Utility and Communications Services:
1. Notify Owner, Architect, authorities having jurisdiction, and entities owning or controlling wires, conduits, pipes, and other services affected by alteration work before commencing operations.
 2. Disconnect and cap pipes and services as required by authorities having jurisdiction, as required for alteration work.
 3. Maintain existing services unless otherwise indicated; keep in service, and protect against damage during operations. Provide temporary services during interruptions to existing utilities.
- E. Existing Drains: Prior to the start of work in an area, test drainage system to ensure that it is functioning properly. Notify Architect immediately of inadequate drainage or blockage. Do not begin work in an area until the drainage system is functioning properly.
1. Prevent solids such as adhesive or mortar residue or other debris from entering the drainage system. Clean out drains and drain lines that become sluggish or blocked by sand or other materials resulting from alteration work.
 2. Protect drains from pollutants. Block drains or filter out sediments, allowing only clean water to pass.
- F. Existing Roofing: Prior to the start of work in an area, install roofing protection.

3.2 PROTECTION FROM FIRE

- A. General: Follow fire-prevention plan and the following:
1. Comply with NFPA 241 requirements unless otherwise indicated.
 2. Remove and keep area free of combustibles, including rubbish, paper, waste, and chemicals, unless necessary for the immediate work.
 - a. If combustible material cannot be removed, provide fire blankets to cover such materials.
- B. Heat-Generating Equipment and Combustible Materials: Comply with the following procedures while performing work with heat-generating equipment or combustible materials, including welding, torch-cutting, soldering, brazing, removing paint with heat, or other operations where open flames or implements using high heat or combustible solvents and chemicals are anticipated:
1. Obtain Owner's approval for operations involving use of welding or other high-heat equipment. Use of open-flame equipment is not permitted. Notify Owner at least 72 hours before each occurrence, indicating location of such work.

2. As far as practicable, restrict heat-generating equipment to shop areas or outside the building.
 3. Do not perform work with heat-generating equipment in or near rooms or in areas where flammable liquids or explosive vapors are present or thought to be present. Use a combustible gas indicator test to ensure that the area is safe.
 4. Use fireproof baffles to prevent flames, sparks, hot gases, or other high-temperature material from reaching surrounding combustible material.
 5. Prevent the spread of sparks and particles of hot metal through open windows, doors, holes, and cracks in floors, walls, ceilings, roofs, and other openings.
 6. Fire Watch: Before working with heat-generating equipment or combustible materials, station personnel to serve as a fire watch at each location where such work is performed. Fire-watch personnel shall have the authority to enforce fire safety. Station fire watch according to NFPA 51B, NFPA 241, and as follows:
 - a. Train each fire watch in the proper operation of fire-control equipment and alarms.
 - b. Prohibit fire-watch personnel from other work that would be a distraction from fire-watch duties.
 - c. Cease work with heat-generating equipment whenever fire-watch personnel are not present.
 - d. Have fire-watch personnel perform final fire-safety inspection each day beginning no sooner than 30 minutes after conclusion of work in each area to detect hidden or smoldering fires and to ensure that proper fire prevention is maintained.
- C. Fire-Control Devices: Provide and maintain fire extinguishers, fire blankets, and rag buckets for disposal of rags with combustible liquids. Maintain each as suitable for the type of fire risk in each work area. Ensure that nearby personnel and the fire-watch personnel are trained in fire-extinguisher and blanket use.

3.3 PROTECTION DURING APPLICATION OF CHEMICALS

- A. Protect motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm or spillage resulting from applications of chemicals and adhesives.
- B. Cover adjacent surfaces with protective materials that are proven to resist chemicals selected for Project unless chemicals being used will not damage adjacent surfaces as indicated in alteration work program. Use covering materials and masking agents that are waterproof and UV resistant and that will not stain or leave residue on surfaces to which they are applied. Apply protective materials according to manufacturer's written instructions. Do not apply liquid masking agents or adhesives to painted or porous surfaces. When no longer needed, promptly remove protective materials.
- C. Do not apply chemicals during winds of sufficient force to spread them to unprotected surfaces.
- D. Neutralize alkaline and acid wastes and legally dispose of off Owner's property.
- E. Collect and dispose of runoff from chemical operations by legal means and in a manner, that prevents soil contamination, soil erosion, undermining of paving and foundations, damage to landscaping, or water penetration into building interior.

3.4 GENERAL ALTERATION WORK

- A. Have specialty work performed only by qualified specialists.

- B. Ensure that supervisory personnel are present when work begins and during its progress.
- C. Record existing work before each procedure (preconstruction), and record progress during the work. Use digital preconstruction documentation photograph. Comply with requirements in Section 013233 "Photographic Documentation."
- D. Perform surveys of Project site as the Work progresses to detect hazards resulting from alterations.
- E. Notify Architect of visible changes in the integrity of material or components whether from environmental causes including biological attack, UV degradation, freezing, or thawing or from structural defects including cracks, movement, or distortion.
 - 1. Do not proceed with the work in question until directed by Architect.

END OF SECTION 01 35 16

SECTION 01 40 00

QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
 - 4. Specific test and inspection requirements are not specified in this Section.

1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

- D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.
- G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If 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 conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. 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 requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 ACTION SUBMITTALS

- A. Shop Drawings: For mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.
 - 1. Indicate manufacturer and model number of individual components.
 - 2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.6 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Qualification Data: For Contractor's quality-control personnel.
- C. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- D. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Entity responsible for performing tests and inspections.
 - 3. Description of test and inspection.
 - 4. Identification of applicable standards.
 - 5. Identification of test and inspection methods.
 - 6. Number of tests and inspections required.
 - 7. Time schedule or time span for tests and inspections.
 - 8. Requirements for obtaining samples.
 - 9. Unique characteristics of each quality-control service.

1.7 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, and telephone number of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.
 - 7. Identification of product and Specification Section.
 - 8. Complete test or inspection data.
 - 9. Test and inspection results and an interpretation of test results.
 - 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 - 12. Name and signature of laboratory inspector.
 - 13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
 - 1. Name, address, and telephone number of technical representative making report.
 - 2. Statement on condition of substrates and their acceptability for installation of product.
 - 3. Statement that products at Project site comply with requirements.
 - 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.

5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of factory-authorized service representative making report.
 2. Statement that equipment complies with requirements.
 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 4. Statement whether conditions, products, and installation will affect warranty.
 5. Other required items indicated in individual Specification Sections.
- D. Permits, Licenses, and Certificates: For 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 for compliance with standards and regulations bearing on performance of the Work.

1.8 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.
- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329 ; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
 - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
 - 2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 - 3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at Project.
 - 4. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 5. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
 - a. Allow seven days for initial review and each re-review of each mockup.
 - 6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 7. Demolish and remove mockups when directed unless otherwise indicated.

1.9 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 - 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 - 2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 33 00 "Submittal Procedures."
- C. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in

preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

- D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- E. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
 - 1. Access to the Work.
 - 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 - 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 - 4. Facilities for storage and field curing of test samples.
 - 5. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 - 6. Security and protection for samples and for testing and inspecting equipment at Project site.
- F. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
 - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- G. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.
 - 1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.10 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:
- B. Special Tests and Inspections: Conducted by a qualified special inspector as required by authorities having jurisdiction, as indicated in individual Specification Sections and in Statement of Special Inspections attached to this Section, and as follows:
 - 1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.

2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
 1. Date test or inspection was conducted.
 2. Description of the Work tested or inspected.
 3. Date test or inspection results were transmitted to Architect.
 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 40 00

SECTION 01 42 00

REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "No Exception Taken": When used to convey Architect's action on Contractor's submittals, applications, and requests, "No Exception Taken" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Existing": indicates something that already is present and is to remain.
- G. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- H. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
- I. "Provide": Furnish and install, complete and ready for the intended use. The lack of a modifier in contract documents, (Furnish, Install or Existing) shall mean, "Provide"
- J. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.
- K. "Salvage": Existing item to be selectively removed undamaged, cleaned, stored and protected, for the owner or for re-installation as indicated.

1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless 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. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should 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, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."
- B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
 - 1. AABC - Associated Air Balance Council; www.aabc.com.
 - 2. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
 - 3. AAPFCO - Association of American Plant Food Control Officials; www.aapfco.org.
 - 4. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
 - 5. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
 - 6. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
 - 7. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org.
 - 8. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
 - 9. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
 - 10. AF&PA - American Forest & Paper Association; www.afandpa.org.
 - 11. AGA - American Gas Association; www.aga.org.
 - 12. AHAM - Association of Home Appliance Manufacturers; www.aham.org.
 - 13. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
 - 14. AI - Asphalt Institute; www.asphaltinstitute.org.
 - 15. AIA - American Institute of Architects (The); www.aia.org.
 - 16. AISC - American Institute of Steel Construction; www.aisc.org.
 - 17. AISI - American Iron and Steel Institute; www.steel.org.
 - 18. AITC - American Institute of Timber Construction; www.aitc-glulam.org.
 - 19. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
 - 20. ANSI - American National Standards Institute; www.ansi.org.
 - 21. AOSA - Association of Official Seed Analysts, Inc.; www.aosaseed.com.
 - 22. APA - APA - The Engineered Wood Association; www.apawood.org.
 - 23. APA - Architectural Precast Association; www.archprecast.org.

24. API - American Petroleum Institute; www.api.org.
25. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
26. ARI - American Refrigeration Institute; (See AHRI).
27. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
28. ASCE - American Society of Civil Engineers; www.asce.org.
29. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
30. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
31. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
32. ASSE - American Society of Safety Engineers (The); www.asse.org.
33. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
34. ASTM - ASTM International; (American Society for Testing and Materials International); www.astm.org.
35. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
36. AWEA - American Wind Energy Association; www.awea.org.
37. AWI - Architectural Woodwork Institute; www.awinet.org.
38. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
39. AWPA - American Wood Protection Association; (Formerly: American Wood-Preservers' Association); www.awpa.com.
40. AWS - American Welding Society; www.aws.org.
41. AWWA - American Water Works Association; www.awwa.org.
42. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
43. BIA - Brick Industry Association (The); www.gobrick.com.
44. BICSI - BICSI, Inc.; www.bicsi.org.
45. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.com.
46. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
47. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bwfbadminton.org.
48. CDA - Copper Development Association; www.copper.org.
49. CEA - Canadian Electricity Association; www.electricity.ca.
50. CEA - Consumer Electronics Association; www.ce.org.
51. CFFA - Chemical Fabrics & Film Association, Inc.; www.chemicalfabricsandfilm.com.
52. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
53. CGA - Compressed Gas Association; www.cganet.com.
54. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
55. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
56. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
57. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
58. CPA - Composite Panel Association; www.pbmdf.com.
59. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
60. CRRC - Cool Roof Rating Council; www.coolroofs.org.
61. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
62. CSA - Canadian Standards Association; www.csa.ca.
63. CSA - CSA International; (Formerly: IAS - International Approval Services); www.csa-international.org.
64. CSI - Construction Specifications Institute (The); www.csinet.org.
65. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
66. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
67. CWC - Composite Wood Council; (See CPA).
68. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
69. DHI - Door and Hardware Institute; www.dhi.org.

70. ECA - Electronic Components Association; (See ECIA).
71. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).
72. ECIA - Electronic Components Industry Association; www.eciaonline.org
73. EIA - Electronic Industries Alliance; (See TIA).
74. EIMA - EIFS Industry Members Association; www.eima.com.
75. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
76. ESD - ESD Association; (Electrostatic Discharge Association); www.esda.org.
77. ESTA - Entertainment Services and Technology Association; (See PLASA).
78. EVO - Efficiency Valuation Organization; www.evo-world.org.
79. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
80. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
81. FM Approvals - FM Approvals LLC; www.fmglobal.com.
82. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
83. FRSA - Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.; www.floridarroof.com.
84. FSA - Fluid Sealing Association; www.fluidsealing.com.
85. FSC - Forest Stewardship Council U.S.; www.fscus.org.
86. GA - Gypsum Association; www.gypsum.org.
87. GANA - Glass Association of North America; www.glasswebsite.com.
88. GS - Green Seal; www.greenseal.org.
89. HI - Hydraulic Institute; www.pumps.org.
90. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
91. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
92. HPVA - Hardwood Plywood & Veneer Association; www.hpva.org.
93. HPW - H. P. White Laboratory, Inc.; www.hpwhite.com.
94. IAPSC - International Association of Professional Security Consultants; www.iapsc.org.
95. IAS - International Accreditation Service; www.iasonline.org.
96. IAS - International Approval Services; (See CSA).
97. ICBO - International Conference of Building Officials; (See ICC).
98. ICC - International Code Council; www.iccsafe.org.
99. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
100. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
101. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
102. IEC - International Electrotechnical Commission; www.iec.ch.
103. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
104. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
105. IESNA - Illuminating Engineering Society of North America; (See IES).
106. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
107. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
108. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.okstate.edu.
109. ILI - Indiana Limestone Institute of America, Inc.; www.ili.ai.
110. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
111. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
112. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
113. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
114. ISO - International Organization for Standardization; www.iso.org.
115. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
116. ITU - International Telecommunication Union; www.itu.int/home.
117. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.

118. LMA - Laminating Materials Association; (See CPA).
119. LPI - Lightning Protection Institute; www.lightning.org.
120. MBMA - Metal Building Manufacturers Association; www.mbma.com.
121. MCA - Metal Construction Association; www.metalconstruction.org.
122. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
123. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
124. MHIA - Material Handling Industry of America; www.mhia.org.
125. MIA - Marble Institute of America; www.marble-institute.com.
126. MMPA - Molding & Millwork Producers Association; (Formerly: Wood Molding & Millwork Producers Association); www.wmmpa.com.
127. MPI - Master Painters Institute; www.paintinfo.com.
128. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
129. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
130. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
131. NADCA - National Air Duct Cleaners Association; www.nadca.com.
132. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
133. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
134. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
135. NCMA - National Concrete Masonry Association; www.ncma.org.
136. NEBB - National Environmental Balancing Bureau; www.nebb.org.
137. NECA - National Electrical Contractors Association; www.necanet.org.
138. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
139. NEMA - National Electrical Manufacturers Association; www.nema.org.
140. NETA - International Electrical Testing Association; www.netaworld.org.
141. NFHS - National Federation of State High School Associations; www.nfhs.org.
142. NFPA - NFPA; (National Fire Protection Association); www.nfpa.org.
143. NFPA - NFPA International; (See NFPA).
144. NFRC - National Fenestration Rating Council; www.nfrc.org.
145. NHLA - National Hardwood Lumber Association; www.nhla.com.
146. NLGA - National Lumber Grades Authority; www.nlga.org.
147. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
148. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
149. NRCA - National Roofing Contractors Association; www.nrca.net.
150. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
151. NSF - NSF International; (National Sanitation Foundation International); www.nsf.org.
152. NSPE - National Society of Professional Engineers; www.nspe.org.
153. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
154. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
155. NWFA - National Wood Flooring Association; www.nwfa.org.
156. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
157. PDI - Plumbing & Drainage Institute; www.pdionline.org.
158. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); www.plasa.org.
159. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
160. RFCI - Resilient Floor Covering Institute; www.rfci.com.
161. RIS - Redwood Inspection Service; www.redwoodinspection.com.
162. SAE - SAE International; (Society of Automotive Engineers); www.sae.org.
163. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
164. SDI - Steel Deck Institute; www.sdi.org.
165. SDI - Steel Door Institute; www.steeldoor.org.
166. SEFA - Scientific Equipment and Furniture Association; www.sefalabs.com.
167. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).

168. SIA - Security Industry Association; www.siaonline.org.
169. SJI - Steel Joist Institute; www.steeljoist.org.
170. SMA - Screen Manufacturers Association; www.smainfo.org.
171. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
172. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
173. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
174. SPIB - Southern Pine Inspection Bureau; www.spib.org.
175. SPRI - Single Ply Roofing Industry; www.spri.org.
176. SRCC - Solar Rating and Certification Corporation; www.solar-rating.org.
177. SSINA - Specialty Steel Industry of North America; www.ssina.com.
178. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
179. STI - Steel Tank Institute; www.steeltank.com.
180. SWI - Steel Window Institute; www.steelwindows.com.
181. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
182. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
183. TCNA - Tile Council of North America, Inc.; (Formerly: Tile Council of America); www.tileusa.com.
184. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
185. TIA - Telecommunications Industry Association; (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
186. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
187. TMS - The Masonry Society; www.masonrysociety.org.
188. TPI - Truss Plate Institute; www.tpinst.org.
189. TPI - Turfgrass Producers International; www.turfgrasssod.org.
190. TRI - Tile Roofing Institute; (Formerly: National Tile Roofing Manufacturing Association); www.tilerroofing.org.
191. UBC - Uniform Building Code; (See ICC).
192. UL - Underwriters Laboratories Inc.; www.ul.com.
193. UNI - Uni-Bell PVC Pipe Association ; www.uni-bell.org.
194. USAV - USA Volleyball; www.usavolleyball.org.
195. USGBC - U.S. Green Building Council; www.usgbc.org.
196. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
197. WASTEC - Waste Equipment Technology Association; www.wastec.org.
198. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
199. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
200. WDMA - Window & Door Manufacturers Association; www.wdma.com.
201. WI - Woodwork Institute; (Formerly: WIC - Woodwork Institute of California); www.wicnet.org.
202. WMMPA - Wood Molding & Millwork Producers Association; (See MMPA).
203. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.
204. WPA - Western Wood Products Association; www.wwpa.org.

- C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

1. DIN - Deutsches Institut for Normung e.V.; www.din.de.
2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
3. ICC - International Code Council; www.iccsafe.org.
4. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.

- D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up-to-date as of the date of the Contract Documents.

1. COE - Army Corps of Engineers; www.usace.army.mil.
2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
4. DOD - Department of Defense; <http://dodssp.daps.dla.mil>.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
8. FG - Federal Government Publications; www.gpo.gov.
9. GSA - General Services Administration; www.gsa.gov.
10. HUD - Department of Housing and Urban Development; www.hud.gov.
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; <http://eetd.lbl.gov>.
12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
13. SD - Department of State; www.state.gov.
14. TRB - Transportation Research Board; National Cooperative Highway Research Program; www.trb.org.
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
17. USDJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
18. USP - U.S. Pharmacopeia; www.usp.org.
19. USPS - United States Postal Service; www.usps.com.

- E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.gpo.gov/fdsys.
2. DOD - Department of Defense; Military Specifications and Standards; Available from Department of Defense Single Stock Point; <http://dodssp.daps.dla.mil>.
3. DSCC - Defense Supply Center Columbus; (See FS).
4. FED-STD - Federal Standard; (See FS).
5. FS - Federal Specification; Available from Department of Defense Single Stock Point; <http://dodssp.daps.dla.mil>.
 - a. Available from Defense Standardization Program; www.dsp.dla.mil.
 - b. Available from General Services Administration; www.gsa.gov.
 - c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org/ccb.
6. MILSPEC - Military Specification and Standards; (See DOD).
7. USAB - United States Access Board; www.access-board.gov.
8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CBHF; State of California; Department of Consumer Affairs; Bureau of Electronic Appliance and Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
2. CCR; California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
3. CDHS; California Department of Health Services; (See CDPH).
4. CDPH; California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
5. CPUC; California Public Utilities Commission; www.cpuc.ca.gov.
6. SCAQMD; South Coast Air Quality Management District; www.aqmd.gov.
7. TFS; Texas Forest Service; Forest Resource Development and Sustainable Forestry; <http://txforests-service.tamu.edu>.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 42 00

SECTION 01 50 00 TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1.3 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.
- B. Sewer Service: Owner will pay sewer-service use charges for sewer usage by all entities for construction operations.
- C. Water Service: Owner will pay water-service use charges for water used by all entities for construction operations.
- D. Electric Power Service: Owner will pay electric-power-service use charges for electricity used by all entities for construction operations.
- E. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
- F. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.4 INFORMATIONAL SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
- B. Parking: availability of off-street parking is limited in the project area. The contractor may use the lay down area shown on the Site Logistics Plan for parking within the temporary fencing that the contractor is to provide.

- C. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
- D. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- E. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.
 - 1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
 - 2. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
 - 3. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.

1.5 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Portable Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top and bottom rails. Provide galvanized-steel bases for supporting posts.

2.2 TEMPORARY FACILITIES

- A. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

1. Store combustible materials apart from building.
2. Secure permits from the City of Schenectady for siting storage containers on the public street/sidewalk if allowed by the City. Otherwise store all material within the Lay Down Area shown on the Site Logistics Plan.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Maintain and Protect mechanical fresh air intakes from dust and odors during construction. Shut down of the air intakes is not allowed without written permission from the owner indication the times of the shut downs.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate facilities within the laydown area shown on the Site logistic Plans and where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
- C. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- E. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.
- F. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
2. Provide superintendent with cellular telephone for communication to the owner and architect.

3.3 SUPPORT FACILITIES INSTALLATION

- A. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas.
 1. Restore existing pavement, pavement markings and signage to its original condition prior to site mobilization.
 2. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
 3. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Section 321216 "Asphalt Paving."
- B. Traffic Controls: Comply with requirements of authorities having jurisdiction.
 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- C. Project Signs: Provide 8'-0" x 4'-0" Project signs as indicated. Unauthorized signs are not permitted.
 1. Identification Signs: Provide Project identification sign and supporting structure. Sign location is to be determined. Signage graphic will be supplied by the architect.
 2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
 - a. Provide temporary, directional signs for construction personnel and visitors.
 3. Maintain and touchup signs so they are legible at all times.
 4. Sign to be mounted where directed by architect..
- D. Waste Disposal Facilities: Comply with requirements specified in Section 01 74 19 "Construction Waste Management and Disposal."
- E. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 01 73 00 "Execution."
- F. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- G. Temporary Elevator Use: Use of elevators is not permitted.

- H. Temporary Stairs: Provide temporary stairs where ladders are not adequate for workers, architect, owner and other authorized construction personnel to access the roof from the contract laydown area.
- I. Existing Stair Usage: Use of Owner's existing stairs will not be permitted.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
 - 1. Comply with work restrictions specified in Section 01 10 00 "Summary."
- C. Storm water Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of storm water from heavy rains.
- D. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- E. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.
- F. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
 - 1. Extent of Fence: GC shall enclose the entire area shown on the Site Logistics Plan as the "Contract Laydown area" with temporary fences and gates.
 - 2. Maintain security by locking the enclosure at all times when work is not being performed. Limit number of keys and restrict distribution to authorized personnel only. Furnish one set of keys to Owner and Architect.
- G. Security Enclosure and Lockup: Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.
- H. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- I. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- J. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

- K. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
 - 1. Prohibit smoking in construction areas and within 20 feet of the county property.
 - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

3.5 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.
- B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
 - 1. Protect porous materials from water damage.
 - 2. Protect stored and installed material from flowing or standing water.
 - 3. Keep porous and organic materials from coming into prolonged contact with concrete.
 - 4. Remove standing water from decks.
 - 5. Keep deck openings covered or dammed.

3.6 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 - 2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 77 00 "Closeout Procedures."

END OF SECTION 01 50 00

SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

1.3 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 ACTION SUBMITTALS

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
 - a. Form of Approval: As specified in Section 01 33 00 "Submittal Procedures."
 - b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 01 33 00 "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
 2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.
- C. Storage:
1. Store products to allow for inspection and measurement of quantity or counting of units.
 2. Store materials in a manner that will not endanger Project structure.
 3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.

4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
 1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
 3. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 4. Where products are accompanied by the term "as selected," Architect will make selection.
 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Products:
 - a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered.
 - b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
3. Manufacturers:
 - a. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
4. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied,

Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 60 00

SECTION 01 73 00

EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Installation of the Work.
 - 4. Cutting and patching.
 - 5. Coordination of Owner-installed products.
 - 6. Progress cleaning.
 - 7. Starting and adjusting.
 - 8. Protection of installed construction.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 INFORMATIONAL SUBMITTALS

- A. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:
 - 1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
 - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
 - 3. Products: List products to be used for patching and firms or entities that will perform patching work.
 - 4. Dates: Indicate when cutting and patching will be performed.
 - 5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be

relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.

- a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

- B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.5 QUALITY ASSURANCE

- A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting, and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.

- a. Primary operational systems and equipment.
- b. Fire separation assemblies.
- c. Air or smoke barriers.
- d. Mechanical systems piping and ducts.
- e. Control systems.
- f. Communication systems.
- g. Fire-detection and -alarm systems.
- h. Electrical wiring systems.

3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.

- a. Water, moisture, or vapor barriers.
- b. Membranes and flashings.
- c. Exterior construction.
- d. Equipment supports.
- e. Piping, ductwork, vessels, and equipment.
- f. Noise- and vibration-control elements and systems.

4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

- B. Cutting and Patching Conference: Before proceeding, meet at 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.

- C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, and other construction affecting the Work.
 - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 - 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 - 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1. Description of the Work.
2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections.

- D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- C. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- D. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.

- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
 - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
 - 4. Maintain minimum headroom clearance of **108 inches** in occupied spaces and **108 inches** in unoccupied spaces.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 - 2. Allow for building movement, including thermal expansion and contraction.
 - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with

integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01 10 00 "Summary."
- F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.
- G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
 - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 6. Proceed with patching after construction operations requiring cutting are complete.

- H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
 - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 - 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 - 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 - 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Use containers intended for holding waste materials of type to be stored.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 01 50 00 "Temporary Facilities and Controls." and Section 01 74 19 "Construction Waste Management and Disposal."
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

- A. Coordinate startup and adjusting of equipment and operating components with requirements in Section 01 91 13 "General Commissioning Requirements."
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

3.9 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 01 73 00

SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Salvaging nonhazardous waste.
 - 2. Recycling nonhazardous waste.
 - 3. Disposing of nonhazardous waste.

1.3 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
 - 1. Comply with operation, termination, and removal requirements in Section 015000 "Temporary Facilities and Controls."
- B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
 - 1. Distribute waste management plan to everyone concerned within [three] Insert number days of submittal return.
 - 2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
 - 2. Comply with Section 015000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 SALVAGING DEMOLITION WASTE

- A. Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 - 3. Store items in a secure area until installation.
 - 4. Protect items from damage during transport and storage.
 - 5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.
- B. Salvaged Items for: Not permitted on Project site.
- C. Salvaged Items for Owner's Use: Salvage items for Owner's use and handle as follows:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 - 3. Store items in a secure area until delivery to Owner.

4. Transport items to Owner's storage area on-site .
5. Protect items from damage during transport and storage.

3.3 RECYCLING WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.
- C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
- D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.
 1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 - a. Inspect containers and bins for contamination and remove contaminated materials if found.
 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 4. Store components off the ground and protect from the weather.
 5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.4 RECYCLING DEMOLITION WASTE

- A. Metals: Separate metals by type.
 1. Structural Steel: Stack members according to size, type of member, and length.
 2. Remove and dispose of bolts, nuts, washers, and other rough hardware.
- B. Metal Suspension System: Separate metal members including trim, and other metals from acoustical panels and tile and sort with other metals.
- C. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.
- D. Conduit: Reduce conduit to straight lengths and store by type and size.

3.5 RECYCLING CONSTRUCTION WASTE

- A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

3.6 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials.
- C. Burning: Burning of waste materials is permitted only at designated areas on Owner's property, provided required permits are obtained. Provide full-time monitoring for burning materials until fires are extinguished.
- D. Disposal: Remove waste materials from Owner's property and legally dispose of them.

END OF SECTION 01 74 19

SECTION 01 77 00 CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Final completion procedures.
 - 3. Warranties.
 - 4. Final cleaning.
 - 5. Repair of the Work.

1.3 ACTION SUBMITTALS

- A. Product Data: For cleaning agents.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.
- C. Field Report: For pest control inspection.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, , and similar final record information.
 - 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect . Label with manufacturer's name and model number where applicable.
 - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.
 - 5. Submit test/adjust/balance records.
 - 6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Advise Owner of pending insurance changeover requirements.
 - 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 - 3. Complete startup and testing of systems and equipment.
 - 4. Perform preventive maintenance on equipment used prior to Substantial Completion.
 - 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 01 79 00 "Demonstration and Training."
 - 6. Advise Owner of changeover in heat and other utilities.
 - 7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
 - 8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 - 9. Complete final cleaning requirements, including touchup painting.
 - 10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 2. Results of completed inspection will form the basis of requirements for final completion.

1.7 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:
1. Submit a final Application for Payment according to Section 01 29 00 "Payment Procedures."
 2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 4. Submit pest-control final inspection report.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
1. Organize list of spaces in sequential order.
 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
 3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Page number.

4. Submit list of incomplete items in the following format:
 - a. MS Excel electronic file. Architect will return annotated file.

1.9 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
 1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.
 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark 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 Installer.
 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
 4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
- D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by 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: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
- a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - d. Remove snow and ice to provide safe access to building.
 - e. Clean exposed exterior and interior 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.
 - f. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - g. Sweep concrete floors broom clean in unoccupied spaces.
 - h. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
 - i. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - j. Remove labels that are not permanent.
 - k. Wipe surfaces of mechanical and electrical equipment, lift equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - l. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - m. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - n. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
 - 1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report on completion of cleaning.
 - o. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
 - p. Leave Project clean and ready for occupancy.
- C. Pest Control: Comply with pest control requirements in Section 01 50 00 "Temporary Facilities and Controls." Prepare written report.
- D. Construction Waste Disposal: Comply with waste disposal requirements in Section 01 50 00 "Temporary Facilities and Controls." and Section 01 74 19 "Construction Waste Management and Disposal."

3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn, items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
 - 1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
 - 2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.
 - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
 - 3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
 - 4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 01 77 00

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory.
 - 2. Emergency manuals.
 - 3. Operation manuals for systems, subsystems, and equipment.
 - 4. Product maintenance manuals.
 - 5. Systems and equipment maintenance manuals.

1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

- A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:
 - 1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.
 - a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.

- b. Enable inserted reviewer comments on draft submittals.
- 2. Two paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect will return two copies.
- C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.
 - 1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:
 - 1. List of documents.
 - 2. List of systems.
 - 3. List of equipment.
 - 4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Construction Manager.
7. Name and contact information for Architect.
8. Name and contact information for Commissioning Authority.
9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
10. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-

- reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.
2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
 3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
 4. Supplementary Text: Prepared on 8-1/2-by-11-inch (215-by-280-mm) white bond paper.
 5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
 1. Type of emergency.
 2. Emergency instructions.
 3. Emergency procedures.
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
 1. Fire.
 2. Flood.
 3. Gas leak.
 4. Water leak.
 5. Power failure.
 6. Water outage.
 7. System, subsystem, or equipment failure.
 8. Chemical release or spill.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include the following, as applicable:
 1. Instructions on stopping.
 2. Shutdown instructions for each type of emergency.
 3. Operating instructions for conditions outside normal operating limits.
 4. Required sequences for electric or electronic systems.

5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
 1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 2. Performance and design criteria if Contractor has delegated design responsibility.
 3. Operating standards.
 4. Operating procedures.
 5. Operating logs.
 6. Wiring diagrams.
 7. Control diagrams.
 8. Piped system diagrams.
 9. Precautions against improper use.
 10. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:
 1. Product name and model number. Use designations for products indicated on Contract Documents.
 2. Manufacturer's name.
 3. Equipment identification with serial number of each component.
 4. Equipment function.
 5. Operating characteristics.
 6. Limiting conditions.
 7. Performance curves.
 8. Engineering data and tests.
 9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:
 1. Startup procedures.
 2. Equipment or system break-in procedures.
 3. Routine and normal operating instructions.
 4. Regulation and control procedures.
 5. Instructions on stopping.
 6. Normal shutdown instructions.
 7. Seasonal and weekend operating instructions.
 8. Required sequences for electric or electronic systems.
 9. Special operating instructions and procedures.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUALS

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Product Information: Include the following, as applicable:
 - 1. Product name and model number.
 - 2. Manufacturer's name.
 - 3. Color, pattern, and texture.
 - 4. Material and chemical composition.
 - 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
 - 1. Inspection procedures.
 - 2. Types of cleaning agents to be used and methods of cleaning.
 - 3. List of cleaning agents and methods of cleaning detrimental to product.
 - 4. Schedule for routine cleaning and maintenance.
 - 5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
 - 1. Standard maintenance instructions and bulletins.

2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 3. Identification and nomenclature of parts and components.
 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
1. Test and inspection instructions.
 2. Troubleshooting guide.
 3. Precautions against improper maintenance.
 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 5. Aligning, adjusting, and checking instructions.
 6. Demonstration and training video recording, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
- B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

- D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
 - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
 - 1. Do not use original project record documents as part of operation and maintenance manuals.
- G. Comply with Section 01 77 00 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 01 78 23

SECTION 01 78 39

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for project record documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.
 - 3. Record Product Data.
 - 4. Miscellaneous record submittals.

1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit one set(s) of marked-up record prints.
 - 2. Number of Copies: Submit copies of record Drawings as follows:
 - a. Initial Submittal:
 - 1) Submit PDF electronic files of scanned record prints and of file prints.
 - 2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
 - b. Final Submittal:
 - 1) Submit PDF electronic files of scanned record prints and two set(s) of prints.
- B. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.
 - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an acceptable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.
 - e. Cross-reference record prints to corresponding archive photographic documentation.
 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations below 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 following Architect's written orders.
 - k. Details not on the original Contract Drawings.
 - l. Field records for variable and concealed conditions.
 - m. Record information on the Work that is shown only schematically.
 3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
 4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
1. Format: Annotated PDF electronic file with comment function enabled.
 2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
 3. Refer instances of uncertainty to Architect for resolution.
 4. Architect will furnish Contractor one set of digital data files of the Contract Drawings for use in recording information.
 - a. See Section 01 33 00 "Submittal Procedures" for requirements related to use of Architect's digital data files.
 - b. Architect will provide data file layer information. Record markups in separate layers.

- C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 2. Format: Annotated PDF electronic file with comment function enabled.
 3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
 4. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect.
 - e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
 5. Note related Change Orders, record Product Data, and record Drawings where applicable.
- B. Format: Submit record Specifications as annotated PDF electronic file.

2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 3. Note related Change Orders, record Specifications, and record Drawings where applicable.
- B. Format: Submit record Product Data as annotated PDF electronic file.
1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

2.4 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- B. Format: Submit miscellaneous record submittals as PDF electronic file.
 - 1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.
- B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION 01 78 39

SECTION 01 79 00

DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Demonstration of operation of systems, subsystems, and equipment.
 - 2. Training in operation and maintenance of systems, subsystems, and equipment.

1.3 INFORMATIONAL SUBMITTALS

- A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
 - 1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.
- B. Qualification Data: For instructor.
- C. Attendance Record: For each training module, submit list of participants and length of instruction time.
- D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.4 CLOSEOUT SUBMITTALS

- A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.
 - 1. Identification: On each copy, provide an applied label with the following information:
 - a. Name of Project.
 - b. Name and address of videographer.
 - c. Name of Architect.

- d. Name of Contractor.
- e. Date of video recording.
- 2. Transcript: Prepared and bound in format matching operation and maintenance manuals. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as the corresponding video recording. Include name of Project and date of video recording on each page.
- 3. Transcript: Prepared in PDF electronic format. Include a cover sheet with same label information as the corresponding video recording and a table of contents with links to corresponding training components. Include name of Project and date of video recording on each page.
- 4. At completion of training, submit complete training manual(s) for Owner's use in PDF electronic file format on compact disc.

1.5 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.
- C. Pre-instruction Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:
 - 1. Inspect and discuss locations and other facilities required for instruction.
 - 2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
 - 3. Review required content of instruction.
 - 4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.6 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
 - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
 - 2. Documentation: Review the following items in detail:
 - a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.
 - d. Project record documents.
 - e. Identification systems.
 - f. Warranties and bonds.
 - g. Maintenance service agreements and similar continuing commitments.
 - 3. Emergencies: Include the following, as applicable:
 - a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
 - 4. Operations: Include the following, as applicable:
 - a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.

- i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
- 5. Adjustments: Include the following:
 - a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
- 6. Troubleshooting: Include the following:
 - a. Diagnostic instructions.
 - b. Test and inspection procedures.
- 7. Maintenance: Include the following:
 - a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
- 8. Repairs: Include the following:
 - a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 01 78 23 "Operation and Maintenance Data."
- B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 - 1. Owner will furnish Contractor with names and positions of participants.
- C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 - 1. Schedule training with Owner, through Architect, with at least fourteen days' advance notice.
- D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
- E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.
- F. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

3.3 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

- A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
 - 1. At beginning of each training module, record each chart containing learning objective and lesson outline.
- B. Video: Provide minimum 640 x 480 video resolution converted to format file type acceptable to Owner, on electronic media.
 - 1. Electronic Media: Read-only format compact disc acceptable to Owner, with commercial-grade graphic label.
 - 2. File Hierarchy: Organize folder structure and file locations according to project manual table of contents. Provide complete screen-based menu.
 - 3. File Names: Utilize file names based upon name of equipment generally described in video segment, as identified in Project specifications.
 - 4. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the Equipment Demonstration and Training DVD that describes the following for each Contractor involved on the Project, arranged according to Project table of contents:
 - a. Name of Contractor/Installer.
 - b. Business address.
 - c. Business phone number.

- d. Point of contact.
 - e. E-mail address.
- C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.
 - 1. Film training session(s) in segments not to exceed 15 minutes.
 - a. Produce segments to present a single significant piece of equipment per segment.
 - b. Organize segments with multiple pieces of equipment to follow order of Project Manual table of contents.
 - c. Where a training session on a particular piece of equipment exceeds 15 minutes, stop filming and pause training session. Begin training session again upon commencement of new filming segment.
- D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.
 - 1. Furnish additional portable lighting as required.
- E. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed.
- F. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

END OF SECTION 01 79 00

SECTION 01 91 13

GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 OVERVIEW

- A. This section of the specification describes the process for commissioning, defines the responsibilities of the contractors and design professionals, and outlines the duties of other members of the commissioning team.
- B. The commissioning process shall be applied to all equipment, components, and systems as listed in this section, including specific interfaces to and from equipment and systems provided under separate contracts.
- C. Building Commissioning work is a joint team effort to ensure that all systems function together properly to meet the design intent, and to document system performance parameters for fine-tuning of control sequences and operations procedures. The commissioning process shall encompass and coordinate the traditionally separate functions of system documentation, equipment start-up, control system calibration, testing and balancing, training, and performance testing. This section does not supersede other requirements of the specification though, it may, expand on some of them.

1.2 THE COMMISSIONING TEAM

- A. The commissioning team shall consist of:
 - 1. Design Engineer (DE)
 - 2. Mechanical Contractor (MC)
 - 3. Plumbing Contractor (PC)
 - 4. Electrical Contractor (EC)
 - 5. General Contractor (GC)
 - 6. All appropriate Contractors and Sub-Contractors
 - 7. Approved Representatives of Mechanical, Electrical and Equipment Manufacturers
 - 8. Design Architect (ARCH)
 - 9. Facility Staff (FS)
 - 10. Owner's Representative (OR)

1.3 STANDARD AND CODE COMPLIANCE

- A. Commissioning will be accomplished to comply with, and in accordance with the requirements of the following:
 - 1. 2020 Energy Conservation Construction Code of New York State, Section C408 System Commissioning.

1.4 COORDINATION

- A. Management - The Contractor(s) coordinates the commissioning activities through the Owner's Representative (OR). All members shall work together to fulfill their contracted responsibilities and meet the objectives of the contract documents.
- B. Scheduling - The Contractors, through the OR, will provide sufficient time for scheduling commissioning activities with respect to the Owner's participation. The Contractors will integrate all commissioning activities into the overall project schedule. All parties will address scheduling problems and make necessary notifications in a timely manner in order to expedite the commissioning process.

1.5 COMMISSIONING PLAN

- A. The Design Engineer will develop the Commissioning Plan which shall be followed by the installing contractors.
- B. The Commissioning Plan shall contain the information necessary to document the commissioning process.
- C. The Commissioning Plan will include the following:
 - 1. Narrative description of the activities that will be accomplished during the commissioning process.
 - 2. List of the specific equipment and systems which are scheduled to be commissioned.
 - 3. Functions to be tested.
 - 4. Conditions under which the testing will be performed.
 - 5. Measurable criteria of acceptable performance.

1.6 COMMISSIONING PROCESS

- A. The following narrative provides a brief overview of the commissioning tasks that shall be performed during construction and the general order in which they occur.
 - 1. The prefunctional checklists, developed by the Contractor(s), are to be completed before and during the startup process.
 - 2. Prefunctional checklists, TAB and startup must be completed before functional performance testing.
 - 3. Items of non-compliance in material, installation, or setup shall be corrected at no expense to the Owner.
 - 4. The Contractor ensures that the Subcontractors' prefunctional checklists are executed and documented and that startup and initial checkout are performed. The DE verifies that the TAB has been completed.

5. The Contractor(s) develops equipment and system functional test procedures.
6. The performance tests are executed by the Contractor in cooperation with the OR with the assistance of the facility staff.
7. The Contractor provides the Commissioning Record.
8. Commissioning is to be completed before substantial completion.
9. Deferred testing and/or seasonal verifications are to be conducted as specified or required.
10. Design Engineer (DE) confirms that commissioning activities have been completed.

1.7 DESCRIPTION OF WORK

- A. Commissioning will be performed for the following equipment and systems, and as described in the 2020 Energy Conservation Construction Code of New York State, Section C408 System Commissioning.
 1. HVAC Systems, Fan Coil Units, Unit Heaters and Other Equipment As Noted On HVAC Drawings.
 2. HVAC System Testing and Balancing
 3. Temperature Control Systems
 4. Lighting Controls, Occupancy Sensors, Daylight Controls, Vacancy Sensors
 5. Domestic Hot Water Equipment
- B. The Contractors shall review and verify the commissioning activities to meet the Owner's project schedule and requirements for the interface between all trades in order to prevent delays in the Commissioning Process.
- C. Seasonal commissioning is required under full load conditions during peak heating and peak cooling seasons, as well as part load conditions in the spring and fall. Simulations of peak load conditions may be implemented to allow for complete commissioning of the work.
- D. Systems that are not weather dependent shall be tested under full and partial load to the fullest extent possible.

1.8 ROLES AND RESPONSIBILITIES

- A. Design Engineer/Professional:
 1. Develops the Commissioning Plan.
 2. Include commissioning requirements in the project construction documents.
 3. Confirm, upon project completion, that commissioning has been performed by the Contractor(s) or their authorized representative.

B. Contractor(s):

1. Follow the general commissioning process as outlined in the Commissioning Plan.
2. Develop and utilize Prefunctional Checklists and Functional Test Procedures for all equipment/systems to be commissioned.
3. Provide and document all air and water systems balancing required for the project.
4. Prepare a preliminary commissioning report. This report will minimally include the following:
 - a. List of deficiencies identified during functional performance testing.
 - b. Listing of deferred or seasonal testing that cannot be completed at this time.
 - c. Listing of climatic conditions that will be required to conduct deferred/seasonal tests.
 - d. Functional Performance Test reports completed to date.
5. Make available a copy of the preliminary commissioning report to the Code Office having jurisdiction.
6. Develop an operations and maintenance manual to be provided to the Owner that will minimally include the following (Some of these items may be addressed elsewhere in the project specifications):
 - a. Submittal data of equipment requiring maintenance.
 - b. Manufacturer's maintenance manual for all commissioned equipment.
 - c. Name, address, and contact information for all relevant service agencies.
 - d. Building direct digital control system information including wiring diagrams, schematics and sequences of operations.
 - e. Lighting and lighting control system submittals.
 - f. Schedule for inspection of lighting control systems.
 - g. General narrative of how each commissioned system is intended to operate.
7. Develop a final commissioning report to be delivered to the building Owner. The report will minimally include the following:
 - a. Functional Performance Testing results.

- b. Final results of previously identified system deficiencies.
 - c. Functional testing procedure documentation.
- C. Owner:
 - 1. Participate in the contractor performed training sessions to the extent possible.
 - 2. Provide any system operation schedules and set point information available to the contractor to allow for proper system start-up and operation.

1.9 REFERENCES

- A. Systems commissioning shall generally be accomplished in accordance with the latest version of commissioning publications from one the following industry associations:
 - 1. American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) Guideline 1.1, HVAC&R Technical Requirements for the Commissioning Process.
 - 2. Associated Air Balancing Council, Commissioning Reference Manual.
 - 3. Building Commissioning Association - The Building Commissioning Handbook.

1.10 DOCUMENTATION

- A. Each Contractor shall provide to the OR three (3) copies of the following items as soon as they become available:
 - 1. Certified and approved start-up and testing report forms for all subsystem equipment that comprise the System. Commissioning documentation shall include control schematics of the total system and all subsystems.
 - 2. Records of required inspections for code compliance, and documentation of approved permits and licenses to operate components of the system.
 - 3. Operating data which shall include all necessary instructions to the Owner's operating staff in order to operate the system to specified performance standards.
 - 4. Maintenance data which shall include all necessary information required to maintain all equipment in continuous operating condition, such as the testing, balancing and adjusting report and the as-built drawings.
 - 5. Written notice that building equipment and systems have been completed, tested and are fully operational.
 - 6. Checklist of all submitted contract deliverables such as; operation and maintenance manuals, spare parts, warranties, training, documentation, etc.

PART 2 - PRODUCTS

2.1 TESTING

- A. The Contractor shall provide any equipment or device required for access such as platforms, scaffolds, and spare filters as may be necessary for all verification and testing.
- B. All standard testing equipment required to perform startup and initial checkout and required performance testing shall be provided by the Contractor for the equipment being tested.
- C. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance within the tolerances specified in the specifications, calibration certification will be provided.

PART 3 - EXECUTION

3.1 DESIGN CRITERIA AND INTENT

- A. Design criteria and intent shall be as described in the technical specification sections and contract drawings. The basis of design developed by the DE will be also referenced.

3.2 MEETINGS

- A. Initial Meeting:
 - 1. The Contractor(s), through the OR, will schedule, plan and conduct an initial commissioning meeting. The Contractors and their responsible parties are required to attend.

3.3 STARTUP, CONSTRUCTION CHECKLISTS AND INITIAL CHECKOUT

- A. The following procedures apply to all equipment/systems to be commissioned.
- B. General: Prefunctional checklists are required to verify that the equipment and systems are fully connected and operational. The prefunctional checklists for a given system must be successfully completed and approved prior to startup and formal performance testing of equipment or subsystems of the given system.
- C. Startup and Checkout Plan: The Contractors shall develop prefunctional checklists and startup shall be identified in the commissioning scoping meeting and on the checklist forms.
 - 1. The Contractor/Subcontractor responsible for the purchase of the equipment shall develop the full startup plan by combining the manufacturer's detailed startup and checkout procedures and the prefunctional checklists.
- D. Execution of Construction Checklists and Startup:
 - 1. The Owner and facility personnel as necessary, shall observe procedures for primary equipment.

2. For lower-level components of equipment, (e.g., sensors, controllers), the OR shall be offered the opportunity to observe a sampling of the startup procedures.
 3. The Contractors, Subcontractors and Vendors shall execute startup and provide the OR with a signed and dated copy of the completed startup and construction checklists.
 4. Only individuals employed by the Contractor (Technicians, Engineers, Tradesmen, Vendors, etc.) who have direct knowledge and witnessed that a line item task on the construction checklist was actually performed shall check off that item. It is not acceptable for non-witnessing onsite supervisors to fill out these forms.
- E. Deficiencies, Non-Conformance, and Approval of Checklists and Startup (Master Issues Log):
1. The Contractor shall ensure that the Subcontractors clearly list any outstanding items of the initial startup and construction checklist procedures that were not completed successfully, on an attached sheet. The form and any outstanding deficiencies shall be provided, to the OR within two (2) days of test completion.

3.4 FUNCTIONAL PERFORMANCE TESTING

- A. Requirements: The functional performance testing shall demonstrate that each system is operating according to the documented design intent and contract documents. Functional performance testing facilitates bringing the systems from a state of individual substantial completion to full dynamic operation. Additionally, during the testing process, areas of deficient performance are identified and corrected, improving the operation and functioning of the systems.

3.5 DOCUMENTATION, NON-CONFORMANCE, AND APPROVAL OF TESTS

- A. Documentation: The Contractors shall complete all documentation for performance testing.

3.6 DEFERRED TESTING

- A. Unforeseen Deferred Tests: If any check or test cannot be completed due to the project completion level, weather conditions, or time of season, execution of checklists and functional performance testing may be delayed upon approval of the OR. These tests will be conducted in the same manner as the seasonal tests as soon as possible. Contractors will not be due any additional compensation.
- B. Seasonal Testing: During the warranty period, seasonal testing (tests delayed until weather conditions are closer to the system's design) shall be completed as part of this contract. The Contractor shall coordinate this activity through the OR. Any final adjustments to the O&M manuals and as-built's due to the testing shall be made by the Contractor.

3.7 COMMISSIONING RECORD

- A. The Contractor is responsible to compile, organize and index the following commissioning data, for all commissioned equipment into labeled, indexed and tabbed, or in an electronic format, as preferred by the Owner.
1. Commissioning Plan. (Design Engineer provided.)
 2. System reports including available design narratives and criteria including sequences. Each system shall contain the startup plan and report, approvals, corrections, construction checklists, completed performance tests, trending and analysis, training plan and recommended recommissioning schedule.
 3. Complete issues log inclusive of all items and resolutions.
 4. Final Commissioning Report including an executive summary and a list of participants and roles.
 5. All outstanding non-compliance items shall be specifically listed. Recommendations for improvement to equipment or operations, future actions, commissioning process changes, etc. shall also be listed. Each non-compliance issue shall be referenced to the specific performance test, inspection, trend log, etc. where the deficiency is documented.

END OF SECTION 01 91 13

COMMISSIONING PLAN

Construction Phase SUNY SCCC Elston Hall Lobby and Mohawk Rooms Renovation

Submitted to:

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COMMISSIONING PLAN

SUNY SCCC - ELSTON HALL LOBBY AND MOHAWK ROOMS RENOVATION

Date: _____

1. Overview

A. Definitions:

1. Acceptance: A contractually defined action that permits an activity to commence or continue.
2. Basis of Design: A document that records the concepts, calculations, decisions, and product selections used to meet the Owner's Project Requirements and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.
3. Commissioning: See Commissioning Process.
4. Commissioning Activity: A component of the Commissioning Process.
5. Commissioning Field Report: A document that records the activities and results of the Commissioning Process.
6. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the Commissioning Process.
7. Commissioning Process: A quality-focused process for enhancing the delivery of a project. The process focuses on verifying and documenting that the facility and all of its systems and assemblies are planned, designed, installed, tested, operated, and maintained to meet the Owner's Project Requirements.
8. Commissioning Process Progress and Approval Form: A document that indicates activities completed as part of the Commissioning Process, approval status of the activities, and significant findings from those activities; it is continuously updated during the course of a project.
9. Commissioning Team: The individuals who through coordinated actions, are responsible for implementing the Commissioning Process.
10. Construction Documents: This includes a wide range of documents, which will vary from project to project, Owner's needs, regulations, laws, and countries. Construction documents usually include the project manual (specifications), plans (drawings) and General terms of the contract, especially those required by subcontractors and manufacturer's representative, suppliers and manufacturers of equipment, assemblies and systems.
11. Continuous Commissioning Process: A continuation of the Commissioning Process well into the Occupancy and Operations Phase to verify that a project continues to meet current and evolving Owner's Project Requirements. The

Continuous Commissioning Process activities are on-going for the life of the facility.

12. Contract Documents: This includes a wide range of documents, which will vary from project to project, owner's needs, regulations, laws, and countries. It frequently includes price agreements, construction management process, subcontractor agreements or requirements, requirements and procedures for submittals, changes, and other construction requirements, timeline for completion, and the Construction Documents.
13. Coordination Drawings: Drawings showing the work of all trades to illustrate that equipment can be installed in the space allocated without compromising equipment function or access for maintenance and replacement. These drawings graphically illustrate and dimension manufacturers' recommended maintenance clearances.
14. Functional Test Procedure: A written protocol that defines methods, personnel, and expectations for tests conducted on components, equipment, assemblies, systems, and interfaces among systems.
15. Verification: The process by which specific documents, components, equipment, assemblies, systems, and interfaces among systems are confirmed to comply with the criteria described in the Owner's Project Requirements.

B. Commissioning Scope:

1. Commissioning is a systematic process of ensuring that selected systems perform interactively according to the design intent and the owner's operational needs. This is achieved by beginning in the design phase, documenting the design intent and continuing through construction, acceptance and the warranty period with actual verification of performance.

C. Commissioned Systems:

1. The following equipment and systems will be commissioned in this project by the respective contractors. Refer to Section 5 for additional details. All general references to equipment in this document refer only to equipment that is to be commissioned.
 - a. **[HVAC Systems]**
 - b. **[HVAC System Testing and Balancing]**
 - c. **[Temperature Control Systems]**
 - d. **[Lighting Controls,] [Occupancy Sensors,] [Time Switch Controls,] [Daylight Controls,] [Photo Sensor Controls,] [Programmable Controls,] [Vacancy Sensors]**
 - e. **[Domestic Hot Water Equipment]**
 - f. []
 - g. []

h. []]

2. General Building Information

Project: _____

Location: _____

Building Type: _____

3. Commissioning Team Members

Team Member	Co. & Contact Names	Office, Cell, Fax, Email
Owner		
Primary Contact		
Architect		
Project Architect		
Engineer		
Design Engineer		
Construction Contractors		

4. Contractors/Sub-Contractors

- A. [Mechanical]
- B. [Electrical]
- C. [Plumbing]
- D. [General]
- E. [Testing and Balancing]
- F. [Direct Digital Controls]
- G. [Other]

Note: Contractor(s) will be responsible for providing the project commissioning services in accordance with the requirements of the project Specification Section 019113, applicable code(s) and this Commissioning Plan.

5. Commissioning Process

- A. This section sequentially details the commissioning process by commissioning task or activity.
 - 1. Commissioning Scoping Meeting:

- a. A commissioning scoping meeting is planned and conducted by the Contractor. In attendance are the respective representatives of the Owner, Facility Staff, DE and the mechanical, electrical, controls, and TAB Contractor. At the meeting, commissioning parties are introduced and the commissioning process is reviewed, and management and reporting lines determined. The Cx Plan is reviewed, process questions are addressed, lines of reporting and communications determined and the work products list discussed.

2. Miscellaneous Management Protocols:

- a. The following protocols will be used on this project:

<u>Issue</u>	<u>Protocol</u>
Scheduling of Commissioning Tasks	Contractor provides to Owner's Representative.
Question/Clarifications in regards to Commissioning Specification and/or Commissioning Plan	Contractor provides to Design Engineer.
Schedule of Training	Contractor provides to Owner's Representative who will notify Owner.
Turnover of Commissioning Documentation	Contractor delivers to Owner's Representative.
For Scheduling Commissioning Activities	Contractor to coordinate with Owner's Representative.
For Commissioning Deficiencies	Contractor notifies Owner's Representative and resolves deficiencies with Subcontractor and Equipment Manufacturer Representatives

3. Execution of Pre-functional Checklists and Startup:

- a. The contractors and manufacturer's representatives execute and submit a signed copy of the completed start-up reports and/or Prefunctional checklists to the OR. Further details are found in the Contract Documents.

4. Deficiencies and Non-Conformance:

- a. The Contractor works with the subcontractors and or manufacturer's representative to correct and retest deficiencies or uncompleted items, with involvement from the DE and others as required. The installing contractors or manufacturer's representatives correct all areas that are deficient or incomplete according to the start-up tests.

5. Execution of Functional Testing Procedures:

- a. Overview and Process:
 - 1) The Contractor schedules functional tests through the OR. The Contractor personnel oversees, witnesses and documents the functional testing of all equipment and systems according to the

Contract Documents and the Cx Plan. The Contractors execute the tests. The control system is tested before it is used to verify performance of other components or systems. The air balancing and water balancing is completed and debugged before functional testing of air-related or water-related equipment or systems. Testing proceeds from components to subsystems to systems and finally to interlocks and connections between systems.

b. Deficiencies and Retesting:

- 1) The Contractor documents the results of the test. Corrections of minor deficiencies identified are made during the tests. The Contractor records the results of the test on the procedure or test form. Deficiencies or non-conformance issues are noted and reported to the OR. Contractors correct all deficiencies, notify the OR. Contractor will schedule re-testing with OR.

c. Commissioning Record:

- 1) The Contractor will compile, organize and index the following commissioning data by equipment/system into labeled, indexed and tabbed, three-ring binders or electronically, based on Owner preference.
- 2) The Final Commissioning Record is provided to the Owner and Design Engineer for review.

END OF COMMISSIONING PLAN

SECTION 02 41 19 SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. 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:
 - 1. Demolition and removal of selected portions of building or structure.
 - 2. Salvage of existing items to be reused or recycled.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
- B. Salvage: Detach items from existing construction, in a manner to prevent damage, and.
- C. Salvage and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
- D. Existing: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.
- E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
 - 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 PREINSTALLATION MEETINGS

- A. Pre-Demolition Conference: Conduct conference at Project site.
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 3. Review areas where existing construction is to remain and requires protection.

1.6 INFORMATIONAL SUBMITTALS

- A. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for dust control and, for noise control. Indicate proposed locations and construction of barriers.
- B. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's building manager's and other tenants' on-site operations are uninterrupted.
 - 2. Interruption of services. Indicate how long services will be interrupted.
 - 3. Coordination for shutoff, capping, and continuation of building services.
 - 4. Use of elevator and stairs.
 - 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- C. Pre-Demolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces that might be misconstrued as damage caused by demolition operations. Comply with Section 01 32 33 "Photographic Documentation." Submit before Work begins.

1.7 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.

1.8 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Contract Documents before proceeding with selective demolition.
- D. Storage or sale of removed items or materials on-site is not permitted.

- E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

- 1. Maintain fire-protection facilities in service during selective demolition operations.

1.9 COORDINATION

- A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
 - 2. Arrange to shut off utilities with utility companies.
 - 3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated in Contract Documents to be removed.

- a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
- b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
- c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
- d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
- e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
- f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
- g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.3 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 01 50 00 "Temporary Facilities and Controls."
- B. Remove temporary barricades and protections where hazards no longer exist.

3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.

5. Maintain fire watch during and for at least 2 hours after flame-cutting operations.
 6. Maintain adequate ventilation when using cutting torches.
 7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 10. Dispose of demolished items and materials promptly.
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- C. Salvaged Items:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers.
 3. Store items in a secure area until delivery to Owner.
 4. Transport items to Owner's storage area on-site.
 5. Protect items from damage during transport and storage.
- D. Salvaged and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse.
 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 3. Protect items from damage during transport and storage.
 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.
- B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.
- C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.
- D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site [and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.]
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 - 4. Comply with requirements specified in Section 01 74 19 "Construction Waste Management and Disposal."
- B. Burning: Do not burn demolished materials.

3.7 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 02 41 19

SECTION 06 10 00

ROUGH CARPENTRY

PART 1 GENERAL

1.01 REFERENCES

- A. Standards: Comply with the following unless otherwise specified or indicated on the Drawings:
 - 1. Lumber: American Softwood Lumber Standard PS 20 by the U.S. Department of Commerce. Comply with applicable provisions for each indicated use.
 - 2. Plywood: Product Standard PS 1 for Softwood Plywood, Construction and Industrial by the U.S. Department of Commerce.
 - 3. Plywood Installation: APA Design/Construction Guide, Residential & Commercial by the American Plywood Association (APA).
 - 4. Grading Rules:
 - a. Douglas Fir, Hem-Fir, Idaho White Pine, and other Western Woods: Western Wood Products Association (WWPA) or West Coast Lumber Inspection Bureau (WCLIB).
 - b. Southern Pine: Southern Pine Inspection Bureau (SPIB).
 - c. Redwood: Redwood Inspection Service (RIS).
 - d. Spruce-Pine-Fir: National Lumber Grades Authority (NLGA).
 - 5. Fire-Retardant Treatment: American Wood Preservers' Association (AWPA) Standards.
 - 6. Framing Installation: American Forest and Paper Association (AFPA).

1.02 QUALITY ASSURANCE

- A. Mill and Producers Mark: Each piece of lumber and plywood shall be gradestamped indicating type, grade, mill, and grading agency certified by the Board of Review of the American Lumber Standards Committee. Mark shall appear on unfinished surface, or ends of pieces with finished surfaces.
 - 1. Fire-Retardant Treated Material: Accredited testing agency mark, on each piece of wood, indicating compliance with the fire hazard classification.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Keep materials dry. Make provision for air circulation around and between stacks of wood products.

PART 2 PRODUCTS

2.01 LUMBER

- A. General: Furnish seasoned dimension lumber dressed to nominal sizes indicated with 19 percent maximum moisture content at time of dressing, marked "S-DRY". Comply with dry size requirements of PS 20.
 - 1. Dress: Surfaced 4 sides (S4S) unless otherwise indicated.
- B. Board Lumber; less than 2 inches thick:

1. Exposed Board Lumber, for Paint Finish: Southern Pine No. 1 (SPIB), Douglas Fir 2 Common (WWPA), Select Merchantable (WCLIB), or Spruce-Pine-Fir Appearance (NGLA).
 2. Concealed Board Lumber: Southern Pine No. 3 (SPIB), any species No. 4 (WWPA), any species Standard (WCLIB), or Spruce-Pine-Fir No. 1 / No. 2 (NGLA).
- C. Miscellaneous Lumber: Standard grade, No. 3 grade, or better grade of the following species unless otherwise indicated:
1. Nailers and Blocking: Douglas Fir, Hem-Fir, Idaho White Pine, Southern Pine, or Spruce-Pine-Fir.
 2. Furring: Spruce, Hem-Fir, or Spruce-Pine-Fir except Douglas Fir or Southern Pine for furring required to receive preservative treatment.

2.02 PLYWOOD

- A. Sheathing and Subflooring: APA RATED SHEATHING, EXPOSURE 1. Furnish APA PS 1 veneered panels, with span ratings for the required thicknesses as listed below unless otherwise indicated.

THICKNESS	SPAN RATING
3/8 inch	24/0
1/2 inch	32/16
5/8	40/20
3/4	48/24

2.03 FIRE-RETARDANT TREATMENT

- A. Furnish "FR-S" lumber, complying with AWP Standards for pressure impregnation with fire-retardant chemicals to achieve a flamespread rating of 25 or less, when tested in accordance with UL Test 723, ASTM E 84 or NFPA Test 255.
1. Where treated items are indicated to receive a transparent or paint finish, use a fire-retardant treatment which will not bleed through or adversely affect bond of finish.
 2. Provide UL label or identifying mark on each piece of fire-retardant lumber.
 3. Redry treated items to a maximum moisture content of 19 percent after treatment.

2.04 FASTENERS AND ANCHORING DEVICES

- A. Select and furnish items of type, size, style, grade, and class as required for secure installation of the Work. Items shall be galvanized for exterior locations, high humidity locations, and for use with treated wood. Unless shown or specified otherwise, comply with the following:
1. Nails and Staples: FS FF-N-105.
 2. Wood Screws: FS FF-S-111.
 3. Bolts and Studs: FS FF-B-575.
 4. Nuts: FS FF-N-836.
 5. Washers: FS FF-W-92.
 6. Lag Bolts or Lag Screws: FS FF-B-561.
 7. Masonry Anchoring Devices: Expansion shields, masonry nails and drive screws: FS FF-S-325.
 8. Toggle Bolts: FS FF-B-588.
 9. Bar or Strap Anchors: ASTM A575 carbon steel bars.

10. Wall Plugs: Corrugated type, galvanized steel, 24 USS gage min, not less than 2 inches wide x 2-1/2 inches deep.
11. Metal Hangers and Framing Anchors: Size and type for intended use, galvanized finish, manufacturer's recommended fasteners.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Wood Framing: Install in accordance with applicable provisions of the AFPA "Manual for Wood Frame Construction", unless otherwise indicated.
- B. Plywood:
 1. Install in accordance with APA Design/Construction Guide, Residential & Commercial, unless otherwise indicated.
 2. Fasten in accordance with APA recommendations.
- C. Nailers and Blocking: Attach to substrate as required to support applied loading.

END OF SECTION

SECTION 062000

FINISH CARPENTRY

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Non Load Bearing Framing and Furring: Section 09 22 13.

1.02 REFERENCES

- A. Comply with the applicable provisions of the "Architectural Woodwork Standards" (First Edition-2009) (AWS) except as otherwise specified herein. References to "Premium", "Custom" and "Economy" Grades herein, shall be as defined in that Standard.
- B. Lumber Standard: AWS Section 3.
- C. Panel Products: AWS Section 4.

1.03 SUBMITTALS

- A. Shop Drawings: Show fabrication details and connections to adjacent Work.

1.04 QUALITY ASSURANCE

- A. Mill and Producer's Label: Each lumber and panel item shall bear label indicating type, grade, mill, and grading agency on unfinished surface, or on end of material with finished surfaces.
 - 1. Panels shall bear APA or equivalent grade-mark; each panel.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store materials and completed fabricated wood items in a dry, well ventilated area completely protected from the weather. Comply with temperature and humidity requirements for storage and installation as specified in the applicable quality standards.
- B. Protect sanded and prefinished surfaces during handling and installation. Keep such surfaces covered with polyethylene film or other suitable protective covering.

1.06 PROJECT CONDITIONS

- A. Environmental Requirements: Maintain constant minimum temperature of 60 degrees F and maximum relative humidity of 55 percent in spaces to receive the Work of this Section.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Lumber: Kiln-dried to 12 percent average moisture content for exterior Work; 8 percent for interior Work.
- B. Fasteners:
 - 1. Nails, Spikes, and Staples: Size and type to suit application; non-ferrous metal or galvanized steel for exterior locations, high humidity locations, treated wood, and wood to receive transparent finishes; plain finish for other interior locations.
 - 2. Bolts, Nuts, Washers, Lags, and Screws: Medium carbon steel; size and type to suit application; galvanized for exterior locations, high humidity locations, and treated wood; plain finish for other interior locations.
 - 3. Anchors: Toggle bolt type for anchorage to hollow masonry; expansion shield and lag bolt type for anchorage to solid masonry or concrete; galvanized steel or stainless steel.

2.02 STANDING AND RUNNING TRIM

- A. Comply with AWS Sections 6 and/or 12 as applicable, and as otherwise specified herein.
- B. Interior Woodwork (to receive transparent finish): AWS Custom Grade.
 - 1. Species; Solid Wood: See Drawings.
 - 2. Cut; Solid Wood: Plain sawn.
 - 3. Panel Products: Veneer core or particleboard core plywood.
 - a. Face and Back Veneer Species: Any Group 1 species, A-D-INT APA,
 - b. Cut; Face and Back Veneer: Plain sliced.

2.03 FIRE-RETARDANT TREATMENT

- A. Furnish "FR-S" lumber, complying with AWPA Standards for pressure impregnation with fire-retardant chemicals to achieve a flamespread rating of 25 or less, when tested in accordance with UL Test 723, ASTM E 84 or NFPA Test 255.
 - 1. Where treated items are indicated to receive a transparent or paint finish, use a fire-retardant treatment which will not bleed through or adversely affect bond of finish.
 - 2. Provide UL label or identifying mark on each piece of fire-retardant lumber.
 - 3. Redry treated items to a maximum moisture content of 19 percent after treatment.

2.04 FABRICATION

- A. Machine and sand wood surfaces to comply with the requirements of the AWS Quality Grade specified.
- B. Mill assemble items to largest sizes practicable, to minimize field cutting and jointing. Allow for cutting and fitting where necessary to fit at the Site.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Examine substrate conditions and surfaces upon which finish Work is to be installed. Do not proceed with finish Work until unsatisfactory substrate conditions are corrected.

3.02 PREPARATION

- A. Condition the Work of this Section to average prevailing humidity conditions in installation areas prior to installing.

3.03 INSTALLATION

- A. Comply with workmanship and finishing standard requirements of the AWS Quality Grade specified herein.
- B. Install the Work plumb, level, and free of distortion. Shim where required, with concealed shims.
- C. Cut wood items to fit unless specified to be shop-fabricated, or shop-cut to exact size. Scribe and cut for accurate fit where Work abuts other finish Work. Drill pilot holes at corners before making cutouts.
- D. Distribute defects to the greatest appearance advantage possible.
- E. Trim and Moulding: Install in single, unjointed lengths at openings and for runs less than the maximum lumber length available. For long runs, use only 1 piece less than the maximum length available in any straight run. Stagger joints in adjacent members. Cope moulding at returns. Miter at corners.
- F. Attach the Work securely in place.
 - 1. Nailing: Blind nail where possible. Use finishing nails where exposed. Set nail heads for filling, except for exterior wood scheduled to receive natural finish (if any).
 - 2. Anchoring: Secure the Work to anchors or to blocking which is built-into or directly attached to substrates.

3.04 CLEANING

- A. Clean exposed surfaces of prefinished Work.

3.05 PROTECTION

- A. Protect installed Work from damage by Work of other trades. Maintain temperature and humidity requirements during the construction period in interior installation areas.

END OF SECTION

SECTION 06 40 23.10 PLASTIC LAMINATES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Decorative Plastic Laminate:
 - 1. Standard Decorative Laminates.
 - 2. Decorative Edges and Edgeband.
 - 3. Accessory Materials.
- B. Laminating Adhesives:
 - 1. Shop and field applied contact adhesives for postforming and non-postforming laminate applications.
 - 2. Cold press PVA applications.
 - 3. Hot press PVA applications.
 - 4. Pinch roller/postforming PVA applications.

1.2 RELATED SECTIONS

- A. Section 06 10 00 - Rough Carpentry.

1.3 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM A 792/A 792M: Standard Specification for Steel Sheet, 55% Aluminum- Zinc Alloy-Coated by the Hot-Dip Process.
 - 2. ASTM B 209: Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - 3. ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 4. ASTM E 162: Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source.
 - 5. ASTM E 662: Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
- B. Architectural Woodwork Institute (AWI):
 - 1. AWS: Architectural Woodwork Standards.
- C. Commercial Item Description (CID):
 - 1. CID A-A-1936A: Adhesive, Contact, Neoprene Rubber.
- D. Forest Stewardship Council (FSC):
- E. International Maritime Organization (IMO):
 - 1. IMO FTP: International Code for Application of Fire Test Procedures.
 - 2. IMO FTP Code Part 2: Smoke and Density Test.
 - 3. IMO FTP Code Part 5: Test for Surface Flammability.
- F. International Organization for Standardization (ISO):
 - 1. ISO 4586: High Pressure Decorative Laminates.
 - 2. ISO 9001: Quality Management Systems.
 - 3. ISO 14001: Environmental Management Systems.

- G. Kitchen Cabinet Manufacturers Association (KCMA):
 - 1. KCMA A161.1: Performance & Construction Standard for Kitchen and Vanity Cabinets.
- H. Leadership in Energy and Environmental Design (LEED):
- I. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA LD-3: High Pressure Decorative Laminates.
- J. Fire National Fire Protection Association (NFPA):
 - 1. NFPA 101: Life Safety Code.
- K. National Science Foundation (NSF):
 - 1. NSF 35: High Pressure Decorative Laminates for Surfacing Food Service Equipment.
 - 2. NSF 51: Food Equipment Materials.
- L. Occupational Health and Safety Assessment Series (OHSAS):
 - 1. OHSAS 18001: Occupational Health and Safety Management Systems.
- M. Southern California Air Quality Management District (SCAQMD):
 - 1. SCAQMD Rule 1168: Adhesive and Sealant Applications.
- N. SCS Global Services (SCS):
 - 1. UL 723: Test for Surface Burning Characteristics of Building Materials.
 - 2. UL 2818: GREENGUARD Certification Program for Chemical Emissions for Building Materials, Finishes and Furnishings.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- B. Product Data: Submit the following:
 - 1. Product data for each specified product. Include manufacturer's technical data sheets and published instruction instructions.
 - 2. Safety Data Sheets (SDS).
- C. Shop Drawings: Fully dimensioned shop drawings showing layouts and components, including edge conditions, joinery, terminating conditions, substrate construction, and cutouts and holes. Include elevations, section details, and large scale details. Indicate color, pattern, and finish selections.
- D. Quality Assurance Submittals:
 - 1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties, if required.
 - 2. LEED Submittals: Applicable LEED documentation for potential credits specified in this Section.
 - 3. GREENGUARD Children & Schools.
 - 4. GREENGUARD Indoor Air Quality.
- E. Maintenance Data: Manufacturer's published maintenance manual with closeout submittals.
- F. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square representing actual product, color, and patterns.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer producing products in an ISO 9001, ISO 14001, and OHSAS 18001 certified facility.

- B. Fabricator Qualifications: Minimum of three years documented experience in fabricating decorative plastic laminates similar in scope and complexity of this Project.
- C. Installer Qualifications: Minimum of three years documented installation experience for projects similar in scope and complexity to this Project.
 - 1. Installer shall be the fabricator.
- D. Adhesives, Sealants, and Sealant Primers:
 - 1. SCAQMD (South Coast Air Quality Management District) Rule 1168 for VOC content.
 - 2. Ozone Transport Commission (OTC) model Rule for Adhesives and Sealants.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.
- B. Storage and Protection: Store plastic laminate materials protected from exposure to harmful weather conditions, at temperature and humidity conditions recommended by manufacturer. Store sheet materials flat on pallets or similar rack-type storage to preclude damage.
- C. Handling: Handle materials to avoid damage.

1.7 PROJECT CONDITIONS

- A. Environmental Requirements: Ensure appropriate acclimatization between plastic laminate and substrate prior to fabrication. Condition plastic laminate and substrate surfaces in the same environment for 48 hours prior to fabrication. Condition at approximately 75 degree F (24 degree C) and 45 percent to 55 percent relative humidity.
 - 1. Adhesive: For best results, apply adhesives at temperatures at or above 65 degree F (18 degree C).
- B. Field Measurements: Verify actual measurements and openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

1.8 SEQUENCING

- A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Wilsonart; 2501 Wilsonart Drive, Temple Texas 76504. ASD. Toll Free Tel (800) 433-3222. Tel: (254) 207-7000. Fax: (254) 207-2545.
<http://www.wilsonart.com>.
- B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2.2 DECORATIVE PLASTIC LAMINATE PROPERTIES

- A. Laminate Composition: Decorative surface papers impregnated with melamine resins and pressed over kraft paper core sheets impregnated with phenolic resin. Sheets then bonded together under pressures greater than 1,000 lbs. per sq. in. and high temperatures approaching 300 degree F (149 degree C). Finished sheets trimmed and backs sanded to

facilitate bonding to substrate.

B. Surface Burning Characteristics:

1. Test Standards: ASTM E 84, ASTM E 162, ASTM E 662, IMO FTP Code Part 2 and Part 5, and UL 723.
2. Interior Finish Classification, Fire-Rated Laminate: Class A according to NFPA 101. Flame spread less than 25 and Smoke Developed less than 450.

2.3 STANDARD DECORATIVE LAMINATES

A. Product: "Wilsonart Laminate."

B. Enhanced Laminate Performance: Fabricate laminate with AEON Enhanced Performance Technology for increased surface wear resistance and surface abrasion.

C. General Purpose Laminate Product: "Wilsonart Type 107."

1. Sheet Thickness: 0.048 inch (1.2 mm) nominal.
2. Laminate Conformance Standard: NEMA LD 3, Grade HGS.
3. Laminate Conformance Standard: ISO 4586, Grade HGS.
4. Color, Pattern, and Finish: Selected from manufacturer's full range of available selections.

D. Vertical Surface Laminate Product: "Wilsonart Type 335."

1. Sheet Thickness: 0.028 inch (0.7 mm) nominal.
2. Laminate Conformance Standard: NEMA LD 3, Grades VGS and VGP.
3. Laminate Conformance Standard: ISO 4586, Grades VGS and VGP.
4. Color, Pattern, and Finish: Selected from manufacturer's full range of available selections.

2.4 DECORATIVE EDGES AND EDGE BANDS

A. Decorative Edge Products: "Wilsonart Decorative Edges."

1. Beveled Edge, FE Profile.
2. Cascade Edge, FE Profile.
3. Crescent Edge, FE Profile.
4. Beveled Edge, SE Profile.
5. Cascade Edge, SE Profile.
6. Crescent Edge, SE Profile.
7. Color, Pattern, and Finish: Selected from manufacturer's full range of available selections.

B. Edgeband Products: "Wilsonart Edgeband."

1. Composition: ABS/PVC extruded fabrication.
2. Color, Pattern, and Finish: Selected from manufacturer's full range of available selections.

2.5 ACCESSORY MATERIALS

A. Substrate Repair Materials: Following products are acceptable for repairing damaged high pressure decorative laminate or wood substrates:

1. J-B Weld WoodWeld.
2. Elmer's Carpenter's Wood Filler.
3. Bondo All-Purpose Putty.

B. Substrate Cleaning Materials: Following products are acceptable; do not use a cleaner that will leave an oily residue and do not use to thin adhesive products:

1. Wilsonart 110 Adhesive Solvent.
2. Wilsonart 121 Adhesive Cleaner.
3. Wilsonart 130 Low VOC Adhesive Solvent.
4. Wilsonart 131 Adhesive Cleaner. OTC compliant.
5. Wilsonart 131A Adhesive Cleaner Aerosol. OTC compliant.
6. Windex with ammonia.
7. Non-proprietary acetone, isopropyl alcohol, or denatured alcohol cleaning material.

C. Self-Edging Adhesive: Wilsonart 30 PVA Yellow Wood Glue.

D. Contact Adhesive:

1. Product: "Wilsonart 1730/1731 Low VOC Contact Adhesive."
2. Description: High solids, low VOC contact adhesive for non-postforming applications.

E. Contact Adhesive, Water-Based:

1. Product: "Wilsonart H20."
2. Description: Non-flammable low VOC water-based contact adhesive for postforming applications.

F. Polyvinyl Acetate (PVA) Adhesive:

1. Product: "Wilsonart PVA Adhesive."
2. Description: PVA-based adhesives for bonding decorative laminate to wood substrates. Acceptable for cold press, hot press, and postforming applications.

2.6 CONTACT ADHESIVES

A. Non-postforming:

1. 1730/1731 Low VOC Contact Adhesive.
2. 730/731 Contact Adhesive, low VOC canister.

B. Postforming:

1. H2O Contact Adhesive, water-based.

C. Water-resistant, non-staining bond for common High Pressure Laminate (HPL) applications.

D. Limitations: Avoid contact with copper. Avoid vinyl surfaces containing plasticizers.

3 EXECUTION

3.1 EXAMINATION

- A. Examine surfaces for conditions that could adversely affect the performance of the decorative plastic laminate installation, including edge performance.
- B. Surfaces to be adhesively bonded shall be clean, dry and free of any dust, loose paint, wax, moisture, dirt, grease, oil, rust, or other contaminants.
- C. Commencement of work will constitute acceptance of existing conditions and surfaces to receive the work.

3.2 INSTALLATION, GENERAL

- A. Install materials according to referenced Specification Sections and the following conformance standards as applicable:
 1. AWI AWS.
 2. KCMA A161.1.

- B. To avoid stress cracking, do not use square-cut inside corners. All inside corners to have a minimum 1/8 inch radius and all edges routed smooth.
- C. Drill oversized holes for screws, bolts, and similar fasteners. Slightly countersink fasteners into face side of laminate-clad substrate.
- D. Use carbide-tipped saw and router blades for cutting, with high tool speed and low feed speed. Keep cutting blades sharp. Use appropriate hold-downs to prevent vibration.

3.3 ADHESIVE SPRAY APPLICATIONS

- A. Comply with adhesive manufacturer's printed installation instructions.
- B. Apply contact adhesive uniformly to both surfaces and with a minimum 80 percent coverage for each surface. Apply PVA adhesive to one side with a minimum 80 percent coverage.
- C. Apply two coats of adhesive to porous surfaces. Provide 100 percent coverage for edges.
- D. Apply uniform downward pressure (30 to 40 psi minimum) across the entire bonded surface.

3.4 ADHESIVE BRUSH APPLICATIONS

- A. Comply with adhesive manufacturer's printed installation instructions.
- B. Apply contact adhesive uniformly to both surfaces with a brush or solvent-resistant medium nap roller; cover each surface 100 percent. Apply PVA adhesive to one side, for 100 percent coverage.
- C. Provide two coats of adhesive on porous surfaces. Double coat edges.
- D. Apply uniform downward pressure (30 to 40 psi minimum) across the entire bonded surface.

3.5 CLEANING AND PROTECTION

- A. Clean decorative plastic laminate according to manufacturer's printed care and maintenance instructions.
- B. Protect installed products and finish surfaces from damage during remainder of construction period.

END OF SECTION

SECTION 07 92 00

JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Nonstaining silicone joint sealants.
 - 2. Latex joint sealants.

1.2 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.
- B. Samples: For each kind and color of joint sealant required.
- C. Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.

1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Preconstruction laboratory test reports.
- C. Field-adhesion-test reports.
- D. Sample warranties.

1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

1.5 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

- A. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 NONSTAINING SILICONE JOINT SEALANTS

- A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C 1248.
- B. Silicone, Nonstaining, S, NS, 50, NT: Nonstaining, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.
- C. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

2.3 JOINT-SEALANT BACKING

- A. Cylindrical Sealant Backings: ASTM C 1330, [Type C (closed-cell material with a surface skin)] [Type O (open-cell material)] [Type B (bicellular material with a surface skin)] [or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated], and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

2.4 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove laitance and form-release agents from concrete.
 - 2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces.

3.2 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with ASTM C 1193 and joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
- C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 1. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

END OF SECTION 07 92 00

SECTION 08 11 02

STEEL DOOR FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Steel doors and frames, including borrowed lites; sidelights; vision lites; glass moldings and stops; louvers; panels; hardware reinforcements; and accessories as shown in the contract documents.

1.02 REFERENCES

- A. ANSI- American National Standard Institute
 - 1. A240: Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications.
 - 2. A250.4-2001 Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcings.
- B. NAAMM National Association of Architectural Metal Manufacturers
 - 1. HMMA 830-1997 Hardware Preparations and Locations for Hollow Metal Doors and Frames.
 - 2. HMMA 831-1997 Recommended Hardware Locations for Hollow Metal Doors and Frames.
 - 3. HMMA 840-1999 Guide Specification for Installation and Storage of Hollow Metal Doors and Frames.
 - 4. HMMA 861-2000 Guide Specification for Commercial Hollow Metal Doors and Frames.

1.03 DEFINITIONS

- A. Steel Door and Frame Manufacturer: Manufacturer of steel doors and frames regularly engaged in the manufacturing of such products for use in commercial, institutional, educational and other similar applications.
- B. Company Field Advisor(s): An employee of the steel door and frame manufacturer who is certified in writing by the manufacturer to be technically qualified in design, installation, and servicing of products.
- C. Steel Door and Frame Distributor: Distribution Company who regularly engages in the distribution of steel doors and frames of the manufacturer whose doors and frames are submitted for this project.
- D. Certified Installation Supervisor: Designated supervisor/installer, who has a minimum three years experience in steel frame and door installation, and is certified in writing by the steel door and frame manufacturer as qualified and responsible to ensure approved steel frames and doors are installed, adjusted, and operate properly.

1.04 SUBMITTALS

- A. Waiver of Submittals: "Waiver of Certain Submittal Requirements" in Section 01330 does not apply to this Section.
- B. Submittals Packages
 - 1. Door Frame Schedule and Shop Drawings Package: Submit as a complete

package. Incomplete packages will be returned unreviewed.

- a. Quality Assurance Submittal
 - 1) Certification of Compliance as described in the Quality Assurance Article.
 - 2) Company Field Advisor's Qualification Data
 - a) Name of Company Field Advisor and Employer's name, business address and telephone number and e-mail address.
 - b) Names and addresses of 3 similar projects Company Field Advisor has worked on during the past three years.
 - c) Written certification on steel door and frame manufacturer's letterhead that Company Field advisor is technically qualified in design, installation, and servicing of the products furnished for this Project.
 - 3) Certified Supervisor's and Installer's Qualification Data
 - a) Name of Supervisor and each Installer performing Work, and Employer's name, business address and telephone number.
 - b) Names and addresses of 3 similar projects Supervisor and each Installer has worked on during the past three years.
 - c) Written certification on steel door and frame manufacturer's letterhead that Supervisor/Installer is technically qualified to ensure approved steel frames and doors are installed, adjusted, and operate properly.
- b. Door Frame Schedule:
 - 1) Include a Cover Sheet that lists:
 - a) OGS project name, project number, and project address.
 - b) Manufacturer's name, address, and telephone number.
 - c) Distributor's name, address, and telephone number.
 - d) Shop drawing preparer's name, and telephone number and e-mail address.
 - e) Submission date.
 - 2) List by opening
 - a) Door Frame number and location by building and room name. Use same reference numbers for openings and as those shown on Contract Drawings.
 - b) Frame type, width, height, jamb depth, gage, anchor type and options.
 - c) Door frame elevations; head and jamb profiles and details; welding requirements; and reinforcements.
 - d) Undercut.
 - e) Hardware Set.
 - f) Show dimensioned elevations; construction details of each door including vertical and horizontal edge details; and frame details for each type, including dimensions profiles; locations for finish hardware, including cutouts and reinforcements; gage of reinforcements; details of connections; anchors and accessories; and details of conduit and preparations for electrified door hardware and controls.
 - 3) Product Data: Manufacturer's catalog sheets, specifications, and detailed installation instructions. Highlight products and options pertaining to this Project. Cross out information irrelevant to this Project.
 - 4) Manufacturer's Written Certification of Compliance that their products conform to the requirements of the references named in

- the References Article of this specification section, and as modified by this specification.
- 5) Samples:
- a) Frames: Corner sample of each type, 18 x 18 inches, with mortises and reinforcements, factory primed or factory finished, as required.
2. Closeout Submittals: Submit as a complete package.
- a. Operation and Maintenance Manuals: Furnish 2 (two) hard cover three ring binders with project name and number prominently displayed on the front cover and the spine.
- b. Listing of Manufacturer, address and contact information
- c. Approved Door and Frame Submittal including shop drawings and product data sheets
- d. Manufacturer's dated warranty for this specific project identified by Facility, OGS project number, and manufacturer's order number.
- e. Certification: Written certification from the Company Field Advisor that their products are installed according to manufacturer's printed installation instructions, and are operating properly.

1.05 QUALITY ASSURANCE

- A. Uniformity and single source responsibility:
1. Provide steel doors and frames from a single source manufacturer who specializes in this type of work.
- B. Certification of Compliance: A statement, written on steel door and frame manufacturer's letterhead, that certifies their products, submitted for this Project, have been tested and comply with references named in the References Article of this specification section, and as modified by other requirements this specification.
- C. Construction Verification: In order to determine if the products furnished comply with the specifications, the Director may choose one or more doors and frames for examination. The examination may involve cutting doors to expose the internal construction to inspect reinforcements, cores, welds and other construction details.
- D. Field Measurements: Verify existing openings by field measurements before fabrication and indicate measurements on shop drawings.
- E. Pre-installation Conference: When steel frames are on site, and before steel frame installation begins, the Director's Representative shall call a conference at the site to review the approved Steel Door Frame Submittal, approved Finish Hardware Submittals, and proper installation procedures for the Work as well as:
1. Pre-installation inspection of Frames
- a. Use and coordination of approved Steel Door Frame submittals with approved Finish Hardware Submittals in the pre- installation inspection process
- b. Reading and understanding manufacturer's Door Frame tags
- e. Inspection and verification of hardware reinforcement and preparations in frame head and jambs.
- f. Inspection and verification of required anchors and fasteners.
2. Review of maximum allowable clearances between frames and doors; doors and floor; and meeting stiles of doors, and verification methods.
3. Verification of plumb, square and level frame installation with jamb rabbets parallel to one another.
4. Review of proper frame installation tools.

The contractor, frame installers, certified Company Field Advisor, inspector shall attend

the conference. Facility personnel may attend.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver door frames in heavy paper cartons or other protective packaging. Remove any plastic protective wrap from the package.
- B. Store frames under cover, in a dry area, on raised platforms in vertical position with minimum 4 inch blocking between units to allow air circulation.
- C. Clearly label packaging, and frames, for identification and installation location.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Hot-Rolled Steel Sheets and Strip: Commercial quality carbon steel, pickled and oiled, complying with ASTM A1011/A1011M-04a 2004.
- B. Cold-Rolled Steel Sheets: Commercial quality carbon steel complying with ASTM A1008/A1008M-04b 2004.
- C. Galvannealed Steel Sheets: Zinc Iron Alloy-Coated carbon steel sheets of commercial quality complying with ASTM A 653/653M, with A 60 zinc coating.
- D. Anchors and Supports: Fabricate of not less than 16 gage sheet steel unless otherwise indicated.
 - 1. Galvanized Units: Galvanize anchors and supports to be used with galvanized frames, complying with ASTM A 153, Class B.
- E. Anchorage Devices, Bolts, and Other Fasteners: Manufacturer's standard units unless otherwise indicated.
 - 1. Galvanized Units: Galvanize items and comply with ASTM A 153, Class C or D as applicable.

2.02 FRAMES

- A. General:
 - 1. Furnish steel frames for doors, transoms, sidelites, borrowed lites, and other openings, as shown, of size and profile as indicated.
 - 2. Construction: Knock down construction
 - a. Fixed Stops: Integral 5/8 inch stop unless otherwise shown.
 - b. Removable Beads: Removable steel beads secured with machine screws. Form corners with butted hairline joints.
 - 3. Do not drill frames for silencers.
 - 4. Weld steel shipping spreaders to the underside of the jamb legs, requiring removal of the spreaders prior to frame installation.
- B. Interior Frames: Form of hot-rolled steel sheets, not less than 14 gage, zinc alloy iron coated A60 galvannealed.
- C. Wall Anchors: Unless otherwise specified or shown, formed of not less than 16 gage galvannealed steel.
 - 1. Masonry Construction: Adjustable, corrugated or perforated T-shaped to suit frame size with leg not less than 2 inches wide by 10 inches long.

- Furnish at least 3 anchors per jamb up to 7'6" jamb height; 4 anchors per jamb up to 8 foot jamb height; one additional anchor per jamb for each 24 inches or fraction thereof over 8 feet high.
2. Steel Stud Construction: Weld-in type welded to back of frame unless otherwise indicated or approved. Furnish at least 4 anchors per jamb up to 7'-6" jamb height; 5 anchors per jamb to 8 foot jamb height; one additional anchor per jamb for each 24 inches or fraction thereof over 8 feet high.
 3. Anchors for Completed Openings: Anchorage devices designed to secure frame to in-place concrete or in-place masonry construction, as applicable. Furnish at least 5 anchors per jamb up to 7'-6" jamb height; 6 anchors per jamb to 8 foot jamb height; one additional anchor per jamb for each 12 inches or fraction thereof over 8 feet high.
- D. Floor Anchors: Furnish floor anchor for each jamb and mullion which extends to floor, formed of not less than 16 gage steel, with 2 holes to receive fasteners, welded to bottom of jamb or mullion, and galvanized if used with galvanized frames

2.03 FABRICATION

- A. Fabricate steel door frame units to be rigid, neat in appearance, and free from warp, buckle and defects. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To assure proper assembly at Project site, clearly identify items that cannot be permanently factory-assembled before shipment.
- B. Exposed Fasteners: Countersunk flat, or oval head torx center pin screws and bolts. Unless otherwise indicated, locate fasteners 2 inches from ends of members and not more than 12 inches apart.
- C. Finish Hardware Reinforcements:
 1. Minimum 10 gage continuous reinforcement for continuous hinges.
 2. Install 7 gage reinforcement for butt hinges, or hinge reinforcement in door edge may be one piece 12 gage channel full door height with extruded hinge screw holes having an average minimum thread pull-out strength of 1600 pounds per hole.
 3. Minimum 12 gage reinforcement for other hardware.
 4. Weld 14 gage steel tongues, 1-1/2 inches high, inside lock mortise to keep lock body centered in door.
 5. Closer reinforce doors and provide full profile closer reinforcement in frames for full width of opening, whether or not closers are specified.
- D. Finish Hardware Preparation:
 1. Factory prepare frames to receive mortised and concealed hardware, including cutouts; reinforcing; drilling and tapping, in accordance with approved Finish Hardware Schedule and templates furnished by hardware manufacturers.
 2. Factory reinforced frames to receive surface applied hardware. Drill and tap for surface applied hardware at project site.
- E. Factory Prime Painting:
 1. Chemically wash, rinse, and dry exposed and concealed surfaces of fabricated units.
 2. Apply one coat of primer with vinyl binder to surfaces and oven-bake units.
 3. Units shall be capable of passing the following tests:

- a. Salt Spray Test complying with ASTM B 117-97 for 120 continuous hours.
- b. Water Fog Test complying with ASTM D 1735-97 for 240 continuous hours.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Examine substrates, areas and conditions, with installer present under which frames are to be installed for defects that will adversely affect execution and quality of Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 PREPARATION

- A. Prior to installation adjust and securely brace door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - 1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - 2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - 3. Twist: Plus or minus 1/16", measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - 4. Plumbness: Plus or minus 1/16 inch, measured at jamb face on a perpendicular line from head to floor.
- B. Drill and tap doors and frames to receive non-templated mortised and surface mounted hardware.

3.03 INSTALLATION

- A. General: Install steel door frames plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
 - 1. Frames: Install frame of size and profile indicated. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set.
 - a) Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - b) Check plumb, squareness, and twist of frames as walls are constructed. Adjust as necessary to comply with installation tolerances.
 - 2. Installation Tolerances: Adjust door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a) Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b) Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c) Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d) Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

3.04 ADJUSTING AND CLEANING

- A. Final Adjustments:
 - 1. Leave work in complete and proper operating condition.

2. Remove and replace defective work including frames that are warped, bowed, or otherwise unacceptable.

- B. Clean foreign materials off steel doors and frames immediately after installation.

3.05 FINAL INSPECTION

- A. Upon completion of the project, the Director's representative will schedule a final inspection to verify doors and frames are properly installed and adjusted. The contractor, door and frame installer, and design representative will attend.
- B. Upon verification, the design representative will certify in writing components are properly installed and adjusted within referenced tolerances in accordance with this specification. Include this certification in the Close-out Submittals.

END OF SECTION

SECTION 08 14 00 FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Interior flush wood doors.
 - 2. Stile and rail wood doors.
- B. Related Requirements:
 - 1. Section **08 71 00**: Door hardware.

1.2 PREINSTALLATION MEETINGS

- A. Conduct pre-installation meeting at Project site.
- B. Discussion Topics:
 - 1. Delivery, storage, and handling.
 - 2. Coordination with hardware installers.
 - 3. Protection of installed doors.

1.3 ACTION SUBMITTALS

- A. Product Data: Each type of door and finish.
 - 1. Core and edge construction.
 - 2. Finishes.
- B. Shop Drawings and Schedule:
 - 1. Use same unit designations used in Contract Documents.
 - 2. Hardware preparation.
- C. Samples for Selection:
 - 1. Available standard **stain** colors and gloss options. Submit samples in the form of actual materials; printed brochures are not acceptable.
- D. Samples for Verification:
 - 1. Each required veneer species and factory finish; corner unit showing construction and finish minimum 8 by 10 inches.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.
- B. Manufacturer warranties transferrable to Owner.

1.5 QUALITY ASSURANCE

- A. Mock-Ups: Supply doors for room mock-ups specified in Division 01.
 - 1. Acceptable mock-ups in satisfactory condition at Substantial Completion may remain as part of the Work.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Package factory-finished doors individually in manufacturer's standard plastic bags, stretch wrap, or cardboard cartons.
- B. Store doors inside building in clean, dry location.
- C. Mark each door on top bottom rail with opening number used on Shop Drawings.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weather tight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity at occupancy levels during remainder of construction period.

1.8 MANUFACTURER WARRANTIES

- A. Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Warping (bow, cup, or twist) more than 1/4 inch (6 mm) in 42-by-84-inch (1065-by-2130-mm) section.
 - b. Telegraphing of core construction in face veneers exceeding 0.01 inch in 3-inch (0.25 mm in 76-mm) span.
 - 2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
- B. Warranty Periods:
 - 1. Solid-Core Interior Doors: Life of installation.
 - 2. Interior Stile and Rail Doors : Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Products of Aspiro™ Series | Marshfield-Algoma by Masonite Architectural are specified to indicate requirements for quality and appearance.
 - 1. Website: masonite.com/architectural/products/aspiro-series
 - 2. Phone: 877.332.4484
- B. Source Control: Supply all wood doors from a single manufacturer.

2.2 MANUFACTURING STANDARDS

- A. Interior Flush Wood Doors: Window & Door Manufacturers Association publication ANSI/WDMA I.S. 1A "Industry Standard for Interior Architectural Wood Flush Doors".
- B. Interior Stile and Rail Wood Doors: Window & Door Manufacturers Association publication ANSI/WDMA I.S. 6A "Industry Standard for Interior Architectural Wood Stile and Rail Doors".

2.3 STILE AND RAIL WOOD DOORS

- A. Basis of Design: Aspiro™ Series by Masonite Architectural – Authentic Stile and Rail.
- B. Interior Stile and Rail Doors with Transparent Finish:
 - 1. WDMA Quality grade: Custom.
 - 2. WDMA Performance Level: Heavy Duty.
 - 3. Panel Type: As indicated in door elevations on Drawings.
 - 4. Panel Arrangement: As indicated in door elevations on Drawings.
 - 5. Stiles and Rails: Veneer on structural composite lumber.
 - 6. Veneer:
 - a. Species: Cherry.
 - b. Grade: A.
 - 7. Wood Panels:
 - a. Design: Raised panels in standard profile selected by Architect.
 - b. Panel Moldings: Same species as face veneer in standard profile selected by Architect.

2.4 DOOR CORE MATERIALS

- A. Particleboard: Wood-based particleboard; ANSI A208.4, Grade LD-2 as required to meet WDMA Performance Duty level specified without added blocking..
- B. Structural Composite Lumber: WDMA T.M.10.

2.5 FABRICATION

- A. Factory Fitting: Fit to frame openings with clearances specified in WDMA I.S. 1A.
 - 1. Undercut: Maximum 3/8 inch (10 mm) above thresholds.
- B. Factory Machining: Machine doors for hardware that is not surface applied.
 - 1. Verify dimensions for hardware mortises in metal frames before machining.

2.6 FINISHES

- A. Finish Grade: Match grade of door.
- B. Transparent: WDMA TR-8, UV-Cured Acrylated Polyester/Urethane.
 - 1. Staining: **Match Architect's sample.**
 - 2. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that door frames are plumb, square, and accurate size.
- B. Inspect each door before installation for damage and defects per WDMA Section F-6.

3.2 INSTALLATION

- A. Hardware installation is conforming to Section 08 7100 – Door Hardware.
- B. Reference Standards:
 - 1. Wood Doors: **WDMA I.S. 1A and WDMA I.S. 6A.**
- C. Align doors with uniform vertical and top edge clearance.

3.3 REPAIR

- A. Repair of damage or defects is subject to Architect's acceptance, including removal of soiling. Provide new replacement doors for doors that cannot be satisfactorily repaired.

3.4 PROTECTING AND CLEANING

- A. Protect installed doors from damage and soiling.
- B. Clean doors shortly before inspection for Substantial Completion.

END OF SECTION

SECTION 08 15 05 FIRE-RATED WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. **Interior** Stile and rail wood doors.
- B. Related Requirements:
 - 1. Section **08 71 00** Door hardware.
 - 2. Section **09 90 00** Painting.

1.2 PREINSTALLATION MEETINGS

- A. Conduct pre-installation meeting at Project site.
- B. Discussion Topics:
 - 1. Delivery, storage, and handling.
 - 2. Coordination with hardware installers.
 - 3. Protection of installed doors.

1.3 ACTION SUBMITTALS

- A. Product Data: Each type of door and finish.
 - 1. Core and edge construction.
 - 2. Fire rated doors.
 - 3. Finishes.
- B. Shop Drawings and Schedule:
 - 1. Use same unit designations used in Contract Documents.
 - 2. Hardware preparation.
- C. Samples for Selection:
 - 1. Available standard stain colors and gloss options. Submit samples in the form of actual materials; printed brochures are not acceptable.
- D. Samples for Verification:
 - 1. Each required veneer species and factory finish; corner unit showing construction and finish minimum 8 by 10 inches (200 by 250 mm) .

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.
- B. Manufacturer warranties transferrable to Owner.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Certified for chain of custody by an FSC-accredited certification body.
- B. Vendor Qualifications: Certified for chain of custody by an FSC-accredited certification body.
- C. Mock-Ups: Supply doors for room mock-ups specified in Division 01.
 - 1. Acceptable mock-ups in satisfactory condition at Substantial Completion may remain as part of the Work.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Package factory-finished doors individually in manufacturer's standard plastic bags, stretch wrap, or cardboard cartons.
- B. Store doors inside building in clean, dry location.
- C. Mark each door on top bottom rail with opening number used on Shop Drawings.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weather tight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity at occupancy levels during remainder of construction period.

1.8 MANUFACTURER WARRANTIES

- A. Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Warping (bow, cup, or twist) more than 1/4 inch (6 mm) in 42-by-84-inch (1065-by-2130-mm) section.
 - b. Telegraphing of core construction in face veneers exceeding 0.01 inch in 3-inch (0.25 mm in 76-mm) span.
 - 2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
- B. Warranty Periods:
 - 1. Interior Stile and Rail Doors: Life of installation.

PART 2 - PRODUCTS

PART 3 - MANUFACTURERS

- A. Basis of Design: Products of Aspiro™ Series | Marshfield-Algoma by Masonite Architectural are specified to indicate requirements for quality and appearance.
 - 1. Website: masonite.com/architectural/products/aspiro-series
 - 2. Phone: 877.332.4484
- B. Source Control: Supply all wood doors from a single manufacturer.

3.2 MANUFACTURING STANDARDS

- A. Interior Stile and Rail Wood Doors: Window & Door Manufacturers Association publication ANSI/WDMA I.S. 6A "Industry Standard for Interior Architectural Wood Stile and Rail Doors".
- B. Fire-Rated Wood Doors: Conforming to NFPA 80; listed and labeled for required ratings based on testing at positive pressure NFPA 252 or UL 10C by UL or other testing agency acceptable to authorities having jurisdiction
 - 1. Temperature-Rise Limit: **Where indicated**, provide doors that have a maximum transmitted temperature end point of not more than 250 deg F (121 deg C) above ambient after 30 minutes of standard fire-test exposure.
 - 2. Blocking: Provide composite blocking approved for use in doors of fire-protection ratings indicated as needed to maintain WDMA performance level and eliminate through-bolting hardware.
 - 3. Vertical Edge Construction:
 - a. Category A Positive Pressure: Integral intumescent seals concealed by outer stile where required.
 - b. Category B Positive Pressure: Intumescent seals applied to door frame per requirements of Section 08 7100 Door Hardware where required.
 - 4. Pairs: Formed-steel edges and astragals with intumescent seals as required for ratings.
 - a. Steel edges and astragals factory primed for field painting.
 - b. Veneer wrapped steel edges in same species and finish as door faces.
 - c. Steel edges and astragals with baked enamel in color selected by Architect from manufacturer's standard offering.
 - d. Stainless steel edges and astragals, #4 satin polish.

3.3 STILE AND RAIL WOOD DOORS

- A. Basis of Design: Aspiro™ Series | Marshfield-Algoma™ by Masonite Architectural – Authentic Stile and Rail.
- B. Interior Stile and Rail Doors with Transparent Finish :
 - 1. WDMA Quality grade: **Custom**.

2. WDMA Performance Level: **Heavy Duty**.
3. Panel Type: **As indicated in door elevations on Drawings**.
4. Panel Arrangement: **As indicated in door elevations on Drawings**.
5. Stiles and Rails: Veneer on structural composite lumber.
6. Veneer:
 - a. Species: **White Birch, Cherry, White Maple, Red Oak**.
 - b. Cut: **Rotary cut, Plain sliced Quarter sliced**.
 - c. Grade: **A**.
7. Wood Panels:
 - a. Design: **Raised panels in standard profile selected by Architect**.
 - b. Panel Moldings: Same species as face veneer in standard profile selected by Architect.

C. Interior Fire-Rated Stile and Rail Wood Doors :

1. WDMA Quality Grade: **Custom**.
2. WDMA Performance Level: **Heavy Duty**.
3. Match appearance characteristics of non-rated stile and rail doors.

3.4 DOOR CORE MATERIALS

- A. Particleboard: Wood-based particleboard; ANSI A208.4, Grade LD-2 as required to meet WDMA Performance Duty level specified without added blocking..
- B. Structural Composite Lumber: WDMA T.M.10.

3.5 FABRICATION

- A. Door Pairs :
 1. Veneer Matching: **Pair match**.
- B. Factory Fitting: Fit to frame openings with clearances specified in WDMA I.S. 1A.
 1. Undercut: Maximum 3/8 inch (10 mm) above thresholds.
 2. Fire-Rated Doors: Comply with NFPA 80.
- C. Factory Machining: Machine doors for hardware that is not surface applied.
 1. Verify dimensions for hardware mortises in metal frames before machining.

3.6 FINISHES

- A. Finish Grade: Match grade of door.
- B. Transparent: WDMA TR-8, UV-Cured Acrylated Polyester/Urethane.

1. Staining: **Standard color selected by Architect.**
2. Sheen: Satin.

PART 4 - EXECUTION

4.1 EXAMINATION

- A. Verify that door frames are plumb, square, and accurate size.
- B. Inspect each door before installation for damage and defects per WDMA Section F-6.

4.2 INSTALLATION

- A. Hardware installation is conforming to Section 08 7100 – Door Hardware.
- B. Reference Standards:
 1. Wood Doors: **[WDMA I.S. 1A] [and] [WDMA I.S. 6A]**.
 2. Fire-Rated Doors: NFPA 80.
- C. Align doors with uniform vertical and top edge clearance.

4.3 REPAIR

- A. Repair of damage or defects is subject to Architect's acceptance, including removal of soiling. Provide new replacement doors for doors that cannot be satisfactorily repaired.

4.4 PROTECTING AND CLEANING

- A. Protect installed doors from damage and soiling.
- B. Clean doors shortly before inspection for Substantial Completion.

END OF SECTION

SECTION 08 41 13

ALUMINUM STOREFRONTS

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 covers Kawneer Architectural Aluminum Storefront Systems, including perimeter trims, stools, accessories, shims and anchors, and perimeter sealing of storefront units.
- B. Types of Kawneer Aluminum Storefront Systems include:
 - 1. Trifab® VersaGlaze® 451 Framing System
 - a. 2" x 4-1/2" (50.8 mm x 114.3 mm) nominal dimension
 - b. Non-thermal
 - c. Front, center, back, multi-plane, structural silicone or weatherseal (type B) glazed
 - d. Screw spline, shear block, stick, or punched opening
- C. Related Sections:
 - 2. 079200: Joint Sealants
 - 7. 088000: Glazing

1.3 DEFINITIONS

- A. For fenestration industry standard terminology and definitions, refer to the Fenestration & Glazing Industry Alliance (FGIA) Glossary (AAMA AG-13).

1.4 PERFORMANCE REQUIREMENTS

- A. General Performance:
 - 1. Product to comply with the specified performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction, as determined by testing of aluminum storefront systems representing those indicated for this project.
 - 2. Aluminum storefront systems shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
 - 3. Failure includes any of these events:
 - a. Thermal stresses transferring to building structure
 - b. Glass breakage
 - c. Loosening or weakening of fasteners, attachments, and other components
 - d. Failure of operating units

- B. Delegated Design:

1. Design aluminum storefront systems, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
3. Without interior seal, air leakage rate shall not exceed 0.06 cfm/ft^2 ($0.3 \text{ l/s} \cdot \text{m}^2$) at a static air pressure differential of 1.6 psf (75 Pa).
4. CSA A440 Fixed Rating
 - a. Glass to interior .41 (low-e) or 0.56 (clear) or project specific (____) $\text{Btu/hr/ft}^2/\text{°F}$ per AAMA 507 or (____) $\text{Btu/hr/ft}^2/\text{°F}$ per NFRC 100.

C. Sound Transmission Class (STC) and Outdoor-Indoor Transmission Class (OITC):

1. Sound transmission loss test results in accordance with AAMA 1801 are based upon 1" (25.4 mm) clear double laminated insulating glass with PVB interlayer (1/8", 0.030", 1/8", 1/2" AS, 1/8", 0.030", 1/8").
2. The glass to exterior ratings, when tested to ASTM E1425 and ASTM E90, shall not be less than STC 38 and OITC 31.
3. The glass to center ratings, when tested to ASTM E1425 and ASTM E90, shall not be less than STC 37 and OITC 30.
4. The glass to interior ratings, when tested to ASTM E1425 and ASTM E90, shall not be less than STC 38 and OITC 30.

1.5 SUBMITTALS

A. Product Data:

1. For each type of aluminum-framed storefront system indicated, include:
 - a. Construction details
 - b. Material descriptions
 - c. Dimensions of individual components and profiles
 - d. Hardware
 - e. Finishes

B. Shop Drawings:

1. Plans
2. Elevations
3. Sections
4. Details
5. Hardware
6. Attachments to other work
7. Operational clearances
8. Installation details

C. Samples for Initial Selection:

1. Provide samples for units with factory-applied color finishes.
2. Provide samples of hardware and accessories involving color selection.

D. Samples for Verification:

1. Provide a verification sample for aluminum-framed storefront system and required components.

E. Product Test Reports:

1. Provide test reports for each type of aluminum-framed storefront used in the project.
2. Test reports must be based on evaluation of comprehensive tests performed by a qualified preconstruction testing agency.
3. Test reports must indicate compliance with performance requirements.

F. Fabrication Sample:

1. Provide a fabrication sample of each vertical-to-horizontal intersection of aluminum-framed systems, made from 12" (304.8 mm) lengths of full-size components and showing details of the following:
 - a. Joinery, including concealed welds
 - b. Anchorage
 - c. Expansion provisions
 - d. Glazing
 - e. Flashing and drainage

G. Entrance Door Hardware Schedule:

1. Schedule shall be prepared by or under the supervision of supplier.
2. Schedule shall detail fabrication and assembly of entrance door hardware, including procedures and diagrams.
3. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

1.6 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installer must have successfully installed the same or similar units required for the project and other projects of similar size and scope.

B. Manufacturer Qualifications:

1. Manufacturer must be capable of providing aluminum-framed storefront systems that meet or exceed performance the stated performance requirements.
2. Manufacturer must document this performance by the inclusion of test reports and calculations.

C. Source Limitations:

1. Obtain aluminum-framed storefront system through one source from a single manufacturer.

D. Product Options:

1. Drawings indicate size, profiles, and dimensional requirements of aluminum-framed storefront system and are based on the specific system indicated. Refer to Division 01 Product Requirements Section. Do not modify size and dimensional requirements.
2. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect f

or review.

1.7 PROJECT CONDITIONS

A. Field Measurements:

1. Verify actual dimensions of aluminum-framed storefront openings by field measurements before fabrication.
2. Indicate measurements on shop drawings.

1.8 WARRANTY

A. Submit manufacturer's standard warranty for owner's acceptance.

B. Warranty Period:

1. Two years from Date of Substantial Completion of the project provided however that in no event shall the Limited Warranty begin later than six months from date of shipment by manufacturer.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product:

1. Kawneer Company, Inc.
 2. Trifab® VersaGlaze® 451 Framing System
 - a. 2" x 4-1/2" (50.8 mm x 114.3 mm) nominal dimension
 - b. Non-thermal
 - c. Front, center, back, multi-plane, structural silicone or weatherseal (type B) glazed
 - d. Screw spline, shear block, stick, or punched opening
- #### B. Substitutions:
1. Refer to Division 01 Substitutions Section for procedures and submission requirements.
 2. Pre-Contract (Bidding Period) Substitutions:
 - a. Submit written requests ten (10) days prior to bid date.
 3. Post-Contract (Construction Period) Substitutions:
 - a. Submit written request in order to avoid installation and construction delays.
 4. Product Literature and Drawings:
 - a. Submit product literature and drawings modified to suit specific project requirements and job conditions.
 5. Certificates:
 - a. Submit certificate(s) certifying that the substitute manufacturer (1) attests to adherence to specification requirements for storefront system performance criteria, and (2) has been engaged in the design, manufacture, and fabrication of aluminum storefronts for a period of not less than ten (10) years. (*Company Name*)
 6. Test Reports:
 - a. Submit test reports verifying compliance with each test requirement required by the

project.

7. Samples:

- a. Provide samples of typical product sections and finish samples in manufacturer's standard sizes.

C. Substitution Acceptance:

1. Acceptance will be in written form, either as an addendum or modification.
2. Acceptance will be documented by a formal change order signed by the owner and contractor.

2.2 MATERIALS

A. Aluminum Extrusions:

1. Alloy and temper recommended by aluminum storefront manufacturer for strength, corrosion resistance, and application of required finish.
2. Not less than 0.070" (1.8 mm) wall thickness at any location for the main frame
3. Complying with ASTM B221: 6063-T6 alloy and temper

B. Fasteners:

1. Nonmagnetic stainless steel or other materials must be non-corrosive and compatible with aluminum members, trim hardware, anchors, and other components.

C. Anchors, Clips, and Accessories:

1. Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating.
2. Anchors, clips, and accessories shall provide sufficient strength to withstand the design pressure indicated.

D. Reinforcing Members:

1. Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating.

E. Sealant:

1. For sealants required within fabricated storefront system, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.

F. Tolerances:

1. References to tolerances for wall thickness and other cross-sectional dimensions of storefront members are nominal and in compliance with AA Aluminum Standards and Data.

2.3 STOREFRONT FRAMING SYSTEM

A. Brackets and Reinforcements:

1. Manufacturer's standard high-strength aluminum with non-staining, non-ferrous shims for aligning system components.

- B. Fasteners and Accessories:
 - 1. Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories must be compatible with adjacent materials.
 - 2. Where exposed, fasteners and accessories shall be stainless steel.
- C. Perimeter Anchors:
 - 1. When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.
- D. Packing, Shipping, Handling, and Unloading:
 - 1. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- E. Storage and Protection:
 - 1. Store materials so that they are protected from exposure to harmful weather conditions.
 - 2. Handle material and components to avoid damage.
 - 3. Protect material against damage from elements, construction activities, and other hazards before, during, and after installation.

2.4 GLAZING SYSTEMS

- A. Glazing to meet requirements in Division 08 Glazing Section.
- B. Glazing Gaskets:
 - 1. Manufacturer's standard compression types
 - 2. Replaceable, extruded EPDM rubber
- C. Spacers and Setting Blocks:
 - 1. Manufacturer's standard elastomeric type
- D. Bond-Breaker Tape:
 - 1. Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.
- E. Glazing Sealants for structural-sealant-glazed systems as recommended by manufacturer for joint type, and as follows:
 - 1. Structural Sealant:
 - a. ASTM C 1184
 - b. Single-component neutral-curing silicone formulation that is compatible with the system components with which it comes in contact
 - c. Specifically formulated and tested for use as structural sealant and approved by a structural-sealant manufacturer for use in the aluminum-framed systems indicated
 - d. Color: Black
 - 2. Weatherseal sealant:
 - a. ASTM C 920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O
 - b. Single-component neutral-curing formulation that is compatible with the structural sealant and other system components with which it comes in contact

- c. Recommended by structural-sealant, weatherseal-sealant, and aluminum-framed-system manufacturers for this use
- d. Color: Matching structural sealant

2.5 ENTRANCE DOOR SYSTEMS

- A. Refer to Entrance Doors as specified in Division 084113 Aluminum-Framed Entrances and Storefronts Section.
- B. Refer to Entrance Door Hardware as specified in Division 08 71 00 Door Hardware Section.
- C. Joint Sealants:
 - 1. For installation at perimeter of aluminum-framed systems, as specified in Division 07 Joint Sealants Section.
- D. Bituminous Paint:
 - 1. Cold-applied asphalt-mastic paint
 - 2. Complies with SSPC-Paint 12 requirements except containing no asbestos
 - 3. Formulated for 30-mil (0.762 mm) thickness per coat

2.6 FABRICATION

- A. Fabricate framing member components that, when assembled, have the following characteristics:
 - 1. Profiles that are sharp, straight, and free of defects or deformations
 - 2. Accurately fitted joints that are flush, hairline, and weatherproof
 - 3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior
 - 4. Physical and thermal isolation of glazing from framing members
 - 5. Accommodations for thermal and mechanical movements of glazing and framing that maintain required glazing edge clearances
 - 6. Provisions for field replacement of glazing
 - 7. Fasteners, anchors, and connection devices that are concealed from view to the greatest extent possible
- B. Mechanically Glazed Framing Members:
 - 1. Fabricate for flush glazing without projecting stops.
- C. Structural-Sealant-Glazed Framing Members:
 - 1. Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.
- D. Storefront Framing:
 - 1. Fabricate components for assembly using manufacturer's standard installation instructions.
- E. After fabrication, clearly mark components to identify their locations in project according to shop drawings.

2.7 ALUMINUM FINISHES

- A. Finish designations that are prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Factory Finishing:
 - 1. Kawneer Permanodic® AA-M10C21A44, AAMA 611, Architectural Class I Color Anodic Coating. Color to be selected by the Architect.

PART 3 EXECUTION

3.1 EXAMINATION

- A. With installer present, examine openings, substrates, structural support, anchorage, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of work:
 - 1. Verify rough opening dimensions.
 - 2. Verify levelness of sill plate.
 - 3. Verify operational clearances.
 - 4. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components for proper water management.
- B. Proceed with installation only after correcting unsatisfactory conditions.

3.2 INSTALLATION

- A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing aluminum-framed storefront system, accessories, and other components.
- B. Install aluminum-framed storefront system so that components:
 - 1. Are level, plumb, square, and true to line
 - 2. Are without distortion and do not impede thermal movement
 - 3. Are anchored securely in place to structural support
 - 4. Are in proper relation to wall flashing and other adjacent construction
- C. Set sill members in bed of sealant or with gaskets, as indicated, for weather-tight construction.
- D. Install aluminum-framed storefront system and components to drain condensation, water penetrating joints, and moisture migrating within aluminum-framed storefront system to the exterior.
- E. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 FIELD QUALITY CONTROL

- A. Field Tests:
 - 1. Architect shall select storefront units to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured.
 - 2. Conduct tests for air infiltration and water penetration with manufacturer's representative present.
 - 3. Tests that do not meet the specified performance requirements and units that have deficiencies shall be corrected as part of the contract amount.

4. Testing shall be performed per AAMA 503 by a qualified independent testing agency. Refer to Testing Section for payment of testing and testing requirements.
 5. Air Infiltration Tests:
 - a. Conduct tests in accordance with ASTM E 783.
 - b. Allowable air infiltration shall not exceed 1.5 times the amount indicated in the performance requirements or 0.09 cfm/ft^2 , whichever is greater.
 6. Water Infiltration Tests:
 - a. Conduct tests in accordance with ASTM E 1105.
 - b. No uncontrolled water leakage is permitted when tested at a static test pressure of two-thirds the specified water penetration pressure but not less than 6.2 psf (300 Pa).
- B. Manufacturer's Field Services:
1. Upon owner's written request, provide periodic site visit by manufacturer's field service representative.

3.4 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjusting: Not applicable.
- B. Protection:
1. Protect installed product's finish surfaces from damage during construction.
- C. Cleaning:
1. Clean glass immediately after installation.
 - a. Comply with glass manufacturer's written recommendations for final cleaning and maintenance.
 - b. Remove non-permanent labels and clean surfaces.
 2. Clean aluminum surfaces.
 3. Avoid damaging protective coatings and finishes.
 4. Remove excess sealants, glazing materials, dirt, and other substances.
 5. Repair or replace damaged installed products.
 6. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during the construction period.
 7. Remove construction debris from project site and legally dispose of debris.

END OF SECTION 08 41 13

SECTION 087100 DOOR HARDWARE

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 but not limited to the following:

- 1. Mechanical and/or electrical hardware.

- B. Related Requirements

- 1. Division 01 Section "Closeout Procedures"
 - 2. Division 06 Section "Rough Carpentry".
 - 3. Division 06 Section "Finish Carpentry".
 - 4. Division 08 Section "Aluminum-Framed Entrances and Storefronts".

- C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

- 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
 - 2. ICC/IBC - International Building Code.
 - 3. NFPA 70 - National Electrical Code.
 - 4. NFPA 101 - Life Safety Code.
 - 5. State Building Codes, Local Amendments.

1.3 COORDINATION

- A. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- B. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

1.4 COORDINATION AND MEETINGS

- A. Location: Conduct conferences on project site or other location as directed by the Architect/Owner.
- B. Preinstallation Conference
 - 1. Purpose of the Preinstallation conference is to:
 - a. Coordinate between trades, so all understand their responsibilities.

- b. To instruct the installing contractors' personnel on the proper installation and adjustment of their respective products.
 - 1. Hardware supplier is responsible for bringing the installation instructions to the meeting.
 - c. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
 - d. Review sequence of operation narratives for each unique access-controlled opening.
 - e. Review the requirements for local and state building codes and how they apply to doors, frames, and hardware.
 - 1. Opening forces to follow DOJ's "2010 ADA Standards for accessible design".
 - f. Review any special applications.
2. Conference participants shall include but not limited to:
- a. General Contractor.
 - b. Installer for doors, frames, and hardware.
 - c. Supplier Representative.
 - d. Owner and/or Owners Representative.
 - e. Construction Manager (if applicable).
 - f. Engineer and/or Engineers Consultant.

C. Keying Conference:

- 1. Incorporate conference decisions into keying schedule after reviewing door hardware keying system including, but not limited to, the following:
 - a. Flow of traffic and degree of security required.
 - b. Preliminary key system schematic diagram.
 - c. Requirements for key control system.
 - 1. This is to include the number of keys per keyset.
 - 2. Number of Master level keys.
 - 3. Use of keyed construction cores.
 - d. Requirements for access control.
 - e. Address for delivery of keys.
- 2. Keying Conference participants shall include but not limited to:
 - a. Supplier Representative.
 - b. Owner and/or Owners Representative.
Engineer and/or Engineers Consultant

1.5 SUBMITTALS

- A. Submittal Sequence to follow in this order and each are to be submitted under separate cover:
 - 1. Door Hardware Schedule.
 - 2. Hardware Product Data.

3. Samples.
 4. Keying Schedule (Only after the keying meeting has taken place).
 5. Closeout Submittals.
 6. Submit door hardware schedule concurrent with submissions of Product Data, Samples, Riser Diagrams.
- B. Information Submittals:
1. Qualification Data: Submit qualification data for the Installer and Supplier as defined under Quality Assurance of the Section.
 2. Product Certifications:
 - a. Certify that door hardware for use on each type and size of labeled fire-rated doors complies with listed fire-rated door assemblies.
- C. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
1. Format: Use same scheduling sequence and use same door numbers as in the Contract Documents.
 2. Content: Include the following information:
 - a. Index of openings showing hardware set assignments.
 - b. Identification number, location, hand, fire rating, size, degree of opening, and material of each door and frame.
 - c. Locations of each door hardware set, cross-referenced to floor plans, and to door and frame schedule.
 - d. Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
 - e. Description of electrified door hardware sequences of operation and interfaces with other building control systems.
 - f. Fastenings and other installation information.
 - g. Explanation of abbreviations, symbols, and designations contained in door hardware schedule.
 - h. Mounting locations for door hardware.
 - i. Complete list of related door devices specified or supplied in other Sections for each door and frame.
- D. Door Hardware Product Data: Prepared by or under the supervision of supplier.
1. Provide an index of products used grouped by manufacturer.
 2. Each product shall be highlighted or marked accordingly.
 - a. Do not include pages or products that are not applicable to the project. If they appear on the same page as a product being used, they shall be crossed out.
- E. Samples:
1. Provide a finish sample for each exposed product in each finish specified, in manufacturer's standard size.
 2. Tag Samples with full product description to coordinate samples with the door hardware schedule.
- F. Keying Schedule: Only after a keying meeting with the owner has taken place, prepare a keying schedule detailing final instruction. Submit the keying schedule in electronic format.

Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions.

1. The owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

G. Closeout Submittals:

1. After final approval is received from the architect, submit a Record Copy of the Door and Hardware Schedule with all the content as previously required.
 - a. Submittal must be stamped "RECORD COPY".
 - b. The Record Copy will be given to the installer for the installation of the hardware.
2. Warranty Submittal: Warranty information to include the following information:
 - a. Original factory order number.
 - b. Date order was placed.
 - c. Date of installation (approximately if unknown).
3. Operating and Maintenance Manuals:
 - a. Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

- H. Submittals that do not comply with all the requirements above will be rejected and will have to be resubmitted. Any project delays caused by incorrect/incomplete submittals will be the responsibility of the General Contractor and Hardware Supplier.

1.6 QUALITY ASSURANCE

A. Installer Qualifications:

1. A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Door Hardware Supplier Qualifications:

1. Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project.
2. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity.

1.7 DELIVERY AND STORAGE

A. All hardware for field installation shall be delivered to the project site.

1. Any hardware that is required to be factory installed shall be delivered to the factory at the cost of the supplier of the doors or frames requiring the factory installation.

B. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site.

1. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
 2. Storage area must be maintaining low humidity and a temperature between 60 to 90 degrees Fahrenheit.
- C. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- D. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.8 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
1. Structural failures including excessive deflection, cracking, or breakage.
 2. Faulty operation of the hardware.
 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 4. Electrical component defects and failures within the systems operation.
- C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.
- D. Special Warranty Periods:
1. Locks, manual overhead door closers & mechanical exit hardware to have a minimum ten (10) years warranty.
 2. All remaining hardware to be warranted as manufacturers standard warranty.

1.9 MAINTENANCE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

Part 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of door hardware from single manufacturer.
1. Provide electrified door hardware from same manufacturer as mechanical door hardware unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

2.2 PERFORMANCE REQUIREMENTS

- A. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
- B. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the DOJ's "2010 ADA Standards for Accessible Design".
 - 1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
 - 2. Comply with the following maximum opening-force requirements:
 - a. Interior, Hinged Doors: 5 lbf applied perpendicular to door.
 - b. Sliding or Folding Doors: 5 lbf applied parallel to door at latch.
 - c. Provide thresholds not more than 1/2 inch high.
 - d. Adjust door closer sweep periods so that, from an open position of 90 degrees, the door will take at least 5 seconds to move to a position of 12 degrees from the latch.
 - e. Adjust spring hinges so that, from an open position of 70 degrees, the door will take at least 1.5 seconds to move to the closed position.

2.3 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
- B. For products furnished, but not installed, under this Section, Coordinating, purchasing, delivering, and scheduling remain requirements of this Section.
- C. Equals: Requests for equals and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01. Approval of requests is at the discretion of the architect, owner, and their designated consultants.
- D. Substitutions: Are not allowed unless the listed product(s) are no longer available.

2.4 HINGES

- A. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.
- B. Hinge Size: Provide the size listed in the hardware sets.
- C. Hinge Type: Provide the type listed in the hardware sets.
- D. Manufacturers:
 - 1. PBB Hinge Company (PB). (Basis of Design).
 - 2. Hager (HA).
 - 3. Stanley Hardware (ST).

2.5 CONTINUOUS HINGES

- A. Geared continuous hinges shall meet ANSI/BHMA 156.26, Grade 1 requirements.
- B. Manufactured out of 6063-T5 extruded aluminum, pinless, geared hinge leaves joined by a continuous extruded aluminum channel cap; with concealed, self-lubricating bearings.
- C. Provide template-produced hinges for hinges installed on hollow-metal and aluminum doors and frames.
- D. Manufacturers:
 - 1. Select (SL) SL24HD (Basis of Design).
 - 2. Ives (IV) 224HD
 - 3. Hager/Roton (HA) 780-224HD.

2.6 MANUAL FLUSH BOLTS

- A. Bolts are to meet or exceed ANSI/BHMA A156.3 and A156.16, Grade 1 requirements.
- B. Furnish Dustproof Strikes for all bottom bolts at interior doors.
- C. Provide related accessories or mounting brackets as required for appropriate installation and operation.
- D. Manufacturers:
 - 1. Architectural Builders Hardware (AH) (Basis of Design).
 - 2. Rockwood Manufacturing (RO).
 - 3. Ives (IV).

2.7 ELECTRIC STRIKES

- A. Electric strikes shall meet or exceed ANSI/BHMA A156.31, Grade 1 requirements.
 - 1. Shall be for use on non-rated or fire rated openings.
 - 2. Strikes shall be tested to a minimum endurance of 1 million operating cycles.
 - 3. Provide strikes with 12 or 24 VDC capability, fail-secure unless otherwise specified.
 - 4. Where specified provide latchbolt and latchbolt strike monitoring indicating both the position of the latchbolt and locked condition of the strike.
 - 5. Manufacturers:
 - a. HES (HS) (Basis of Design).
 - b. Security Door Controls (SD).
 - c. Trine (TR) (Basis of Design).

2.8 MECHANICAL LOCK AND LATCHING DEVICE

- A. Cylindrical Locks:
 - 1. Locks shall meet or exceed ANSI/BHMA A156.2 Series 4000 Operation Grade 1 requirements.
 - 2. Locks are to be non-handed and fully field reversible.
 - 3. Basket:
 - a. 2-3/4" unless noted otherwise.
 - 4. Lock trim and function as shown in hardware sets.
 - 5. Latchbolt:
 - a. Provide deadlocking latchbolt for all locks with a keyed function.

6. Manufacturers:

- a. TownSteel (TS). CDCI Series (Basis of Design)
- b. Falcon (FA) T Series.
- c. Sargent Manufacturing (SA) 10 Line.

2.9 EXIT DEVICES

- A. Exit Devices and Auxiliary Items shall meet or exceed ANSI/BHMA A156.3, Grade 1 requirements.
- B. Where function of the Exit Device requires a cylinder, provide a cylinder per the requirements of the Keying System.
- C. Function and Trim design as listed in the Hardware Sets.
- D. Provide mounting bracket or spacers as required for proper installation and operation.
- E. Do not cut perimeter gasket to mount the Exit Device Strikes. Adjust template accordingly.
- F. Manufacturers:
 1. TownSteel (TS) ED9700 Series (Basis of Design).
 2. Sargent (SA) 80 Series.
 3. Falcon (FA) 25 Series.

2.10 CYLINDERS AND KEYING

- A. Cylinders: Original manufacturer cylinders complying with the following:
 1. Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.
 2. Meet or exceed ANSI/BHMA A156.5 Grade 1 requirements.
 3. Mortise Type: Threaded cylinders with rings and cams to suit hardware application.
 4. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
 - a. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes. Stamped collars are not allowed.
 5. Face finished to match lockset.
 6. Core Type: SFIC.
 - a. Permanent cores to be provided by owner.
- B. Construction Keying:
 1. Construction Master Keys: Provide temporary construction cylinders or permanent cylinders with feature that permits voiding of construction keys without cylinder removal.
 - a. Provide 10 construction master keys.
- C. Manufacturers:
 1. Best (BE) (Basis of Design).

2.11 SURFACE CLOSERS

- A. Surface Closers shall meet or exceed ANSI/BHMA A156.4, Grade 1 requirements.

- B. Surface Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
- C. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use.
- D. Provide Surface Closers complying the Americans with Disabilities Act, ANSI ICC/A117.1.
- E. Provide accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation and operation.
- F. Coordinate with Overhead Holder/Stop installation, provide special templates as required to avoid hardware conflicts.
- G. Manufacturers:
 - 1. TownSteel (TS). TDC-40 Series (Basis of Design).
 - 2. Norton (NO) 9500 Series.
 - 3. LCN (LC) 4040XP Series.

2.12 ARCHITECTURAL TRIM

A. Protective Plates:

- 1. Shall meet ANSI/BHMA A156.6 requirements.
- 2. Protective plates, fabricated from the following:
 - a. Stainless Steel: 300 grade, .050-inch thick.
- 3. Kick Plates are to be installed on the push side of the door, unless stated otherwise.
- 4. Size: Fabricate protection plates not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates.
- 5. Provide Plates with countersunk screw holes.
- 6. Provide Plates are to be beveled on all 4 edges.
- 7. Height: 10", unless noted otherwise.
- 8. Manufacturers:
 - a. Trimco (TC) (Basis of Design).
 - b. Rockwood Products (RO).
 - c. Burns Manufacturing (BU).

2.13 MAGNETIC HOLDERS & OVERHEAD STOPS

- A. Provide wall or floor mounted electromagnetic door release as specified with minimum of 25 pounds of holding force. Coordinate projection of holder and armature with other hardware

and wall conditions to ensure that door sits parallel to wall when fully open. Connect magnetic holders on fire-rated doors into the fire control panel for fail-safe operation.

B. Manufacturers:

- a. ABH (AB) (Basis of Design).
- b. Rixson (RI).
- c. LCN (LC).

2.14 SWEEPS, WEATHERSTRIP, AND GASKETING

A. Door Gasketing shall comply with ANSI/BHMA A156.22 requirements.

B. Provide with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

C. Perimeter gasketing should not be cut around door hardware. Gaskets must maintain a continuous seal at top and vertical edges. Adjust hardware templates accordingly.

D. Manufacturers:

1. K.N. Crowder (KN) (Basis of Design).
2. Hager Companies (HA).
3. National Guard (NG).

2.15 THRESHOLDS

A. Thresholds shall comply with ANSI/BHMA A156.21 requirements.

B. Thresholds shall be fabricated to full width of opening.

C. Provide non-slip surface.

D. Provide Stainless Steel Fasteners, type as detailed or required for specific floor conditions.

E. Manufacturers:

1. K.N.Crowder (KN) (Basis of Design).
2. National Guard (NA).
3. Pemko (PE).

2.16 FABRICATION

A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rating labels and as otherwise approved by Architect.

1. Manufacturer's identification is permitted on rim of lock cylinders only.

B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and

hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.

1. The use of Aluminum or Brass/Bronze based screws is not acceptable.
- C. Fasteners: Provided by door hardware manufacturer, to comply with published installation instructions, templates and as test for fire rated applications.
 1. The use of other fasteners will be rejected.
 2. Provide Phillips flat-head screws with finished heads to match surface of door hardware unless otherwise indicated.
 3. The use of Self-Drilling or Self-Tapping Screws is not permitted.
 4. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners.
 5. Gasket Fasteners: Provide Stainless Steel fasteners.
 6. Threshold Fasteners:
 - a. Concrete floors: Provide 1/4-20 Stainless Steel Machine Screws and Expansion Shields.
 7. Hinge Fasteners:
 - a. Provide steel or stainless-steel screw to match hinge base material.
 - b. Provide Machine Screws for metal door and frame applications.

2.17 FINISHES

- A. Provide finishes complying with ANSI/BHMA A156.18 as indicated in door hardware schedule.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

Part 3 – EXECUTION

3.1 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance of the Work.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware.

C. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Steel Doors and Frames: For surface-applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.

3.3 INSTALLATION

A. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.

B. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.

C. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI' s "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames".
2. Comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities".

D. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

E. Self-closing doors must close and latch completely from the fully opened position.

F. Lock Cylinders:

1. Install construction cylinders to secure building and areas during construction period.

G. Thresholds: Set thresholds in full bed of sealant, and caulk around all edges, complying with requirements specified in Section 079200 "Joint Sealants."

H. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

1. Do not notch or cut perimeter gasketing to install other surface-applied hardware.

I. Door Bottoms: Apply to bottom of door, forming seal with floor or threshold when door is closed.

J. Door Closers: Adjust closers to follow opening forces listed under this sections Performance Requirements.

1. Degree of opening: Template the closer to allow for the maximum degree of opening the conditions will allow.
2. Back Check valve shall be adjusted so it engages 10 degrees prior to the door reaching full swing.

3. Latch Speed valve shall be adjusted so the door latches properly without slamming.

K. Wall Bumpers or Stops: Note that blocking in drywall partitions where wall stops, or other wall mounted hardware is located is required.

3.4 FIELD QUALITY CONTROL

A. Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating, and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.

B. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

1. Submit documentation of incomplete items in PDF electronic format.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

3.6 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.7 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

3.8 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.9 DOOR HARDWARE SCHEDULE

A. The hardware sets represent the design intent and direction of the owner and architect. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process.

- B. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required.

Hardware Sets:

Hardware Group No. 01

For use on Door #(s):

102 107 113

Each To Have:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	BB81 4.5	US26D	PB
1	EA	STOREROOM LOCKSET	CDCI-86-S	626	TS
1	EA	SFIC PERMANENT CORE	BY OWNER	626	BE
1	EA	OVERHEAD STOP	4400	626	AB
3	EA	SILENCER	1229	GRY	TR

Hardware Group No. 02

For use on Door #(s):

103 104 105 106 108 110
111 112

Each To Have:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	BB81 4.5	US26D	PB
1	EA	OFFICE LOCKSET	CDCI-82-S	626	TS
1	EA	SFIC PERMANENT CORE	BY OWNER	626	BE
1	EA	WALL STOP	1270	626	TR
3	EA	SILENCER	1229	GRY	TR

Hardware Group No. 03

For use on Door #(s):

109

Each To Have:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
5	EA	HINGE	BB81 4.5	US26D	PB
1	EA	HINGE	BB81EL4 4.5	US26D	PB
1	EA	ELECTRIC STRIKE	8000C	630	HE

1	EA	STOREROOM LOCKSET	CDCI-86-S	626	TS
1	EA	SFIC PERMANENT CORE	BY OWNER	626	BE
1	SET	FLUSH BOLTS	1855P	626	TR
1	EA	DUST PROOF STRIKE	3910	626	TR
1	EA	DOOR CLOSER	TDC-40	689	TS
2	EA	WALL STOP	1270	626	TR
2	EA	SILENCER	1229	GRY	TR
1	EA	CARD READER	BY SECURITY CONTRACTOR		
1	EA	DOOR CONTACT	BY SECURITY CONTRACTOR		
1	EA	POWER SUPPLY	BY SECURITY CONTRACTOR		

Hardware Group No. 04

For use on Door #(s)

114 (BASE BID)

EXISTING HARDWARE TO REMAIN.

Hardware Group No. 05

For use on Door #(s):

115 (ALT. 01)

Each To Have:

8	EA	HINGE	4B81 4.5 NRP	US26D	PB
1	EA	FIRE EXIT DEVICE	EF9727-ELR-3684 X KES908-S SFIC	630	TS
1	EA	FIRE EXIT DEVICE	EF9727-3684	630	TS
1	EA	SFIC CORE	BY OWNER	626	BE
1	EA	AUTO. OPERATOR	HA9 (PULL SIDE MOUNT)	AL	RE
2	EA	JAMB ACTUATOR	8310-818T	630	LC
2	EA	TRANSMITTER	8310-844J		LC
1	EA	RECEIVER	8310-865		LC
1	EA	DOOR CLOSER	TDC-40 EDA	689	TS
2	EA	FLR MTD MAG HO	2600	689	AB
1	EA	GASKETING	BY DOOR MFR.		
2	EA	DOOR BOTTOM	420APKL	AL	PE
1	EA	POWER SUPPLY	PS-101		TS
1	EA	CARD READER	BY SECURITY CONTRACTOR		
1	EA	DOOR CONTACT	BY SECURITY CONTRACTOR		
1	EA	REX DEVICE	BY SECURITY CONTRACTOR		

COORDINATE WITH DOOR AND FRAME SUPPLIER FOR MANUFACTURER PROVIDED
HARDWARE.

THEORY OF OPERATION:

DOOR NORMALLY LOCKED FROM CORRIDOR. OUTSIDE ACTUATOR DISABLED.

PROPER CREDENTIAL TO READER OR REMOTE RELEASE FROM CHECK-IN RETRACTS LATCH AND ENABLES OUTSIDE ACTUATOR FOR AUTOMATIC OPERATION.

FROM CHECK-IN – INSIDE ACTUATOR ALWAYS ENABLED.

WHEN LOCKED FROM CORRIDOR ACTUATOR RETRACTS LATCH PRIOR TO INITIATING AUTOMATIC OPERATION.

FREE EGRESS AT ALL TIMES.

DOORS MAY BE HELD OPEN BY FLOOR MAGNETS. AUTOMATIC RELEASE UPON SMOKE/FIRE ALARM ACTIVATION.

Hardware Group No. 06

For use on Door #(s):

116

Each To Have:

1	EA	AUTO. OPERATOR	HA9 (PULL SIDE MOUNT)	AL	RE
2	EA	JAMB ACTUATOR	8310-818T	630	LC
2	EA	TRANSMITTER	8310-844J		LC
1	EA	RECEIVER	8310-865		LC

THEORY OF OPERATION:

DOOR NORMALLY LOCKED FROM CORRIDOR. OUTSIDE ACTUATOR DISABLED.

PROPER CREDENTIAL TO READER ENERGIZES ELECTRIC STRIKE AND ENABLES OUTSIDE ACTUATOR FOR AUTOMATIC OPERATION.

FROM CAREER SERVICES – INSIDE ACTUATOR ALWAYS ENABLED.

WHEN LOCKED FROM CORRIDOR, ACTUATOR ENERGIZES ELECTRIC STRIKE PRIOR TO INITIATING AUTOMATIC OPERATION.

FREE EGRESS AT ALL TIMES.

REMOVE EXISTING DOOR CLOSER. BALANCE OF EXISTING HARDWARE TO REMAIN.

COORDINATE OPERATION WITH EXISTING CARD READER AND ELECTRIC STRIKE.

Hardware Group No. 07

For use on Door #(s):

117

Each To Have:

1	EA	GASKETING	W50S	C.A.	KN

1	EA	SWEEP	W13S	C.A.	KN

BALANCE OF EXISTING HARDWARE TO REMAIN

END OF SECTION

SECTION 09 01 60 TERRAZZO RESTORATION

PART 1: GENERAL

1.01 SECTION INCLUDES

- A. Refinishing terrazzo floors.
- B. Provide all labor, material, and equipment necessary to complete the following terrazzo repair work
- C. Preparation of all surfaces to receive patching compound
- D. Repairs to delaminated areas
- E. Repair of cracks (as per NTMA recommendations)
- F. Placement of patching compounds/terrazzo matrix
- G. Finish and curing of terrazzo

1.02 REFERENCE STANDARDS

- A. NTMA – Terrazzo Specifications; The National Terrazzo and Mosaic Association, Inc.; current edition located at www.ntma.com

1.03 SUBMITTALS

- A. Product Data: Provide manufacturers technical data for sealer and cleaner and grout.
- B. Cleaning products to be used and Terrazzo Maintenance Data/Protocols for facility managers
- C. Submit letter clearly identifying the terrazzo system (Epoxy, Cement, etc) and that the products are suitable/compatible

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section with not fewer than 5 years of documented experience.
 - 1. Installer shall be a contractor member of NTMA in good standing and shall perform all work in accordance with NTMA standards
 - 2. Use only skilled journeyman who are familiar and experienced with the materials and methods specified shall be used for terrazzo restoration/refinishing.
 - 3. Crack Repair: Prepare a sample area for each type of crack repair required (Hairline cracks 1/64" to 1/16" in size; Cracks and voids larger than 1/8") Repair shall demonstrate methods and quality of workmanship of crack repair.
 - 4. Patching: Prepare on-floor, a sample of patching. Patch shall demonstrate methods and quality of workmanship of patch repair

PART 2: PRODUCTS

2.01 MATERIALS

- A. Cleaner: Potable water, free of iron, all cleaners (optional) must be pH neutral
- B. Sealer: Liquid type to completely seal matrix surface; not detrimental to terrazzo components.
- C. Grout: Color to match existing matrix.
- D. Matrix: Pigmented epoxy to match sample submitted
- E. Aggregates: Aggregates to match architects approved sample

2.02 EQUIPMENT

- A. All work shall be executed with conventional terrazzo grinding equipment according to NTMA published trade practice.

PART 3: EXECUTION

3.01 GENERAL

- A. Perform work in accordance with NTMA recommendations as posted on the NTMA website (www.ntma.com)

3.02 PREPARATION

- A. Cover and protect all adjacent finished surfaces during restoration process.

3.03 CRACK REPAIR

A. Determination

- 1. The owner and contractor shall walk the entire floor and identify cracks and agree on
 - a. NA (No Action) RC (Repair Crack) or RT (Replace Terrazzo)
 - b. Hairline cracks are classified as less than 1/32" (0.030)
 - c. Replacement (RT) shall be from architectural break to architectural break

B. RC - Repair Crack

- 1. Clean crack of loose material, dirt or sealer
- 2. Fill with resin/to match existing. Use aggregate in the crack if crack is wider than 1/4 inch.

3.04 RT- Replace Terrazzo (if repair is not to architectural break or existing terrazzo divider strip, the joining edge shall be a saw tooth (jagged edge)

- A. Remove areas to be replaced
- B. Clean area and prepare concrete for new terrazzo
- c. Repair concrete, fill cracks in concrete substrate as needed. Fill cracks in concrete with hardening epoxy
 - Optional upgrade: Employ the use of a mesh (isolation membrane) to cover crack with liquid applied membrane (epoxy systems only)
- e. Fill area with epoxy or cement /cement matrix and approved aggregate mixture/blend

3.04 INITIAL GRINDING

- A. Wet or dry grind with appropriate medium diamonds/Stones

3.05 GROUTING

- A. Cleanse floor with clean water and rinse. Wet grind with 50 or higher abrasive grit medium diamonds.
- B. Remove excess water and machine or hand grout with cement or epoxy material to fill as needed.

3.06 CURING GROUT

- A. Allow grout to cure a minimum of 12 hours. Maintain ambient air temperature between 70°F (21°C) and 80°F (27°C)

3.07 FINE (Final) GRINDING

- A. Grind with 120 grit carborundum or 200 grit resin bond diamond until grout has been removed from the terrazzo surface.

3.08 CLEANING AND SEALING:

- A. Rinse with clean water and allow too thoroughly dry.
- B. Seal: Apply sealer per sealer manufacturer's written directions
- C. Remove protection and clean any adjacent surfaces effected by the refinishing process.

3.09 PROTECTION

- A. General Contractor shall protect the finish floor from all site activity until Substantial Completion.

END OF SECTION

SECTION 09 22 13 NON-LOAD BEARING FRAMING AND FURRING

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Gypsum Board: Section 09 29 00.

1.02 SUBMITTALS

- A. Product Data: Catalog sheets, specifications, and installation instructions for the following:
 - 1. Studs, Tracks, and Furring.
 - 2. Fasteners.
- B. Samples:
 - 1. Steel Framing and Furring: 12 inches long, each component.
 - 2. Fasteners: 10 each type.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Studs, Tracks, and Furring: ASTM C 645; 25 gage galvanized steel, with additional framing members, reinforcing, accessories, and anchors necessary for the complete framing system.
- B. Fasteners: Except where shown or specified, select fasteners of type, size, style, grade, and class required for secure installation of framing and furring. Galvanize all fasteners and accessories.
 - 1. Standard Bolts and Nuts: ASTM A 307, Grade A, regular hexagon head.
 - 2. Lag Bolts: FS FF-B-561, square head.
 - 3. Machine Bolts: FS FF-B-584 head; FS FF-N-836 nuts.
 - 4. Machine Screws: FS FF-S-92, cadmium plated steel.
 - 5. Plain Washers: FS FF-W-92, round, general assembly grade, carbon steel.
 - 6. Lock Washers: FS FF-W-84, helical spring type, carbon steel.
 - 7. Toggle Bolts: Tumble-wing type; FSS FF-B-588, type, class and style as required to sustain load.
 - 8. Self-Drilling Fasteners: No. 12-14 x 3/4 inch, hex washer head, self-drilling fastener with pilot point.
- C. Anchors: Steel framing manufacturer's recommended types and sizes for substrates involved.

PART 3 EXECUTION

3.01 STEEL FRAMING AND FURRING INSTALLATION

- A. Install steel framing, furring and accessories in accordance with manufacturer's printed instructions, unless otherwise shown or specified.
- B. Framing Installation:

1. Align tracks accurately at floor and ceiling. Secure tracks as recommended by the framing manufacturer for the upper and lower construction involved, except do not exceed 24 inches oc spacing for nail or powder-driven fasteners, or 16 inches oc for other types of attachment. Provide fasteners approximately 2 inches from corners and ends of tracks.
 2. Position studs vertically and engage both upper and lower tracks. Space studs 16 inches on center, unless otherwise indicated on the Drawings. Fasten studs to track flanges with screws or by crimping.
 - a. Use full length studs between tracks wherever possible. If necessary, splice studs with a minimum 8 inch nested lap and fasten with two screws per stud flange.
 3. Install additional studs to support inside corners at intersections and corners, and to support outside corners, terminations of partitions, and both sides of control joints (if any).
 4. Terminate partitions at finish ceiling line unless otherwise indicated on the Drawings.
 5. Brace chase wall framing horizontally to opposite studs with 12 inch wide gypsum board gussets or metal framing braces, spaced vertically not more than 4 feet on center.
 - a. Attach gypsum board gussets with a minimum 3 screws per stud flange.
 - b. Attach metal framing braces with a minimum 2 screws per stud flange.
 6. Install rough framing at openings consisting of full-length studs adjacent to jambs and horizontal header and sill tracks. Cut horizontal tracks to length and split flanges and bend webs at ends for flange overlap and screw to jamb studs. Install intermediate studs between jamb studs at head and sill sections, at same spacing as full-length studs.
 7. At door frames, install rough framing as specified above. Install jamb studs to comply with framing manufacturer's recommendations for the types of frames and weights of doors required. Fasten jamb studs to metal frames with anchor clips using 2 self tapping screws or bolts per clip. Where wood frames are shown, fasten jamb studs to rough framing with screws.
 8. Where double doors, or doors weighing more than 50 lb are shown or scheduled, install two studs at each jamb and one additional stud not more than 6 inches from jamb studs.
 9. Where vertical control joints are shown at jamb lines, install additional vertical studs located on opening side of jambs and not less than 1/2 inch from jamb studs. Do not fasten the additional studs to tracks or jamb studs.
- C. Steel Furring Installation: Install steel furring at 16 inches oc maximum spacing and provide additional furring at openings, cutouts, and corners. Securely anchor with fasteners spaced 24 inches oc maximum and stagger on opposite flanges of hat-shaped channels.
- D. Tolerances: Do not exceed 1/8 inch in 8 feet variation from plumb or level in any exposed line or surface, except at joints between boards do not exceed 1/16 inch variation between planes or abutting edges or ends. Shim as required to comply with specified tolerances.

END OF SECTION

SECTION 09 23 00 PLASTERING

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Interior Paint: Section 09 90 00.

1.02 DESCRIPTION OF PLASTER SYSTEMS

- A. Type 1: Gypsum plaster consisting of scratch coat, brown coat, and regular strength finish coat.

1.03 SUBMITTALS

- A. Product Data: Manufacturer's name and brand, material type, specifications, and application instructions for the following:
 - 1. Plaster Type(s) specified.
 - 2. Bonding Compound.
 - 3. Accessories, except fasteners.
- B. Quality Control Submittals:
 - 1. Sand: Name and location of source, and N.Y.S. Department of Transportation Test Number.

1.04 QUALITY ASSURANCE

- A. Regulatory Requirements: Do not use asbestos bearing materials and do not add asbestos to plaster mixes.
- B. Allowable Tolerances: Maximum deviation from true plane shall be 1/8" in 10 ft. as measured by a straight-edge placed at any location on surface.
- C. Ready-mixed plaster mixes are subject to the approval of the Architect.
 - 1. Ready-mixed gypsum plaster mixes shall conform to the standards and requirements established by the Gypsum Association for materials and packaging.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver manufactured materials in original sealed containers, with manufacturer's label intact and legible.
- B. Keep cement, gypsum and lime dry, stored off ground, under cover.
- C. Remove wet, lumpy, and hardened materials from the site.

1.06 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Do not apply plaster when ambient temperature is less than 50 degrees F.
 - 2. If necessary, heat aggregate and water prior to mixing.
 - 3. Interior Plastering: Make arrangements thru the Owner to have the required temperature maintained for a minimum of 24 hours prior to application, during application, and until plaster has cured.
 - 4. Small on-the-job mix adjustments recommended by the plasterer for working characteristics and drying conditions may be made with the approval of the Director's Representative.
- B. Protection:
 - 1. Protect adjacent finishes with suitable, non-staining covers.
 - 2. Protect plaster from uneven and excessive evaporation and from temperature differentials of more than 20 degrees F. until it has cured.

PART 2 PRODUCTS

2.01 GYPSUM PLASTER MATERIALS

- A. Gypsum Plaster Basecoat: Neat or ready-mixed plaster unless otherwise indicated; ASTM C 28.
 - 1. Sand Aggregate: ASTM C 35.
- B. Gypsum Plaster Finish Coat (Regular Strength): Ready-mixed white gauging finish plaster, or a mixture of gauging plaster and lime.
 - 1. Gauging Plaster: ASTM C 28, 1200 psi (min.) compressive strength.
 - 2. Lime: Special finishing hydrated type; ASTM C 206, Type S.
- C. Gypsum Sand-Float Finish Coat: Factory mixed and packaged blend of gypsum, lime, and aggregate.

2.03 MISCELLANEOUS MATERIALS

- A. Water: Potable, clear, and free of substances harmful to plaster.
- B. Bonding Compound: Non-oxidizing, non-crystallizing type, unaffected by reapplication of moisture; ASTM C 631.

2.04 ACCESSORIES

- A. Corner Beads: Metal corner bead, with expanded metal flanges (each) not less than 2-1/2" wide.
 - 1. 26 gage galvanized steel.
 - 2. Roll formed zinc alloy.

3. Standard small-nose bead.
 4. Bullnose bead, 3/4" radius.
- B. Casing Beads: Metal casing bead with expanded metal flange not less than 3" wide.
1. 24 gage galvanized steel.
 2. Roll formed zinc alloy.
 3. Modified or semi-square edge where plaster abuts dissimilar material.
 4. Quarter round edge at perimeter of openings.
 5. Square edge at perimeter of openings.
 6. Modified or semi-square edge at perimeter of openings.
- C. Control Joint Screeds: Folded metal expansion and contraction screed with expanded metal flanges having a total width of not less than 4".
1. 26 gage galvanized steel.
 2. Roll formed zinc alloy.
- D. Base Screeds: Unless otherwise indicated, 26 gage galvanized steel, 1/2" ground, expanded metal flanges having a total width of not less than 4".
- E. Expanded Metal Reinforcement: Diamond mesh expanded metal lath fabricated from copper-bearing steel sheet, not less than 2.5 lbs. per sq. yd., black asphaltum paint finish.
1. Internal Corner Reinforcing: 6" wide, bent to form 3" legs.
 2. Strip Reinforcing: Self-furring type, 6" wide.
- F. Fasteners: Corrosion resistant fasteners of the type recommended by the accessory manufacturer.

2.05 GYPSUM PLASTER MIX COMPOSITION

- A. Ready-Mixed Basecoat and Finish Coat Materials: Use straight without addition of other materials, unless otherwise recommended by the manufacturer.
- B. Scratch Coat:
1. Over Metal Lath: Wood-fibered gypsum plaster factory mix.
 2. Over Solid Base: 100 lbs. wood-fibered gypsum plaster to not more than 1 cu. ft. sand, vermiculite or perlite.
- C. Brown Coat: 100 lbs. neat gypsum plaster to not more than 2-1/2 cu. ft. sand, vermiculite or perlite.
- D. Gypsum-Lime Trowel Finish Coat (Regular Strength): 1 part (by weight) gauging plaster to 2 parts (by weight) lime.
1. Over lightweight basecoat, add not less than 1/2 cu. ft. and not more than 1 cu. ft. of fine grit silica sand to each 100 lbs. of gauging plaster.

- E. Gypsum-Lime Sand Float Finish Coat: Follow the manufacturer's mix instructions.

2.06 MIXING

- A. General:
 - 1. Accurately proportion materials for each batch with measuring devices of known value.
 - 2. Size batches for complete use within maximum of one hour after mixing.
 - 3. Do not retemper plaster, except Keene's cement finish coat and lime putty may be retempered.
 - 4. Do not use frozen, caked, or lumpy materials. Remove such materials from the site.
 - 5. When sand is required in mix proportions, use moist loose sand.
 - 6. Withhold 10% of mixing water until mixing is almost complete. Add remainder as needed to produce necessary consistency.
- B. Machine Mixing:
 - 1. Unless otherwise approved by the Director's Representative, mix materials in a power mixer.
 - 2. Clean mixer of set materials before loading each new batch.
 - 3. Maintain mixer in continuous operation while adding the components. After all materials are in the machine, continue mixing for at least 2 minutes.

PART 3 EXECUTION

3.01 PREPARATION

- A. Remove dust, loose particles and other foreign matter which would affect bond of plaster.
- B. Wet absorptive bases with a fine spray or fog of clean water to produce a uniform moist condition.
- C. When interior concrete surfaces are smooth, dense, and not suitable for keying of the plaster coat, prepare surfaces and apply bonding compound in conformance with the manufacturer's instructions.

3.02 INSTALLING ACCESSORIES

- A. Provide all accessories required for a complete finished installation.
 - 1. Set accessories plumb or level, and true to line. Use shims where necessary. Align joints with concealed splices and tie plates. Attach accessories to substrate at not more than 9" centers.

Beads and screeds shall be in one piece where straight run does not exceed 10'.

2. Install continuous corner beads at all external corners of plaster.
3. Unless otherwise indicated, install continuous casing beads to terminate plaster at head and jambs of doors and windows, at each side of expansion joints, and at internal corner junctions of load bearing and non-load bearing elements.
4. Unless otherwise indicated, install screeds at control joints and along top of wainscots.

3.03 PLASTER APPLICATION

A. General:

1. Provide plaster thicknesses indicated on the Drawings. On solid base, thickness will be measured from face of base material. On metal lath base, thickness will be measured from the back plane of metal lath.
2. Apply plaster by hand or machine, unless otherwise indicated.
3. Over metal lath, apply plaster by hand only.
4. Provide 3 coat application consisting of scratch, brown, and finish coats.
5. Finish coats shall form true, sharp lines at angles and against other items. Where plaster abuts flush trim, make a small V-joint in the finish coat at the trim.
6. Stop off plaster application only at junctions of plaster planes, at openings, or control joints.
7. Except for metal lath, apply base and finish coats to moist surfaces only.
8. Ready-Mixed Materials: Follow the manufacturer's application instructions.
9. In spaces where plastering is indicated on the Drawings, apply plaster on surfaces of reveals, soffits, pilasters, columns, and other related surfaces, except where other finish is shown.
10. Extend scratch and brown coats in back of built-in casework unless otherwise indicated. Carry finish coat a minimum of 1" past edges of built-in casework.
11. Extend all coats to the floor where vinyl and rubber base is indicated.

B. Scratch Coat:

1. Metal Lath Base: Apply with sufficient material to form keys through lath and fill all voids in lath. Cross scratch to form key for brown coat.
2. Solid Base: Apply material with sufficient pressure to fill all depressions in base surface and insure tight contact and complete coverage. Cross scratch to form key for brown coat.
3. Allow scratch coat to set hard, but not dry, before application of brown coat. Maintain moisture by fogging with clean water as necessary.

- C. Brown Coat:
 - 1. Straighten and float gypsum plaster to an even plane to allow for finish coat of uniform thickness. Let brown coat set hard. Make certain that brown coat is moist when applying finish coat.

- D. Finish Coat:
 - 1. Gypsum-Lime Trowel Finish: Work part of the material thoroughly into the basecoat. Lay additional material on well, double back, float and fill to an even plane not less than 1/16" and not more than 1/8" thick. Trowel with water to a smooth hard finish, free of cat faces, streaks, waves, and other blemishes.
 - 2. Gypsum-Lime Sand Float Finish: Follow the manufacturer's application instructions.

3.04 CLEAN-UP

- A. Clean adjacent surfaces that have been soiled or defaced due to performing the work of this Section. Restore marred or damaged surfaces.

END OF SECTION

SECTION 09 29 00 GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.

B. Related Requirements:

1. Section 09 22 13 "Non-load Bearing Metal Framing" for non-structural steel framing and suspension systems that support gypsum board panels.

1.2 DELIVERY, STORAGE AND HANDLING

- A.** Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.3 FIELD CONDITIONS

- A.** Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.
- B.** Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C.** Do not install panels that are wet, moisture damaged, and mold damaged.
1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 GYPSUM BOARD, GENERAL

- A.** Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.2 INTERIOR GYPSUM BOARD

- A.** Gypsum Board, Type X: ASTM C 1396/C 1396M.
1. Thickness: 5/8 inch (15.9 mm).
 2. Long Edges: Tapered.

2.3 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: **Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet.**
2. Shapes:
 - a. Cornerbead.
 - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - c. Expansion (control) joint.
 - d. Curved-Edge Cornerbead: With notched or flexible flanges.

2.4 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.

C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints **rounded or beveled panel edges**, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use **setting-type taping** compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
3. Fill Coat: For second coat, use **setting-type, sandable topping** compound.
4. Finish Coat: For third coat, use **drying-type, all-purpose** compound.

2.5 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

B. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
 - 1. Wallboard Type: **As indicated on Drawings.**
 - 2. Type X: **As indicated on Drawings**
 - 3. Ceiling Type: **As indicated on Drawings.**
- B. Single-Layer Application:
 - 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - 2. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
 - 3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

3.4 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints **according to ASTM C 840 and in specific locations approved by Architect for visual effect.**
- C. Interior Trim: Install in the following locations:
 - 1. Cornerbead: Use at outside corners **unless otherwise indicated.**
 - 2. LC-Bead: Use **at exposed panel edges.**
 - 3. Curved-Edge Cornerbead: Use at curved openings.

3.5 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
 - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 - 2. Level 2: Panels that are substrate for tile
 - 3. Level 3: Where indicated on Drawings

4. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
 - a. Primer and its application to surfaces are specified in Section 09 90 23 "Interior Painting."

3.6 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 29 00

SECTION 09 51 23

SUSPENDED ACOUSTICAL TILE CEILINGS

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:
 - 1. Acoustical tiles for ceilings.
 - 2. Concealed suspension systems.
- B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified, 6-inches- (150-mm-) in size.
- C. Samples for Initial Selection: For components with factory-applied color finishes.
- D. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.
 - 1. Acoustical Tile: Set of full-size Samples of each type, color, pattern, and texture.
 - 2. Concealed Suspension-System Members: 6-inch- (150-mm-) long Sample of each type.
 - 3. Exposed Moldings and Trim: Set of 6-inch- (150-mm-) long Samples of each type and color.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Ceiling suspension-system members.
 - 2. Method of attaching hangers to building structure.
 - a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.

3. Size and location of initial access modules for acoustical tile.
4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
5. Minimum Drawing Scale: **1/4 inch = 1 foot (1:48)**.

- B. Qualification Data: For testing agency.
- C. Product Test Reports: For each acoustical tile ceiling, for tests performed by **manufacturer and witnessed by a qualified testing agency**.
- D. Evaluation Reports: For each acoustical tile ceiling suspension system **and anchor and fastener type**, from ICC-ES.
- E. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Acoustical Ceiling Units: Full-size tiles equal to **2** percent of quantity installed.
 2. Suspension-System Components: Quantity of each concealed grid and exposed component equal to **2** percent of quantity installed.

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to the National Voluntary Laboratory Accreditation Program (NVLAP) for testing indicated.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical tiles, suspension-system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical tiles, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical tiles carefully to avoid chipping edges or damaging units in any way.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not install acoustical tile ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and

ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to **ASCE/SEI 7**.
- B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: Comply with ASTM E 1264 for **Class A** materials.
 - 2. Smoke-Developed Index: **50** or less.

2.2 ACOUSTICAL TILES, GENERAL

- A. Source Limitations:
 - 1. Acoustical Ceiling Tile: Obtain each type from single source from single manufacturer.
 - 2. Suspension System: Obtain each type from single source from single manufacturer.
- B. Source Limitations: Obtain each type of acoustical ceiling tile and supporting suspension system from single source from single manufacturer.
- C. Acoustical Tile Standard: Provide manufacturer's standard tiles of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances unless otherwise indicated.

2.3 ACOUSTICAL TILES

- A. Acoustical Panel Type **ACT - 1**
 - 1. Basis of Design: Subject to compliance with project requirements, the design is based on the following: USG Mars high-NRC panels | FLB | 86347 white
 - 2. Classification: Provide ceiling panels complying with ASTM E 1264 for type, form and pattern as follows:
 - a. Type: IV, mineral base with membrane faced overlay
 - b. Form: 2, Nodular and water felted
 - c. Pattern: E, smooth and light texture: Fire Class A
 - 3. Color: See Drawings.
 - 4. Flame spread Index: less than 25.
 - 5. NRC: Not less than 0.80.
 - 6. CAC: Not less than 35
 - 7. Edge/Joint Detail: Beveled Tegular.
 - 8. Suspension Grid/Width Prelude XL exposed tee system 15/16 inch (24 mm)
 - 9. Panel Thickness: 7/8 inch (22 mm).
 - 10. Modular Size: 24 by 24 inches (610 by 610 mm) As indicated on Drawings.
 - 11. VOC Emissions: Meets CA Specification 01350, GreenGuard Gold Certified Low VOC.

2.4 METAL SUSPENSION SYSTEMS, GENERAL

- A. Metal Suspension-System Standard: Provide manufacturer's standard metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635/C 635M.
- B. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
 - 1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to **five** times that imposed by ceiling construction, as determined by testing according to ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
 - a. Type: **Postinstalled expansion** anchors.
 - b. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition.
 - c. Corrosion Protection: Stainless-steel components complying with ASTM F 593 and ASTM F 594, Group 1 Alloy 304 or 316 for bolts; Alloy 304 or 316 for anchors.
 - 2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to **10** times that imposed by ceiling construction, as determined by testing according to ASTM E 1190, conducted by a qualified testing and inspecting agency.
- C. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
 - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 - 2. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than **0.135-inch- (3.5-mm-)** diameter wire.
- D. **Hanger Rods:** Mild steel, zinc coated or protected with rust-inhibitive paint.
- E. Angle Hangers: Angles with legs not less than 7/8 inch (22 mm) wide; formed with 0.04-inch- (1-mm-) thick, galvanized-steel sheet complying with ASTM A 653/A 653M, G90 (Z275) coating designation; with bolted connections and 5/16-inch- (8-mm-) diameter bolts.

2.5 METAL SUSPENSION SYSTEM ACT-GRD

- A. Direct-Hung, Double-Web Suspension System: Main and cross runners roll formed from and capped with cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, G30 (Z90) coating designation.
 - 1. Structural Classification: **Intermediate**-duty system.
 - 2. Access: **Upward**, with initial access openings of size indicated below and located throughout ceiling within each module formed by main and cross runners, with additional access available by progressively removing remaining acoustical tiles.
 - a. Initial Access Opening: In each module, **[24 by 24 inches (610 by 610 mm)**.

2.6 METAL EDGE MOLDINGS AND TRIM

- A. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations complying with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.
 - 1. Provide manufacturer's standard edge moldings that fit acoustical tile edge details and suspension systems indicated and that match width and configuration of exposed runners unless otherwise indicated.
 - 2. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing and substrates to which acoustical tile ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine acoustical tiles before installation. Reject acoustical tiles that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Testing Substrates: Before installing adhesively applied tiles on wet-placed substrates such as cast-in-place concrete or plaster, test and verify that moisture level is below tile manufacturer's recommended limits.
- B. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION OF SUSPENDED ACOUSTICAL TILE CEILINGS

- A. General: Install acoustical panel ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and Cisca's "Ceiling Systems Handbook."
- B. Suspend ceiling hangers from building's structural members and as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 - 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 4. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, post-installed mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 5. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 6. Do not attach hangers to steel deck tabs.
 7. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 8. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each member.
 9. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
- D. Install edge moldings and trim of type indicated at perimeter of acoustical tile ceiling area and where necessary to conceal edges of acoustical tiles.
1. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3.2 mm in 3.6 m). Miter corners accurately and connect securely.
 2. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
1. As indicated on reflected ceiling plans.
- F. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension-system flanges into kerfed edges so tile-to-tile joints are closed by double lap of material.
1. Fit adjoining tile to form flush, tight joints. Scribe and cut tile for accurate fit at borders and around penetrations through tile.
 2. Hold tile field in compression by inserting leaf-type, spring-steel spacers between tile and moldings, spaced 12 inches (305 mm) o.c.
- 3.4 FIELD QUALITY CONTROL
- A. Testing Agency: **Engage** a qualified testing agency to perform tests and inspections and prepare test reports.
- B. Perform the following tests and inspections of completed installations of acoustical tile ceiling hangers and anchors and fasteners in successive stages and when installation of ceiling suspension systems on each floor has reached 20 percent completion but no tiles have been installed. Do not proceed with installations of acoustical tile ceiling hangers for the next area

until test results for previously completed installations of acoustical tile ceiling hangers show compliance with requirements.

1. Within each test area, testing agency will select one of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for 200 lbf (890 N) of tension; it will also select one of every two postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbf (1957 N) of tension.
 2. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.
- C. Acoustical tile ceiling hangers and anchors and fasteners will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

3.5 CLEANING

- A. Clean exposed surfaces of acoustical tile ceilings, including trim and edge moldings. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace tiles and other ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 51 23

09 55 00
WOOD FLOOR REFINISHING

PART 1- GENERAL

1.1 WORK

- A. Provide all labor and materials required to complete the wood flooring work as listed on the **Scope**, and as specified herein.

1.2 QUALITY STANDARDS

- A. Provide experienced, well-trained workers competent to complete the work as specified.
B. All work shall comply with manufacturer's instructions and governing building codes.
C. Provide a certified lead abatement supervisor and certified lead abatement workers if work will involve refinishing of wood floors or the removal and disturbance of more than 2 square feet of wood flooring.

1.3 SUBMITTALS

- A. Do not start work until **Owner** has approved and signed the Owner's Selection Sheet (Appendix A).
 - Supply **Owner** with samples of standard color selections.
 - Provide a copy of the **Owner's** written color selection to **Agency**.
 - Submit to **Owner** manufacturer's flooring care and cleaning instructions, and warranty.

1.4 MATERIALS HANDLING

- A. Provide all materials required to complete the work.
 - Deliver and transport materials to avoid damage to the product or to any other work.
 - Return any products or materials delivered in a damaged or unsatisfactory condition.
 - Materials and products delivered will be certified by the manufacturer to be as specified.
 - Packaging must be sealed with clear manufacturer and identification markings.

B. Store wood flooring materials in work area for at least 72 hours prior to installation.
 - Protected from weather or moisture.
 - Protected from construction damage.
 - Protected from occupant traffic.

PART 2 – MATERIALS

2.1 FLOORING AND ACCESSORIES

- A. Wood flooring repairs:
 - Follow guidelines found in MFMA (Maple Floor Manufacturer's Association) literature.
 - Provide wood flooring in sizes, species, grades and configurations as similar as possible to the original flooring.

B. Nails, screws, other fasteners as per flooring manufacturer's specifications.
 - Ring-shank flooring nails must be long enough to securely attach the flooring to substrate.
 - Where possible, nails shall be hidden from view.
 - When nails cannot be hidden, countersink nails and fill holes with manufacturer's recommended filler

- Nails must not split the flooring.

PART 3 – INSTALLATION

3.1 PRECONSTRUCTION AND PREPARATION

- A. Examine and verify that job conditions are satisfactory for speedy and acceptable work.
- B. Prior to installation of new wood flooring:
 - Clear area or room of furniture, appliances, and other obstructions.
 - **Contractor** shall take all necessary precautions to minimize damage to surrounding surfaces during removal and installation of flooring materials.
 - The **Contractor** at the **Contractor's** expense shall repair any surfaces damaged during removal and installation of flooring materials.
 - Remove existing shoe molding, nosings, transition strips (thresholds), etc. to allow for the complete and proper installation of the flooring.
 - Remove base molding only if necessary for a complete and proper installation of new flooring, or if listed in **Scope**.
 - Inspect sub-floor for structural deficiencies, soundness, and make any necessary repairs.

3.2 FINISHING AND REFINISHING

- A. Refinishing of existing wood flooring:
 - Remove existing wood flooring finish materials using approved lead safe methods
 - After cleanup is complete, containment measures may be removed and properly disposed.
 - Fill all nail holes with manufacturer's recommended wood filler compound.
 - Apply final finish as soon as possible after finish removal is complete.
 - Apply final finish as per manufacturer's instructions.
 - Allow at least twenty-four (24) hours, or longer per manufacturer's instructions, drying time between finish coats.

3.3 FINAL CLEANING

- A. Follow cleaning instructions as per MFMA (Maple Floor Manufacturer's Association) guidelines.

3.4 INSPECTION, REPAIR, AND TOUCH-UP

- A. Securely protect flooring from damage by construction traffic or further construction work.
- B. Repair or replace any damaged or defective work:
 - Chipped
 - Scratched
 - Marred
 - Stained
 - Joints that are not tight
 - Gaps at walls, jambs, or trim
- C. The **Contractor** shall pay all costs for repairing or replacing defective flooring or flooring which has been damaged as a result of **Contractor** failing to adequately protect flooring.

END OF SECTION – 09 55 00 WOOD FLOORING

SECTION 09 65 10 RUBBER BASE

PART 1 GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

- A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
1. Rubber wall base and accessories.
 2. Substrate preparation.
- B. Related Work: The following items are not included in this Section and are specified under the designated Sections:
1. Section 09 65 00 Resilient Tile Flooring.
- C. References (Industry Standards):
1. ASTM International (ASTM):
 - a. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials
 - b. ASTM E648 Standard Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source
 - c. ASTM E662 Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials
 - d. ASTM F1861 Standard Specification for Resilient Wall Base
 - e. ASTM F386 Standard Test Method for Thickness of Resilient Flooring Materials Having Flat Surfaces
 2. Canadian ULC Standards (CAN/ULC):
 - a. CAN/ULC-S102.2 Surface Burning Characteristics
 3. National Fire Protection Association (NFPA):
 - a. NFPA 253 Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source
 - b. NFPA 258 Test Method for Specific Density of Smoke Generated by Solid Materials
 - c. NFPA 255 Test Method of Test of Surface Burning Characteristics of Building Materials

1.3 SUBMITTALS

- A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures.
- B. Product Data: Submit manufacturer's technical data sheet, care & maintenance document, submittal and/or warranty for each material and accessory proposed for use (available at www.roppe.com).
- C. Samples: Submit representative samples of each product specified for verification.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Provide resilient flooring materials manufactured in the United States of America by a firm with a minimum of 10 years' experience with resilient flooring materials of type equivalent to those specified.
1. Manufacturer's quality management system must have ISO 9001:2000 approval.

2. Provide resilient flooring products, including wall base, accessories and subfloor preparation products from one manufacturer to ensure color matching and compatibility.
 3. Manufacturer shall be capable of providing technical training and technical field service representation.
 - B. Installer Qualifications: Installer must be professional, licensed, insured and acceptable to manufacturer of resilient flooring materials. Project Managers or Field Supervisors must be INSTALL (International Standards & Training Alliance) certified, CFI (Certified Floorcovering Installers) Certified and/or an FCICA (The Flooring Contractors Association) CIM (Certified Installation Manager) for the requirements of the project.
- 1.5 DELIVERY, STORAGE, AND HANDLING
- A. Deliver materials in labeled packages. Store and handle in strict compliance with manufacturer's recommendations. Protect from damage due to weather, excessive temperatures, and construction operations.
 - B. Deliver materials sufficiently in advance of installation to condition materials to the required temperature for 48-hours prior to installation.
- 1.6 PROJECT CONDITIONS
- A. Maintain temperature and humidity at service levels or the ambient temperature must remain steady ($\pm 10^{\circ}$ F) and be between 65° F and 85° F for at least 48-hours prior to, during and after installation. The ambient relative humidity is recommended to be between 40% and 65% RH; avoid dew point conditions.
- 1.7 WARRANTY
- A. Provide manufacturer's standard limited commercial warranty to cover manufacturing defects.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Basis-of-Design: Roppe | 1602 N. Union Street | Fostoria, OH 44830 | P: (800) 633-3151
- B. Substitutions: No substitutions permitted

2.2 PRODUCTS

A. TRADITIONAL WALL BASE

- i. ROPPE CONTOURS WALL BASE THERMOPLASTIC RUBBER (TP) WALL BASE - specify rubber wall base with the following characteristics: Meets the performance requirements for the following Industry Standards:
 - a. ASTM F1861, Standard Specification for Resilient Wall Base, Type TP (rubber, thermoplastic), Group 2 (layered), Style A&B (straight, cove)
 - b. ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials, Class A
 - c. ASTM E648 (NFPA 253), Standard Test Method for Critical Radiant Flux, Class 1, >0.45 W/cm²
 - d. ASTM E662 (NFPA 258), Standard Test Method for Smoke Density, Passes, <450
 - e. ASTM F137, Standard Test Method for Flexibility of Resilient Flooring Materials protocols, Passes
 - f. ASTM F386, Standard Test Method for Thickness of Resilient Flooring Materials Having Flat Surfaces, Passes
 - g. ASTM F925, Standard Test Method for Resistance to Chemicals of Resilient Flooring, Excellent
 - h. ASTM F1515, Standard Test Method for Measuring Light Stability of Resilient Flooring protocols, PassesNational Fire Protection Association (NFPA):

- i. NFPA 253, Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source
- j. NFPA 255, Standard Method of Test of Surface Burning Characteristics of Building Materials
- k. NFPA 258, Test Method for Specific Density of Smoke Generated by Solid Materials

CAN/ULC-S102.2

- l. FSR 10, SDS 60

B. ROPPE RUBBER WALL BASE IS A THERMOPLASTIC RUBBER (TP)

- i. Roppe Contours Wall Base
- ii. PV6085 #85 (height – 6 1/4" / thickness – 1/4"
- iii. Size: Contours Base 40' rolls].
- iv. Color: see finish schedule.
- v. TP CONTOURS BASE rubber base meets NSF 332 Platinum Criteria
- vi. TP CONTOURS BASE rubber base meets CHPS Criteria
- vii. TP CONTOURS BASE rubber base is manufactured in the U.S.A.
- viii. TP CONTOURS BASE rubber base is manufactured in a Facility that is ISO 14001 Certified
- ix. TP CONTOURS BASE rubber base is free of materials known to be teratogenic, mutagenic or carcinogenic
- x. TP CONTOURS BASE rubber base is free of Halogens
- xi. TP CONTOURS BASE rubber base is free of Asbestos
- xii. TP CONTOURS BASE rubber base is free of Phthalates
- xiii. TP CONTOURS BASE rubber base is free of Heavy Metals

2.3 INSTALLATION AND MAINTENANCE MATERIALS

- A. Substrate/Background Preparation Products:
 - i. Adhesives: Adhesives should be selected based on the site conditions and use of the space being installed.
- B. Recommended Adhesive Products:
 - i. Excelsior WB-600 Acrylic Wall Base Adhesive provided by Roppe
 - a. Unit Size: 30 oz. cartridge, 1 Gallon & 4 Gallon
 - b. Coverage: 30 – 70 linear feet per cartridge, 180 – 340 linear feet per gallon
 - c. Standard installations over porous backgrounds
 - d. 100 % solids, solvent free and low VOCs
 - e. Hard set adhesive adding to dimensionally stable materials
 - f. Excellent sheer strength
 - ii. Excelsior C-630 Contact Adhesive provided by Roppe
 - a. Unit Size: 1 Quart
 - b. Coverage: 20 – 40 Square Feet per unit / 120 – 140 Linear Feet per unit
 - c. Standard installations over porous and non-porous substrates
 - d. Hard set adhesive adding to dimensionally stable materials
 - e. Excellent sheer strength
 - f. Superior bond strength
 - g. Great for environments with topical moisture
- C. Accessories: Items needed to complete the installation. Recommended accessory products:
 - a. Rubber Corner Blocks (Inside and Outside corners)
 - b. Micro Corners (Inside and Outside corners)

- D. **Maintenance Materials:** Proper maintenance of the installation is critical to the long term performance of the wall base products being specified. Using the appropriate chemicals to maintain the product according to the environment in which it is specified is critical. Recommend maintenance products:
- i. Excelsior NC-900, All-Purpose Neutral pH Cleaner provided by Roppe
 - a. For initial maintenance
 - b. For daily and routine maintenance

PART 3 – EXECUTION

3.1 GENERAL

A. **General Contractor Responsibilities:**

- i. Supply a safe, climate controlled building as detailed in Roppe's Installation Instructions and Technical Data.
- ii. Ensure substrate/background meets the requirements of ASTM F1861, Roppe Installation Instructions and Technical Data and Excelsior Installation Instructions and Technical Data.
- iii. Provide a secure storage area that is maintained permanently or temporarily at normal operating temperature and humidity conditions between 65° F and 85° F and between 40% and 65% relative humidity, for at least 48-hours prior to and during the application of the wall base, so the contractor can acclimate the rubber base materials per manufacturer's instructions.
- iv. Provide an installation area that is weather tight and maintained either permanently or temporarily at ambient service temperature and humidity. Normal operating temperature and humidity conditions are between 65° F and 85° F and between 40% and 65% relative humidity, for at least 48-hours prior to and during the application of the wall base per the manufacturer's instructions.
- v. Ensure areas with direct prolonged exposure to sunlight are protected with protective UVA/UVB restrictive coatings or films.
- vi. In areas where the walls are subject to direct sunlight through doors or windows, the doors and windows should be covered using blinds, curtains, cardboard or similar for the time of the installation and 72-hours after the installation to allow the adhesive to cure. Note: These areas should be installed using wet adhesives only.
- vii. Conduct initial maintenance prior to final usage per the Roppe Care & Maintenance Documents. Do not conduct initial maintenance until adhesive has cured per the adhesive technical data.
- viii. Provide trained installers that are professional, licensed, insured and acceptable to manufacturer of resilient rubber wall base materials.
- ix. Ensure installers or installation teams meet one of the following requirements:
 - a. Have completed INSTALL (International Standards & Training Alliance)
 - b. CFI (Certified Floorcovering Installers) training programs
 - c. Certified by INSTALL or CFI.
 - d. Are being supervised by Project Managers or Field Supervisors that are INSTALL (International Standards & Training Alliance) certified, CFI (Certified Floorcovering Installers) Certified and/or an FCICA (The Flooring Contractors Association) CIM (Certified Installation Manager).
- x. Follow all requirements in the appropriate Roppe and/or Excelsior Installation Instructions and Technical Data, Care & Maintenance Documents, Warranties and other technical documents or instructions.

3.2 EXAMINATION

- A. **General:** Follow guidelines laid out in Division 01, Section 01 71 00 – Examination and Preparation, as well as Section 01 43 00 – Quality Assurance.

- B. Verification of Conditions: Inspect all substrates/backgrounds to ensure they are clean, smooth, permanently dry, structurally sound and without voids. Confirm all areas are properly sealed and acclimated per manufacturer's requirements.
- C. Verification of Products: In accordance with manufacturer's installation requirements, visually inspect material for size, style, color or visual defects prior to installing. Any material that is incorrect or visually defective shall not be installed.

3.3 SUBSTRATE/BACKGROUND PREPARATION

- A. General: Follow guidelines laid out in Division 01, Section 01 71 00 – Examination and preparation. All work required ensuring substrate/background meets manufacturers' guidelines are the responsibility of the general contractor.
- B. Preparation: Ensure substrate/background meets the requirements of ASTM F1861 for resilient wall base and/or Roppe Installation Instructions and Technical Data and Excelsior Installation Instructions and Technical Data.
 - i. Substrates/backgrounds must be free of visible water or moisture, dust, sealers, paint, residual adhesives and adhesive removers, solvents, wax, oil, grease, mold, mildew and any other extraneous coating, film, material or foreign matter.
 - ii. Acclimate all products to be used during the installation and the installation environment prior to installation according to the manufacturers written instructions.
 - iii. Fill cracks, holes, depressions and irregularities in the substrate/background to prevent transferring through to the surface of the resilient wall base.

3.4 INSTALLATION

- A. General: Follow all relevant guidelines detailed in Division 01, as well as wall base and adhesive manufacturer's technical data sheets.
- B. Resilient Vinyl Wall Base: Install material in accordance with manufacturer's recommendations.
 - i. Select the appropriate adhesive for the application and job site conditions.
 - ii. Install material according to roll sequence or with like run numbers.
 - iii. Ensure material is rolled appropriately into the adhesive using a hand roller.

3.5 CLEANING & MAINTENANCE

- A. General: Clean up installation area and vacuum dust or wipe material to remove any dirt, dust or debris.
- B. Initial Maintenance: Conduct initial maintenance per the manufacturer's recommended procedures stated in the Maintenance Documents. All documentation is available upon request or from the Roppe website: www.roppe.com. Excelsior Cleaning products are the recommended products for use. All can be found linked to the product on the Roppe website or at www.excelsiorproducts.net.
- C. Regular Maintenance: Conduct maintenance on regular intervals as needed. Insufficient cleaning will reduce the wear life of the wall base and alter the aesthetic properties of the wall base. The amount of maintenance depends directly upon the amount of dirt and particulates the area is subjected to.

3.6 CLOSEOUT ACTIVITIES

- A. General: Follow all federal, state and local requirements and Division 01 Section 01 76 00 – Protecting Installed Construction and Section 01 78 00 – Closeout Submittal requirements for these activities, protecting installed construction.
- B. Protection: Protect newly installed material from damage by other trades. Be sure all construction debris is picked up and vacuumed or removed prior to leaving the area. Limit usage and foot traffic according to the adhesive's requirements. When moving appliances or heavy furniture, protect wall base from scuffing and tearing using temporary floor protection as well.

END OF SECTION 09 65 10

SECTION 09 65 13
VINYL STAIR TREADS

PART 1 – GENERAL

1.1 SUMMARY

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications. Section includes: Resilient Stair Treads and Risers and Stringers and Nosing and accessories.

1.2 DESCRIPTION OF WORK

- A. **Work Included:** Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
 - i. Section 09 65 13. Vinyl Stair Treads and accessories
- B. **Related Work:** The following items are not included in this Section and are specified under the designated Sections:
 - i. Section 03 30 00 Cast-In-Place Concrete, Substrate Preparation
- C. **References (Industry Standards):**
 - i. ASTM International (ASTM):
 - a. ASTM F2169, Standard Specification for Resilient Stair Treads
 - b. ASTM F2240, Hardness
 - c. ASTM E648, Standard Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source
 - d. ASTM E662, Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials
 - e. ASTM F925, Standard Test Method for Resistance to Chemicals of Resilient Flooring
 - f. ASTM D2047, Standard Test Method for Static Coefficient of Friction as Measured by the James Machine
 - g. ASTM F1515, Light Stability
 - h. ASTM F1514, Heat Stability
 - ii. **National Fire Protection Association (NFPA):**
 - a. NFPA 253, Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source
 - b. NFPA 258, Test Method for Specific Density of Smoke Generated by Solid Materials

1.3 SUBMITTALS

- A. **General:** Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures.
- B. **Product Data:** Submit manufacturer's technical data sheet, care & maintenance document, submittal and/or warranty for each material and accessory proposed for use also available at www.roppe.com.

- C. **Samples:** Submit representative samples of each product specified for verification, in manufacturer's standard size samples of each resilient product color, texture and pattern required.
- 1.4 QUALITY ASSURANCE
 - A. **Manufacturer Qualifications:** Provide resilient stair treads and accessory materials manufactured in the United States of America by a firm with a minimum of 10 years' experience with resilient flooring materials of type equivalent to those specified.
 - i. Provide resilient stair tread products, including risers, stringers, nosing and subfloor preparation products from one manufacturer to ensure color matching and compatibility.
 - ii. Manufacturer shall be capable of providing technical training and technical field service representation.
 - B. **Installer Qualifications:** Installer must be professional, licensed, insured and acceptable to manufacturer of resilient stair tread materials and accessories. Project Managers or Field Supervisors must be INSTALL (International Standards & Training Alliance) certified CFI (Certified Floorcovering Installers) Certified and/or an FCICA (The Flooring Contractors Association) CIM (Certified Installation Manager) for the requirements of the project.
- 1.5 DELIVERY, STORAGE, AND HANDLING
 - A. Deliver materials in labeled packages. Store and handle in strict compliance with manufacturer's recommendations. Protect from damage due to weather, excessive temperatures, and construction operations.
 - B. Deliver materials sufficiently in advance of installation to condition materials to the required temperature for 48-hours prior to installation.
- 1.6 PROJECT CONDITIONS
 - A. Install Rubber Stair Treads after other finishing operations, including painting, have been completed.
 - B. Maintain temperature at service levels and/or the ambient temperature must remain steady ($\pm 10^{\circ}$ F) between 65° F and 85° F for at least 48-hours prior to, during and until substantial completion.
 - C. Maintain relative humidity at service levels, or between 40% and 65% RH.
 - D. Avoid conditions in which dew point causes condensation on the installation surface.
- 1.7 WARRANTY
 - A. Provide manufacturer's standard limited commercial warranty to cover manufacturing defects.

PART 2 - PRODUCTS

- 2.1 MANUFACTURER
 - A. Basis-of-Design: Roppe Corporation | 1602 N Union St. | Fostoria, OH 44830 | P: (800) 537-9527
 - B. Substitutions: No substitutions permitted
- 2.2 PRODUCTS
 - A. VINYL STAIR TREADS
 - i. Roppe VINYL STAIR TREADS
 - ii. Specify Profile by number and description: #16 AND #17 LIGHT DUTY RIB TREAD
 - iii. Color Shade with Square or Round Nose: see drawings

- a. ASTM F2169, Standard Specification for Resilient Stair Treads; Complies, Type TV, Class 2 & Group 1 & 2, Grade 1
- b. ASTM F2240, Hardness; Shore A, 85
- c. ASTM E648, Standard Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; Class I, $>0.45 \text{ W/cm}^2$
- d. ASTM E662, Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials; Pass <450
- e. ASTM F925, Standard Test Method for Resistance to Chemicals of Resilient Flooring; Passes
- f. ASTM F1514, Standard Test Method for Measuring Heat Stability of Resilient Flooring by Color Change; Passes
- g. ASTM D3389, Standard Test Method for Coated Fabrics Abrasion Resistance (Rotary Platform Abrader), Passes <1 gram loss.
- iv. **National Fire Protection Association (NFPA):**
 - a. NFPA 253, Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source
 - b. NFPA 258, Test Method for Specific Density of Smoke Generated by Solid Materials

2.3 INSTALLATION AND MAINTENANCE MATERIALS

- A. **Moisture Mitigation:** Moisture testing is required for all Vinyl Stair Treads installations. Mitigation should be performed if results indicate high levels of moisture. Recommended Moisture Mitigation Product:
 - i. Excelsior MM-100, Moisture Mitigation provided by Roppe
 - a. Unit Size: 2.5 Gallons
 - b. Coverage: 1000 square feet per unit with one coat
 - c. MM-100 is a water, solvent and VOC free, polyurethane-based moisture mitigation product used to treat concrete slabs with excessive moisture levels beyond what flooring adhesives allow.
 - d. MM-100 can block moisture up to 20 lbs. MVER or 99% RH.
 - e. MM-100 is a single component product, eliminating extensive mix times and concerns regarding pot life.
 - f. MM-100 does not require aggressive concrete preparation, such as shot blasting or diamond grinding.
 - g. MM-100 is a two coat system that is incredibly easy to apply and does not require any specialized equipment, its excellent coverage rates also make it incredibly cost effective.
 - h. Despite being a two coat system, MM-100 is incredibly fast drying.
 - i. Flooring or subsequent coatings can be installed in less than two hours.
 - j. Backed by a 10 year material and labor warranty, MM-100 is a fast and easy solution for the moisture issues that commonly plague flooring installations.
- B. **Substrate Preparation Products:** Substrates should be prepared to properly receive the resilient flooring products being specified. Trowelable leveling and patching compounds that are latex-modified, Portland cement based or blended hydraulic cement-based formulation. Recommended Substrate Preparation Products:
 - i. Excelsior NP-230, Non-Porous Substrate Primer provided by Roppe
 - a. Unit Size: 2.5 Gallons

- b. Coverage: 1000 Square Feet per unit with one coat
 - c. Used over MM-100 to promote adhesion of cementitious materials
 - d. Single component and fast drying to allow for quick and easy installation
 - e. Contains an aggregate to provide mechanical bond for cementitious materials.
 - ii. Excelsior CP-300, Cementitious Patch provided by Roppe
 - a. Unit Size: 10 lb. Pail
 - b. Coverage: 33 Square Feet per unit @ 1/8"
 - c. Doesn't require primer over porous substrates
 - d. Install flooring in as little as 30 minutes
 - iii. Excelsior SU-310, Self-Leveling Underlayment provided by Roppe
 - a. Unit Size: 50 lb. Bag
 - b. 5500 PSI Compressive Strength after 28 days
 - c. Install flooring within 12 hours
 - d. Pumpable
- C. **Adhesives:** Adhesives should be selected based on the site conditions and use of the space being installed. Recommended Adhesive Products:
 - i. Excelsior AW-510, Acrylic Wet-Set Adhesive provided by Roppe
 - a. Unit Size: 1 Gallon & 4 Gallon
 - b. Coverage: 150 Square Feet
 - c. Standard installations over porous and non-porous substrates
 - d. Hard set adhesive adding to dimensionally stable materials
 - e. Excellent sheer strength
 - f. Approved for Hill-Rom Beds
 - g. Installation Limits
 - (1) 90% RH, ASTM F2170
 - (2) 6 lbs. MVER, ASTM F1869
 - (3) 7-10 pH
 - ii. Excelsior EN-610, Epoxy Nose Filler Adhesive provided by Roppe
 - a. Unit Size: 13.5 oz. Cartridge
 - b. Coverage: 25 linear feet with 1/2" bead / 50 linear feet with 1/4" bead
 - c. Standard installations over porous and non-porous substrates.
 - d. Directly install over concrete, metal or wood
 - e. Excellent sheer strength
 - f. Installation Limits
 - (1) 90% RH, ASTM F2170
 - (2) 6 lbs. MVER, ASTM F1869
 - (3) 7-10 pH
 - iii. Excelsior C-630, Contact Adhesive provided by Roppe
 - a. Unit Size: 1 Quart
 - b. Coverage: 20 – 40 sq. ft.
120-140 lin. ft. per unit
 - c. Vertical or Horizontal installations over porous and non-porous substrates.
 - d. Hard set adhesive adding to dimensionally stable materials
 - e. Superior sheer strength
 - f. Installation Limits

- (1) 85% RH, ASTM F2170
 - (2) 6 lbs. MVER, ASTM F1869
 - (3) 7-10 pH
 - iv. Excelsior TP-620, Pressure Sensitive Tape based adhesive provided by Roppe
 - a. Unit Size: 1" x 164' (6 per case)
 - 4" x 164' (3 per case)
 - 9.5" x 164" (1 per case)
 - b. Easy installations over porous and non-porous substrates.
 - c. No Clean-up, Limited Waste
 - d. Superior sheer strength
 - e. Installation Limits
 - (1) 80% RH, ASTM F2170
 - (2) 5 lbs. MVER, ASTM F1869
 - (3) 7-10 pH
 - v. Excelsior MS-700, Modified Silane Wet-Set Adhesive provided by Roppe
 - a. Unit Size: 3 Gallon
 - b. Coverage: 480-705 Square Feet per unit
 - c. Standard installations over porous and non-porous substrates.
 - d. Excellent green grab
 - e. Hard set adhesive adding to dimensionally stable materials
 - f. Excellent sheer strength
 - g. Approved for Hill-Rom Beds
 - h. Superior bond strength
 - i. Great for environments with topical moisture
 - j. Great for exterior applications
 - k. Installation Limits, Indoor Installations only
 - (1) 95% RH, ASTM F2170
 - (2) 10 lbs. MVER, ASTM F1869
 - vi. Excelsior EW-710, Epoxy Wet-Set Adhesive provided by Roppe
 - a. Unit Size: 1 Gallon
 - b. Coverage: 150 Square Feet per unit
 - c. Standard installations over porous and non-porous substrates.
 - d. Excellent green grab
 - e. Hard set adhesive adding to dimensionally stable materials
 - f. Excellent sheer strength
 - g. Approved for Hill-Rom Beds
 - h. Superior bond strength
 - i. Great for environments with topical moisture
 - j. Great for exterior applications
 - k. Installation Limits, Indoor Installations only
 - (1) 90% RH, ASTM F2170
 - (2) 6 lbs. MVER, ASTM F1869
 - (3) 7-10 pH

- D. **Maintenance Materials:** Proper maintenance of the installation is critical to the long term performance of the flooring products being specified. Using the appropriate

chemicals to maintain the product according to the environment in which it is specified is critical. Recommend maintenance products:

- i. Excelsior NC-900, All-Purpose Neutral pH Cleaner provided by Roppe
 - a. For initial maintenance
 - b. For daily and routine maintenance
- ii. Excelsior MF-940 for ease of floor maintenance, provided by Roppe
 - a. Creates protective wear layer that protects flooring and eases maintenance.
- iii. Excelsior GF-950, Gloss Acrylic Floor Finish, for ease of floor maintenance, provided by Roppe.
 - a. Creates protective wear layer that protects flooring and eases maintenance.
- iv. Excelsior FR-920 Finish Remover, provided by Roppe
 - a. Will remove all acrylic floor finishes

PART 3 – EXECUTION

3.1 GENERAL

A. General Contractor Responsibilities:

- i. Supply a safe, climate controlled building and subfloor as detailed in Roppe Technical Data Sheets.
- ii. Ensure substrate meets the requirements of ASTM F2169, Roppe Technical Data Sheets and Excelsior Technical Data Sheets.
- iii. Provide a secure storage area that is maintained permanently or temporarily at normal operating temperature and humidity conditions between 65° F and 85° F and between 40% and 65% relative humidity, for at least 48-hours prior to and during the application of the flooring, so the flooring contractor can acclimate the flooring materials per manufacturer's instructions.
- iv. Provide an installation area that is weather tight and maintained either permanently or temporarily at ambient service temperature and humidity. Normal operating temperature and humidity conditions are between 65° F and 85° F and between 40% and 65% relative humidity, for at least 48-hours prior to and during the application of the flooring per the manufacturer's instructions.
- v. Ensure areas with direct prolonged exposure to sunlight are protected with protective UVA/UVB restrictive coatings or films.
- vi. Areas of the flooring that are subject to direct sunlight through doors or windows should have them covered using blinds, curtains, cardboard or similar for the time of the installation and 72-hours after the installation to allow the adhesive to cure. Note: These areas should be installed using wet adhesives only.
- vii. Conduct initial maintenance prior to final usage per the Roppe Care & Maintenance Documents. Do not conduct initial maintenance until adhesive has cured per the adhesive technical data.

B. Flooring Contractor Responsibilities:

- i. Provide trained installers that are professional, licensed, insured and acceptable to manufacturer of resilient stair tread materials.
- ii. Ensure installers or installation teams meet one of the following requirements:

- iii. Have completed INSTALL (International Standards & Training Alliance) or CFI (Certified Floorcovering Installers) training programs and/or are certified by INSTALL or CFI.
- iv. Are being supervised by Project Managers or Field Supervisors that are INSTALL (International Standards & Training Alliance) certified, CFI (Certified Floorcovering Installers) Certified and/or an FCICA (The Flooring Contractors Association) CIM (Certified Installation Manager).
- v. Follow all requirements in the appropriate Roppe and/or Excelsior Technical Data Sheets, Care & Maintenance Documents, Warranties and other technical documents or instructions.

3.2 EXAMINATION

- A. **General:** Follow guidelines laid out in Division 01, Section 01 71 00 – Examination and Preparation, as well as Section 01 43 00 – Quality Assurance.
- B. **Verification of Conditions:** Inspect all substrates to ensure they are clean, smooth, permanently dry, flat, and structurally sound. Confirm all areas are properly sealed and acclimated per manufacturer's requirements.
- C. **Verification of Products:** In accordance with manufacturer's installation requirements, visually inspect material for size, color or visual defects prior to installing. Any material that is incorrect or visually defective shall not be installed.

3.3 SUBSTRATE PREPARATION

- A. **General:** Follow guidelines laid out in Division 01, Section 01 71 00 – Examination and preparation. All work required ensuring substrate or subfloor meets manufacturers' guidelines are the responsibility of the general contractor.
 - i. Ensure surface is troweled flush with surface of concrete.
 - ii. Follow material manufacturer's as well as adhesive manufacturer's instructions for installation.
- B. **Preparation:** Ensure substrate meets the requirements of ASTM F710 for concrete substrates and ASTM F1482 for wood substrates and/or Roppe Technical Data Sheets and Excelsior Technical Data Sheets.
 - i. Substrates must be free of visible water or moisture, dust, sealers, paint, sweeping compounds, curing compounds, residual adhesives and adhesive removers, concrete hardeners or densifiers, solvents, wax, oil, grease, asphalt, visible alkaline salts or excessive efflorescence, mold, mildew and any other extraneous coating, film, material or foreign matter.
 - ii. Acclimate all products to be used during the installation and the installation environment prior to installation according to the manufacturers written instructions.
- C. **Concrete Substrates:**
 - i. **Moisture Testing:** Perform moisture testing per the manufacturer's recommendations to determine conditions, it is recommended to treat new and existing slabs a little bit different to ensure adequate conditions exist for installation.
 - a. New concrete substrates: it is recommended to perform ASTM F2170 Relative Humidity testing no more than a week prior to installation to determine the levels present and when to proceed with the installation.
 - b. Existing concrete substrates: in addition to ASTM F2170 testing, existing slabs that have previously had floor covering installed, must be tested to

ASTM F1869 Calcium Chloride test kits to determine the MVER of the concrete.

- ii. Mechanically remove contamination on the substrate that may cause damage to the flooring material, this includes paint, permanent and non-permanent markers, pens, crayons, etc. Leaving these on the substrate or marking with them on the back of the material could cause bleed through and damage the flooring.
- iii. Fill cracks, holes, depressions and irregularities in the substrate to prevent transferring through to the surface of the resilient flooring. Use a high-quality Portland cement-based product such as Excelsior installation products provided by Roppe.

3.4 INSTALLATION

- A. **General:** Follow all relevant guidelines detailed in Division 01, as well as flooring and adhesive manufacturer's technical data sheets.
- B. **Resilient Vinyl Treads:** Install material in accordance with manufacturer's recommendations.
 - i. Select the appropriate adhesive for the application and job site conditions.
 - ii. Install material is installed according to installation instructions.
 - iii. Ensure material is rolled appropriately into the adhesive.
- F. **Interface with Other Work:** If caulking or sealing is required after installation, please contact the manufacturer for a suitable, color matching caulk.

3.5 CLEANING & MAINTENANCE

- A. **General:** Clean up installation area and sweep, dust or wipe material to remove any dirt, dust or debris.
- B. **Initial Maintenance:** Conduct initial maintenance per the manufacturer's recommended procedures stated in the Maintenance Documents. All documentation is available upon request or from the Roppe website. Excelsior Cleaning products and floor finishes are the recommended products for use. All can be found linked to the product on the Roppe website or at www.excelsiorproducts.net.
- C. **Regular Maintenance:** Conduct maintenance on regular intervals as needed. Insufficient cleaning will reduce the wear life of the flooring and alter the dissipative properties of the tiles. The amount of maintenance depends directly upon the amount of dirt and particulates the floor is subjected to.

3.6 CLOSEOUT ACTIVITIES

- A. **General:** Follow all federal, state and local requirements and Division 01 Section 01 76 00 – Protecting Installed Construction and Section 01 78 00 – Closeout Submittal requirements for these activities.
- B. **Protection:** Protect newly installed material with construction grade paper or protective boards, such as Masonite or Ram Board, to protect material from damage by other trades. Be sure all construction debris is swept up and removed prior to the protective material being installed and does not get trapped underneath. Limit usage and foot traffic according to the adhesive's requirements. When moving appliances or heavy furniture, protect wall base from scuffing and tearing using temporary floor protection as well.

END OF SECTION 09 65 13.23

SECTION 09 68 00 CARPETING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Carpet.

1.2 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Verification Samples: For each finish product specified, two samples, representing actual product and finish.
- D. Seaming Layout: Submit proposed seaming layout.
- E. Extra Stock: Submit extra stock equal to 2% of total installed.

1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum 5 year experience manufacturing similar products.
- B. Installer Qualifications: Minimum 2 year experience installing similar products.
- C. Performance: Fire performance meeting requirements of building code and local authorities.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.
- B. Handling: Handle materials to avoid damage.

1.5 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.6 SEQUENCING

- A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Shaw Contract
- B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2.2 MATERIALS

- A. Carpet Material:
 - 1. Product: Gradient Broadloom (Shade) and Adage Ultraloc (Cultivate Soul).
 - 2. Protective Treatment: SSP Shaw Soil Protection
 - 3. Color: As selected by Architect per finish schedule.
 - 4. Installation Method: Direct glue down.
 - 5. Auxiliary Materials:
 - a. Edge guards.
 - b. Adhesives, cements and fasteners.
 - c. Leveling compound.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions and in proper relationship with adjacent construction. Test for proper operation and adjust until satisfactory results are obtained.
- B. Comply with recommendations of Carpet and Rug Institute 'Specifier's Handbook'.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 09 68 13

CARPET TILE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Carpet tile.

1.2 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Verification Samples: For each finish product specified, two samples, representing actual product and finish.
- D. Extra Stock: Submit extra stock equal to 2% of total installed.

1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum 5 year experience manufacturing similar products.
- B. Installer Qualifications: Minimum 2 year experience installing similar products.
- C. Performance: Fire performance meeting requirements of building code and local authorities.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.
- B. Handling: Handle materials to avoid damage.

1.5 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.6 SEQUENCING

- A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Shaw Contract
- B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2.2 MATERIALS

- A. Carpet Tile:
 - 1. Product: Shaw Contract – PURPOSE / 08557 NOCTURE.
 - 2. Product: Shaw Contract – INTENT / 08530 SKYLIGHT.
 - 3. Color and size: per finish schedule.
 - 4. Installation Method: Glue-down.
 - 5. Auxiliary Materials:
 - a. Edge guards.
 - b. Adhesives, cements and fasteners.
 - c. Leveling compound.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Installation method: Monolithic.
- B. Install in accordance with manufacturer's instructions and in proper relationship with adjacent construction. Test for proper operation and adjust until satisfactory results are obtained.
- C. Comply with recommendations of Carpet and Rug Institute 'Specifier's Handbook'.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 09 71 26

WALL COVERING

PART 1 GENERAL

1.01 REFERENCES

- A. Wall Covering, Vinyl Coated: Comply with Federal Specification CCC-W-408B.
- B. Effect of Household Chemicals on Clear and Pigmented Organic Finishes: ASTM D 1308.

1.02 SUBMITTALS

- A. Product Data: Catalog sheets, specifications, and installation instructions for the following:
 - 1. Wall Covering, each type specified.
 - 2. Adhesive, Primer/Sealer.
 - 3. Metal Molding.
- B. Samples:
 - 1. Wall Covering: 12 x 12 inch samples of each type, pattern and color specified, with two samples mounted on hardboard backing.
 - 2. Metal Molding: Two 12 inch long piece.
- C. Contract Closeout Submittals:
 - 1. Maintenance Data: Deliver 2 copies covering the installed products, to the Director's Representative.
 - 2. Include manufacturer's recommended cleaning materials, application methods, and precautions in the use of materials and methods which would damage the wall covering.

1.03 QUALITY ASSURANCE

- A. Installer's Qualifications: The persons installing the wall covering and their Supervisor shall be experienced in wall covering installation and regularly employed by a company engaged in the installation of wall coverings for a minimum of five years.
 - 1. Furnish to the Architect the names and addresses of five similar projects which the foregoing people have worked on during the past three years.
- B. Fire Hazard Classification: Class "A" as tested and classified by UL in accordance with ASTM E 84 and equal to or less than the following:
 - 1. Flame Spread: 25.
 - 2. Fuel Contributed: 15.
 - 3. Smoke Developed: 50.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in the manufacturer's original, unopened packages or containers, clearly labeled to identify manufacturer, brand name, quality or grade, and flammability classifications.
- B. Store wall covering in a clean and dry area where the temperature is maintained at 40 degrees F minimum.

- C. Do not store wall covering in upright position.

1.05 PROJECT CONDITIONS

- A. Environmental Requirements: Comply with manufacturer's written recommendations as to environmental conditions under which wall coverings can be applied.

1.06 MAINTENANCE

- A. Extra Stock, Wall Covering: Furnish one extra roll of wall covering for each type, pattern and color of wall covering installed. The extra wall covering shall be from the same run and lot number as the installed wall covering. Store wall covering at the site where directed.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Wall Covering:
1. **Basis of Design: Surface Materials: DeNovo, Canyon Linen.**
 2. Type II (Medium Duty): Total weight 13 oz/sq yd minimum.
 - a. Backing: Osnaburg Drill or Cotton/Polyester sheeting.
 - b. Top Coating: Stain-resistant clear polyvinylchloride film, minimum 0.005 inch (1/2 mil) thick.
 2. Performance and Physical Properties:
 - a. Tensile Breaking Strength (Minimum): Type I - 40 x 30 lbs; Type II - 50 x 55 lbs; Type III - 100 x 95 lbs.
 - b. Tear Strength (Minimum): Type I - 14 x 12 scale reading; Type II - 25 x 25 scale reading; Type III - 50 x 50 scale reading.
 - c. Abrasion Resistance: Type I - 200 + double rubs; Type II - 300 + double rubs; Type III - 1,000 + double rubs.
 3. Pattern and Color: As indicated on the Drawings.
- B. Adhesive, Primer/Sealer: Type recommended by Wall Covering manufacturer to suit application.
1. Provide materials which are mildew - resistant and non-staining to the wall covering.
- C. Spackling: FS SS-P-00450.
- D. Metal Molding: Factory fabricated extruded aluminum alloy 6063-T-52, with fine satin mechanical finish, clear anodic coating complying with AA-M31A31, and manufactured especially for use with wall covering.
1. Molding Adhesive: Light colored solvent system conforming to FS MMM-A-130A and certified by the manufacturer to firmly bond molding to the substance.
 2. Fasteners: Nails or screws recommended by molding manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine surfaces to receive wall covering for defects that will adversely affect the execution and quality of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 PREPARATION

- A. Protection: Prior to surface preparations and wall covering application remove switch plates, wall plates, surface-mounted fixtures and all other similar items.
- B. Surface Preparation:
 - 1. Perform preparation and cleaning procedures in accordance with wall covering manufacturer's instructions and as specified.
 - 2. Remove dirt, grease, old adhesive, loose paint and plaster from wall. Fill cracks, crevices and holes with spackling. Sand rough spots smooth.
 - 3. Gypsum Wallboard: Apply primer/sealer and allow to dry.
 - 4. Plaster: Do not apply primer/sealer until moisture content is less than 8 percent as determined with electronic moisture meter. Remove crystals due to efflorescence. Apply primer/sealer and allow to dry.
 - 5. Painted Surfaces: Remove loose paint. Dull surfaces of enamel and gloss paints, and rinse with clear water.

3.03 APPLICATION OF WALL COVERING

- A. Handle and apply wall covering in accordance with manufacturer's instructions.
- B. Place wall covering panels consecutively in the order they are cut from rolls, including spaces above or below openings.
- C. Apply adhesive to back of wall and place in accordance with the manufacturer's instructions.
- D. Install seams vertically and plumb, and at least 6 inches away from any corner.
- E. Trim selvage edges as required to assure color uniformity and pattern match at seams.
- F. Place wall covering continuously around inside and outside corners.
- G. Use stiff bristled brush or flexible broad knife to eliminate air pockets, wrinkles, blisters and other defects. Force into corners to avoid bridging or spanning.
- H. Remove excess adhesive from each seam before proceeding to next.

3.04 INSTALLATION OF METAL MOLDING

- A. Install with molding adhesive and fasteners in accordance with the molding manufacturer's recommendations and instructions.

3.05 ADJUSTING AND CLEANING

- A. Remove excess adhesive from wall covering.
- B. After wall covering has dried, reinstall the items which were removed.
- C. Upon completion of the Work, remove surplus materials, rubbish and debris resulting from installation of wall covering.

END OF SECTION

SECTION 09 90 00
PAINTING AND COATING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Interior paint and coatings systems including surface preparation.

1.2 RELATED SECTIONS

- A. 06 20 00 - FINISH CARPENTRY
- B. 08 11 02 - STEEL DOOR FRAMES
- C. 09 23 00 – PLASTERING
- D. 09 29 00 - GYPSUM BOARD

1.3 REFERENCES

- A. Steel Structures Painting Council (SSPC):
 - 1. SSPC-SP 1 - Solvent Cleaning.
 - 2. SSPC-SP 2 - Hand Tool Cleaning.
 - 3. SSPC-SP 3 - Power Tool Cleaning.
- B. Material Safety Data Sheets / Environmental Data Sheets: Per manufacturer's MSDS/EDS for specific VOCs (calculated per 40 CFR 59.406). VOCs may vary by base and sheen.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: For each paint system indicated, including:
 - 1. Product characteristics.
 - 2. Surface preparation instructions and recommendations.
 - 3. Primer requirements and finish specification.
 - 4. Storage and handling requirements and recommendations.
 - 5. Application methods.
 - 6. Cautions for storage, handling and installation.
- C. Selection Samples: Submit a complete set of color chips that represent the full range of manufacturer's color samples available.
- D. Verification Samples: For each finish product specified, submit samples that represent actual product, color, and sheen.
- E. Coating Maintenance Manual: upon conclusion of the project, the Contractor or paint manufacturer/supplier shall furnish coating maintenance manual, such as Sherwin-Williams "Custodian Paint Maintenance Manual" report or equal. Manual shall include an area summary with finish schedule, Area detail designating where each product/color/finish was used, product data pages, Safety Data Sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- B. Paint exposed surfaces. If a color of finish, or a surface is not specifically mentioned, Architect will select from standard colors and finishes available.
- C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels unless indicated.
- D. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - 1. Finish surfaces for verification of products, colors and sheens.
 - 2. Finish area designated by Architect.
 - 3. Provide samples that designate primer and finish coats.
 - 4. Compatibility and Adhesion: Check after one week of drying and curing by testing in accordance with ASTM D3359; Adhesion by tape test. If coating system is incompatible, additional surface preparation up to and including complete removal may be required.
 - 5. Do not proceed with remaining work until the Architect approves the mock-up.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver manufacturer's unopened containers to the work site. Packaging shall bear the manufacturer's name, label, and the following list of information:
 - 1. Product name, and type (description).
 - 2. Application and use instructions.
 - 3. Surface preparation.
 - 4. VOC content.
 - 5. Environmental issues.
 - 6. Batch date.
 - 7. Color number.
- B. Storage: Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.
- C. Store materials in an area that is within the acceptable temperature range, per manufacturer's instructions. Protect from freezing.
- D. Handling: Maintain a clean, dry storage area, to prevent contamination or damage to the coatings.

1.7 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8 EXTRA MATERIALS

- A. Furnish extra paint materials from the same production run as the materials applied and, in the quantities, described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner.

- B. Furnish Owner with an additional one percent of each material and color, but not less than 1 gal (3.8 l) or 1 case, as appropriate.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Sherwin-Williams, 101 Prospect Ave., Cleveland, OH 44115; Tel: 800-321-8194; Email: [request info](#); Web: www.sherwin-williams.com
- B. Substitutions: When submitting request for substitution, provide complete product data specified above under Submittals, for each substitute product.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 APPLICATIONS/SCOPE

- A. Interior Paint and Coating Commercial Systems:
 - 1. Masonry: Concrete masonry units, including split-face, scored, and smooth block.
 - 2. Metal: Structural steel, joists, trusses, beams, partitions and similar items.
 - 3. Drywall: Drywall board, Gypsum board.

2.3 PAINT MATERIALS - GENERAL

- A. Paints and Coatings:
 - 1. Unless otherwise indicated, provide factory-mixed coatings. When required, mix coatings to correct consistency in accordance with manufacturer's instructions before application. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
 - 2. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color. Or follow manufactures product instructions for optimal color conformance.
- B. Primers: Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.
- C. Coating Application Accessories: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required, per manufacturer's specifications.
- D. Color: Refer to Finish Schedule for paint colors, and as selected.

2.4 INTERIOR PAINT AND COATING COMMERCIAL SYSTEMS

- A. Metal: Miscellaneous and Ornamental Iron and Ferrous Metal.
 - 1. Alkyd Systems; Waterbased:
 - a. Semi-Gloss Finish: (Metal Doors)
 - 1) 1st Coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66-1310 Series (5.0 mils wet, 2.0 mils dry). Existing: S-W Extreme Bond Primer, B51 Series (3.1 mils wet, .9 dry_
 - 2) 2nd Coat: S-W Pro Industrial Waterbased Alkyd Urethane Enamel Semi-Gloss, B53-1150 Series.
 - 3) 3rd Coat: S-W Pro Industrial Waterbased Alkyd Urethane Enamel Semi-

Gloss, B53-1150 Series (4.0-5.0 mils wet, 1.4 - 1.7 mils dry per coat).

- B. Drywall: Walls, Ceilings, Gypsum Board and similar items.
 - 1. Epoxy Systems; Waterbased:
 - a. Gloss Finish: (see schedule for rooms and finish)
 - 1) 1st Coat: S-W ProMar 200 Zero VOC Interior Latex Primer, B28W2600 (4 mils wet, 1.5 mils dry).
 - 2) 2nd Coat: S-W Pro Industrial Waterbased Catalyzed Epoxy, B73-300 Series.
 - 3) 3rd Coat: S-W Pro Industrial Waterbased Catalyzed Epoxy, B73-300 Series (5.0 mils wet, 2.0 mils dry per coat).
 - b. Eg-Shel/Low Luster Finish: (Office Areas/Storage/Mechanical/Utility/Bath Ceilings)
 - 1) 1st Coat: S-W ProMar 200 Zero VOC Interior Latex Primer, B28W2600 (4 mils wet, 1.5 mils dry).
 - 2) 2nd Coat: S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy, K45-Series.
 - 3) 3rd Coat: S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy, K45-Series (4 mils wet, 1.5 mils dry per coat).
- C. Wood (semi-gloss, water base)
 - a. Primer: PrepRite Premium Wall and Wood Primer MDF 1.4.
 - b. Two coats: ProMar 200 Zero VOC Semi-Gloss MDF 1.6. Total System: MDF 4.6.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared; notify Architect of unsatisfactory conditions before proceeding. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- B. Proceed with work only after conditions have been corrected and approved by all parties, otherwise application of coatings will be considered as an acceptance of surface conditions.
- C. Previously Painted Surfaces: Verify that existing painted surfaces do not contain lead based paints, notify Architect immediately if lead based paints are encountered.

3.2 SURFACE PREPARATION

- A. General: Surfaces shall be dry and in sound condition. Remove oil, dust, dirt, loose rust, peeling paint or other contamination to ensure good adhesion.
 - 1. Remove mildew before painting by washing with a solution of 1 part liquid household bleach and 3 parts of warm water. Apply the solution and scrub the mildewed area. Allow the solution to remain on the surface for 10 minutes. Rinse thoroughly with clean water and allow the surface to dry 48 hours before painting. Wear protective glasses or goggles, waterproof gloves, and protective clothing. Quickly wash off any of the mixture that comes in contact with your skin. Do not add detergents or ammonia to the bleach/water solution.
 - 2. Remove items including but not limited to thermostats, electrical outlets, switch covers and similar items prior to painting. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
 - 3. Prior to attempting to remove mildew, it is recommended to test any cleaner on a small, inconspicuous area prior to use. Bleach and bleaching type cleaners may damage or discolor existing paint films. Bleach alternative cleaning solutions are

- advised.
4. No exterior painting should be done immediately after a rain, during foggy weather, when rain is predicted, or when the temperature is below 50 degrees F (10 degrees C), unless products are designed specifically for these conditions. On large expanses of metal siding, the air, surface and material temperatures must be 50 degrees F (10 degrees F) or higher to use low temperature products.
- B. Aluminum: Remove all oil, grease, dirt, oxide and other foreign material by cleaning per SSPC-SP1, Solvent Cleaning.
 - C. Block (Cinder and Concrete): Remove all loose mortar and foreign material. Surface must be free of laitance, concrete dust, dirt, form release agents, moisture curing membranes, loose cement, and hardeners. Concrete and mortar must be cured at least 30 days at 75 degrees F (24 degrees C). The pH of the surface should be between 6 and 9 unless the products are designed to be used in high pH environments. On tilt-up and poured-in-place concrete, commercial detergents and abrasive blasting may be necessary to prepare the surface. Fill bug holes, air pockets, and other voids with a cement patching compound.
 - D. Concrete, SSPC-SP13 or NACE 6: This standard gives requirements for surface preparation of concrete by mechanical, chemical, or thermal methods prior to the application of bonded protective coating or lining systems. The requirements of this standard are applicable to all types of cementitious surfaces including cast-in-place concrete floors and walls, precast slabs, masonry walls, and shotcrete surfaces. An acceptable prepared concrete surface should be free of contaminants, laitance, loosely adhering concrete, and dust, and should provide a sound, uniform substrate suitable for the application of protective coating or lining systems.
 - E. Dry wall Interior: Must be clean and dry. All nail heads must be set and spackled. Joints must be taped and covered with a joint compound. Spackled nail heads and tape joints must be sanded smooth and all dust removed prior to painting.
 - F. Galvanized Metal: Clean per SSPC-SP1 using detergent and water or a degreasing cleaner to remove greases and oils. Apply a test area, priming as required. Allow the coating to dry at least one week before testing. If adhesion is poor, Brush Blast per SSPC-SP7 is necessary to remove these treatments.
 - G. Steel: Structural, Plate, And Similar Items: Should be cleaned by one or more of the surface preparations described below. These methods are used throughout the world for describing methods for cleaning structural steel. Visual standards are available through the Society of Protective Coatings. A brief description of these standards together with numbers by which they can be specified follow.
 1. Solvent Cleaning, SSPC-SP1: Solvent cleaning is a method for removing all visible oil, grease, soil, drawing and cutting compounds, and other soluble contaminants. Solvent cleaning does not remove rust or mill scale. Change rags and cleaning solution frequently so that deposits of oil and grease are not spread over additional areas in the cleaning process. Be sure to allow adequate ventilation.
 2. Hand Tool Cleaning, SSPC-SP2: Hand Tool Cleaning removes all loose mill scale, loose rust, and other detrimental foreign matter. It is not intended that adherent mill scale, rust, and paint be removed by this process. Before hand tool cleaning, remove visible oil, grease, soluble welding residues, and salts by the methods outlined in SSPC-SP1.
 3. Power Tool Cleaning, SSPC-SP3: Power Tool Cleaning removes all loose mill scale, loose rust, and other detrimental foreign matter. It is not intended that adherent mill scale, rust, and paint be removed by this process. Before power tool cleaning, remove visible oil, grease, soluble welding residues, and salts by the methods outlined in

SSPC-SP1.

4. White Metal Blast Cleaning, SSPC-SP5 or NACE 1: A White Metal Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.
 5. Commercial Blast Cleaning, SSPC-SP6 or NACE 3: A Commercial Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except for staining. Staining shall be limited to no more than 33 percent of each square inch of surface area and may consist of light shadows, slight streaks, or minor discoloration caused by stains of rust, stains of mill scale, or stains of previously applied paint. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.
 6. Brush-Off Blast Cleaning, SSPC-SP7 or NACE 4: A Brush-Off Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, loose mill scale, loose rust, and loose paint. Tightly adherent mill scale, rust, and paint may remain on the surface. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP 1 or other agreed upon methods.
 7. Power Tool Cleaning to Bare Metal, SSPC-SP11: Metallic surfaces that are prepared according to this specification, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxide corrosion products, and other foreign matter. Slight residues of rust and paint may be left in the lower portions of pits if the original surface is pitted. Prior to power tool surface preparation, remove visible deposits of oil or grease by any of the methods specified in SSPC-SP1, Solvent Cleaning, or other agreed upon methods.
 8. Near-White Blast Cleaning, SSPC-SP10 or NACE 2: A Near White Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except for staining. Staining shall be limited to no more than 5 percent of each square inch of surface area and may consist of light shadows, slight streaks, or minor discoloration caused by stains of rust, stains of mill scale, or stains of previously applied paint. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.
 9. High- and Ultra-High Pressure Water Jetting for Steel and Other Hard Materials: SSPC-SP12 or NACE 5: This standard provides requirements for the use of high- and ultra-high pressure water jetting to achieve various degrees of surface cleanliness. This standard is limited in scope to the use of water only without the addition of solid particles in the stream.
 10. Water Blasting, SSPC-SP12/NACE No. 5: Removal of oil grease dirt, loose rust, loose mill scale, and loose paint by water at pressures of 2,000 to 2,500 psi at a flow of 4 to 14 gallons per minute.
- H. Wood: Must be clean and dry. Prime and paint as soon as possible. Knots and pitch streaks must be scraped, sanded, and spot primed before a full priming coat is applied. Patch all nail holes and imperfections with a wood filler or putty and sand smooth.

3.3 INSTALLATION

- A. General: Apply all coatings and materials with manufacture specifications in mind. Mix and thin coatings according to manufacturer's recommendations.
- B. Do not apply to wet or damp surfaces. Wait at least 30 days before applying to new concrete or masonry. Or follow manufacturer's procedures to apply appropriate coatings prior to 30

days. Test new concrete for moisture content.

- C. Apply coatings using methods recommended by manufacturer.
- D. Uniformly apply coatings without runs, drips, or sags, without brush marks, and with consistent sheen.
- E. Apply coatings at spreading rate required to achieve the manufacturers recommended dry film thickness.
- F. Regardless of number of coats specified, apply as many coats as necessary for complete hide, and uniform appearance.
- G. Inspection: The coated surface must be inspected and approved by the Architect just prior to each coat.

3.4 PROTECTION

- A. Protect finished coatings from damage until completion of project.
- B. Touch-up damaged coatings after substantial completion, following manufacturer's recommendation for touch up or repair of damaged coatings. Repair any defects that will hinder the performance of the coatings.

END OF SECTION

SECTION 10 44 13

FIRE PROTECTION CABINETS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes fire-protection cabinets for portable fire extinguishers.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.4 COORDINATION

- A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

1.5 SEQUENCING

- A. Apply decals on field-painted fire-protection cabinets after painting is complete.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.

2.2 FIRE-PROTECTION CABINET

- A. Cabinet Type: Suitable for fire extinguisher.
- B. Cabinet Material: Cold-rolled steel sheet.
- C. Semi-Recessed Cabinet:

1. Trimless with Concealed Flange: Surface of surrounding wall finishes flush with exterior finished surface of cabinet frame and door, without overlapping trim attached to cabinet. Provide recessed flange, of same material as box, attached to box to act as drywall bead.
- D. Door Material: Steel sheet.
- E. Door Style: Vertical duo panel with frame.
- F. Door Glazing: Tempered float glass (clear).
- G. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
- H. Accessories:
 1. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
 2. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed by Architect.
 - a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."
 - 1) Location: Applied to cabinet door.
 - 2) Application Process: Decals.
 - 3) Lettering Color: Red.
 - 4) Orientation: Vertical.
- I. Materials:
 1. Cold-Rolled Steel: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
 - a. Finish: Baked enamel or powder coat.
 - b. Color: As selected by Architect from full range of industry colors and color densities.
 2. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

2.3 FABRICATION

- A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Prepare recesses for recessed fire-protection cabinets as required by type and size of cabinet and trim style.
- B. Install fire-protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
- C. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.

- D. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

END OF SECTION 10 44 13

SECTION 10 44 16 FIRE EXTINGUISHERS

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 portable, hand-carried fire extinguishers, and mounting brackets for fire extinguishers.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher.
- B. Product Schedule: For fire extinguishers. Coordinate final fire-extinguisher schedule with fire-protection cabinet schedule to ensure proper fit and function.

1.4 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.6 COORDINATION

- A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure of hydrostatic test according to NFPA 10 when testing interval required by NFPA 10 is within the warranty period.
 - b. Faulty operation of valves or release levers.
 - 2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

2.2 FIRE EXTINGUISHERS AND CABINETS

- A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Amerex Corporation.
 - b. Ansul Incorporated; Tyco International.
 - c. Babcock-Davis.
 - d. Badger Fire Protection.
 - e. Buckeye Fire Equipment Company.
 - f. Fire End & Croker Corporation.
 - g. Guardian Fire Equipment, Inc.
 - h. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - i. Kidde Residential and Commercial Division.
 - j. Larsens Manufacturing Company.
 - k. MOON American.
 - l. Nystrom, Inc.
 - m. Oval Fire Products Corporation.
 - n. Potter Roemer LLC.
 - o. Pyro-Chem; Tyco Fire Suppression & Building Products.
 - p. Strike First Corporation of America (The).
 - 2. Valves: Manufacturer's standard.
 - 3. Handles and Levers: Manufacturer's standard.
 - 4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B, and bar coding for documenting fire-extinguisher location, inspections, maintenance, and recharging.
- B. Multipurpose Dry-Chemical Type in Aluminum Container: UL-rated 2-A:10-B:C, 5-lb (2.3-kg) nominal capacity, with monoammonium phosphate-based dry chemical in enameled-aluminum container.

PART 3 - EXECUTION

3.1 EXAMINATION

FIRE EXTINGUISHERS

- A. Examine fire extinguishers for proper charging and tagging.
 - 1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install fire extinguishers in locations indicated and in compliance with requirements of authorities having jurisdiction.
 - 1. Mounting Brackets: Top of fire extinguisher to be at 42 inches (1067 mm) above finished floor.
- B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 10 44 16

SECTION 12 24 00 MANUAL WINDOW SHADES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Manually operated, roll-up fabric interior window shades including mounting and operating hardware.

1.2 REFERENCES

- A. NFPA 701-99 - Fire Tests for Flame-Resistant Textiles and Films.
- B. ANSI/WCMA A100.1-2018. For manual window shades with closed loop bead chains, all shades being installed where young children are likely to be present will meet all current standards mandated by the Consumer Product Safety Commission.

1.3 SUBMITTALS

- A. Submit under provisions of Section 013300 - Submittal Procedures:
- B. Product Data: Manufacturer's data sheets on each product specified, including:
 - 1. Preparation instructions and recommendations.
 - 2. Installation and maintenance instructions.
 - 3. Styles, material descriptions, dimensions of individual components, profiles, features, finishes, and operating instructions.
 - 4. Storage and handling requirements and recommendations.
 - 5. Mounting details and installation methods.
- C. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, and relationship to adjacent work.
- D. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings, field verified window dimensions, quantities, type of shade, controls, fabric, and color, and include opening sizes and key to typical mounting details.
- E. Verification Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements. Shade fabric sample and aluminum finish sample as selected, representing actual product, color, and patterns. Mark face of material to indicate interior faces.
- F. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.
- G. Standard manufacturer's defect warranty: Standard manufacturer's warranty documents indicating compliance with requirements of Section 1.9 below.
- H. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Obtain roller shades through one source from a single manufacturer with a minimum of twenty years' experience in manufacturing products comparable to those specified in this section. If manufacturer does not meet minimum experience requirement, please submit life cycle test data showing minimum 2000 complete operational cycles for each year of warranty showing no failure and that shade remains fit for use as an operable shade).
- B. NFPA Flame-Test: Passes NFPA 701. Materials tested shall be identical to products proposed for use. Show complete manufacturer data (name, location, contact) and certification from manufacturer that the fabrics sourced for this project comply with the test data provided.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver window shades until building is enclosed and construction within spaces where shades will be installed is substantially complete.
- B. Deliver products in manufacturer's original, unopened, undamaged containers with labels intact.
- C. Label containers and shades according to Window Shade Schedule.
- D. Store products in manufacturer's unopened packaging until ready for installation.

1.6 SEQUENCING

- A. Ensure that locating templates and other information required for installation of products of this section are furnished to affected trades in time to prevent interruption of construction progress.
- B. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.7 PROJECT CONDITIONS

- A. Install roller shades after finish work and ambient temperature, humidity, and ventilation conditions are maintained at levels recommended for project upon completion.

1.8 WARRANTY

- A. Hardware and Shade Fabric: Draper® standard twenty-five-year limited warranty.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Draper, Inc., which is located at: 411 S. Pearl P. O. Box 425; Spiceland, IN 47385-0425. ASD. Toll Free Tel: 800-238-7999; Tel: 765-987-7999; Fax: 866-637-5611; Web: www.draperinc.com.
- B. Requests for substitutions will be considered in accordance with provisions of Section 01 25 00. Contractor to be responsible for ALL COSTS related to a substitution requested less than 10 days prior to bid date, including cost of review by Architect.

2.2 MANUALLY OPERATED WINDOW SHADES

A. NOTE - Architect to select the following attributes for window treatments to be applied to allowance:

B. Manually Operated Window Shades with Independent Control: Manually operated, vertical roll-up, fabric window shade with components necessary for complete installation; Clutch-operated FlexShade® as manufactured by Draper, Inc.

1. Operation: Bead chain and clutch operating mechanism allowing shade to stop when chain is released. Designed never to need adjustment or lubrication. Provide limit stops to prevent shade from being raised or lowered too far.
 - 1) Clutch mechanism: Fabricated from high carbon steel and molded fiberglass reinforced polyester or injected molded nylon. White or Black color as selected by Architect.
 - (a) Spring-assist bead chain clutch mechanism: Adjustment-free system includes spring-assist components to reduce lifting forces required to raise the shade. Manufacturer shall provide estimated torque for shade unit. Spring-assist is recommended on estimated non-spring-assist torque above 6 lb.-in; required on shades with an estimated torque higher than 15 lb.-in.
 - b. Bead chain loop: Stainless steel bead chain hanging at side of window.
 - c. Idler Assembly: Provide roller idler assembly of molded nylon with adjustable or spring-loaded length idler pin to facilitate easy installation, and removal of shade for service.
 - d. Bead Chain Hold Down: Spring-Loaded Tensioner complies with ANSI/WCMA A100.1-2018 safety standard.
 - e. Bead Chain Hold Down: P-Clip.
2. Single Roller Configuration:
 - a. Mounting:
 - 1) Universal Mounting brackets.
 - 2) Endcaps only.
 - 3) Endcaps and fascia.
 - 4) Ceiling/Wall Style Headbox.
 - 5) Recessed Pocket Headbox.
 - b. Brackets: Plated stamped steel. Provide size compatible with roller size.
 - 1) Mounted to wall.
 - 2) Finish: White/Linen.
 - c. Endcaps: Stamped steel with universal design suitable for mounting to ceiling, wall, and jamb. Provide size compatible with roller size.
 - 1) Idler endcap to have optional levelling adjustment.
 - 2) Endcap covers: To match fascia or headbox color.
 - d. Fascia: L shaped aluminum extrusion to conceal shade roller and hardware.
 - 1) Attachment: Snaps onto endcaps without requiring exposed fasteners of any kind. Fascia can be mounted continuously across two or more shade bands. No notching is required.
 - 2) Shape: Square Fascia Panel.
 - 3) Finish: Selected from Manufacturers standard range.
 - e. Headbox Ceiling/Wall style: "L" shaped extruded aluminum back and top cover piece with removable extruded aluminum closure and stamped steel endcaps:
 - 1) Finish: Selected from Manufacturers standard range.
 - f. Headbox, Pocket style: Extruded aluminum U-shaped pocket with removable closure and endcaps.

- 1) Finish: Selected from Manufacturers standard range.
 - g. Type D Shade pocket: Rectangular pocket and endcaps designed for recessed ceiling installation of window shades with ceiling tile lip.
 - 1) Material: Extruded aluminum with white finish.
 - 2) Size: 5 inches (127 mm) wide by 5-3/8 inches (137 mm) high.
 - 3) Closure Panel:
 - (a) 1-1/2 (38 mm) closure dimension, recommended for bead chain operation.
 - 4) Pocket End Cap Kit: Metal endcaps with 7/8 inch (22 mm) lip for support of acoustical ceiling panel.
 - 5) Corners: Welded one-piece aluminum sections connecting to and matching pockets to allow continuous shade recess at ceiling corners.
 - h. Wall Clip with Closure Panel: For site constructed ceiling recesses, provide removable closure panel to minimize slot for shade passage but allowing access to shade for maintenance.
 - 1) Material: Aluminum alloy with white finish.
 - 2) Tile Lip: Provide wall clip with 7/8-inch tile lip (22 mm).
 - 3) Closure width: 1-1/2 inches (38 mm).
 - 4) Provide continuous wall clip, 1-3/4 (44 mm) by 3/16 inch (5 mm), for snap-in attachment of closure panel without fasteners.
3. Roller Tube: Fabricated from extruded aluminum, galvanized steel, or enameled steel. Diameter, wall thickness, and material selected by manufacturer to accommodate shade type and size. Minimum roller diameter 1.5 inches. Tube diameters less than 1.5 inches shall not be acceptable unless manufacturer provides deflection analysis showing deflection limited to $\leq \text{width(inches)}/700$ at 1.5 X design load.
4. Fabric to tube attachments: LSE (low surface energy) double sided adhesive specifically developed to attach coated textiles to metal. Adhesive attachment to eliminate horizontal impressions in fabric.
5. Shade slat:
 - a. Closed pocket elliptical slat: 1 inch (25 mm) aluminum elliptical slat inside of a 1-5/8 inch (41 mm) pocket with heat sealed ends.
 - b. Open pocket elliptical slat: 1 inch (25mm) aluminum elliptical slat with plastic ends inside of a 1-5/8 inch (41 mm) pocket.
 - c. Small flat exposed hem bar: 7/8 inch by 5/16 inch (22 mm by 8 mm) aluminum rectangular hem bar with plastic end caps.
 - d. Large flat exposed hem bar: 1-1/2 inch by 5/16 inch (38 mm by 8 mm) aluminum rectangular hem bar with plastic end caps.
 - e. Small round exposed hem bar: 5/8 inch (16 mm). Aluminum with plastic end caps.
6. Light Gap Reduction Channels.
 - a. Aluminum L Angle – 3/4 inch (19 mm) by 1 inch (25 mm).
 - b. Vinyl L Angle-1-1/2 inches (38 mm) by 3/4 inch (19 mm).
 - c. U Channel -1 inch (25 mm) by 2-1/2 inches (64 mm).
 - d. H Channel – 1 inch (25 mm) by 5 inches (127 mm).
7. Interior cable guide kit.
 - a. Slat/hem bar is a 5/8-inch (16 mm) round bar for use in a 1-5/8 inch (41 mm) open-ended hem pocket.

2.3 FABRIC

A. Light-Filtering Fabrics

1. PVC Coated Fiberglass

a. Basketweave

- 1) E Screen™ 1% by Mermet®: PVC coated fiberglass yarn woven in 2 by 2 basketweave. Fire rating: NFPA 701-10 TM#1, California U.S. Title 19,

CAN/ULC-S109-03 Small & Large Flame Test. Environmental Benefits: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. RoHS compliant – lead free. Bacterial and fungal resistance: ASTM E2180, ASTM G21. Average 1 percent open, .020 inches thick, 13.3 oz/square yard.

- 2) E Screen™ 3% by Mermet®: PVC coated fiberglass yarn woven in 2 by 2 basketweave. Fire rating: NFPA 701-10 TM#1, California U.S. Title 19, CAN/ULC-S109-03 Small & Large Flame Test. Environmental Benefits: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. RoHS compliant – lead free. Bacterial and fungal resistance: ASTM E2180, ASTM G21. Average 3 percent open, .017 inches thick, 11.6 oz/square yard.
- 3) E Screen™ 5% by Mermet®: PVC coated fiberglass yarn woven in 2 by 2 basketweave. Fire rating: NFPA 701-10 TM#1, California U.S. Title 19, CAN/ULC-S109-03 Small & Large Flame Test. Environmental Benefits: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. RoHS compliant – lead free. Bacterial and fungal resistance: ASTM E2180, ASTM G21. Average 5 percent open, .016 inches thick, 10.7 oz/square yard.
- 4) E Screen™ 10% by Mermet®: PVC coated fiberglass yarn woven in 2 by 2 basketweave. .016 inches thick. Fire rating: NFPA 701-10 TM#1, California U.S. Title 19, CAN/ULC-S109-03 Small & Large Flame Test. Environmental Benefits: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. RoHS compliant – lead free. Bacterial and fungal resistance: ASTM E2180, ASTM G21. Average 10 percent open, .020 inches thick, 10.3 oz/square yd.
- 5) E Screen™ 1% with KOOLBLACK® by Mermet®: PVC coated fiberglass yarn woven in 2 by 2 basketweave. Fire rating: NFPA 701-10 TM#1, California U.S. Title 19, CAN/ULC-S109-03 Small & Large Flame Test. Environmental Benefits: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. RoHS compliant – lead free. Bacterial and fungal resistance: ASTM E2180, ASTM G21. Average 1 percent open, .021 inches thick. Weight: 12.95 oz/square yard.
- 6) E Screen™ with KOOLBLACK®. 3 percent openness factor by Mermet®: PVC coated fiberglass yarn woven in 2 by 2 basketweave. Fire rating: NFPA 701-10 TM#1, California U.S. Title 19, CAN/ULC-S109-03 Small & Large Flame Test. Environmental Benefits: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. RoHS compliant – lead free. Bacterial and fungal resistance: ASTM E2180, ASTM G21. Average 3 percent open, .020 inches thick, 11.3 oz. per square yard.
- 7) E Screen™ with KOOLBLACK®. 5 percent openness factor by Mermet®: PVC coated fiberglass yarn woven in 2 by 2 basketweave. Fire rating: NFPA 701-10 TM#1, California U.S. Title 19, CAN/ULC-S109-03 Small & Large Flame Test. Environmental Benefits: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. RoHS compliant – lead free. Bacterial and fungal resistance: ASTM E2180,

- ASTM G21. Average 5 percent open, .019 inches thick, 10.6 oz/square yard.
- 8) E Screen Deco™ 1% by Mermet®: PVC coated fiberglass yarn woven in 2 by 2 basketweave. Fire rating: NFPA 701-10 TM#1, California U.S. Title 19, CAN/ULC-S109-03 Small & Large Flame Test. Environmental Benefits: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. RoHS compliant – lead free. Bacterial and fungal resistance: ASTM E2180, ASTM G21. 1 percent open, .022 inches thick. 12.30 oz/square yard.
 - 9) E Screen Deco™ 3% by Mermet®: PVC coated fiberglass yarn woven in 2 by 2 basketweave. Fire rating: NFPA 701-10 TM#1, California U.S. Title 19, CAN/ULC-S109-03 Small & Large Flame Test. Environmental Benefits: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. RoHS compliant – lead free. Bacterial and fungal resistance: ASTM E2180, ASTM G21. 3 percent open, .019 inches thick. 11.50 oz/square yard.
 - 10) Natte™ 5% by Mermet: PVC coated fiberglass yarn woven in 2 by 2 basketweave. NFPA 701-10 TM#1, California U.S. Title 19, CAN/ULC-S109-03 Small & Large Flame Test. Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. RoHS compliant – lead free. Bacterial and fungal resistance: ASTM E2180, ASTM G21. Openness factor: 5%. Thickness: 0.022 inches. Weight: 14.13 oz/square yard.
 - 11) Natte™ 10% by Mermet: PVC coated fiberglass yarn woven in 2 by 2 basketweave. NFPA 701-10 TM#1, California U.S. Title 19, CAN/ULC-S109-03 Small & Large Flame Test. Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. RoHS compliant – lead free. Bacterial and fungal resistance: ASTM E2180, ASTM G21. Openness factor: 5%. Thickness: 0.021 inches. Weight: 13.48 oz/square yard.
 - 12) S Screen™ 1% by Mermet®: PVC coated fiberglass wrapped in polyester thread in a plain weave. Fire rating: NFPA 701-10 TM#1, California U.S. Title 19, CAN/ULC-S109-03 Small & Large Flame Test. Environmental Benefits: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. RoHS compliant – lead free. Bacterial and fungal resistance: ASTM E2180, ASTM G21. 3 percent open, .041 inches thick, 19.10 oz/square yard.
 - 13) S Screen™ 4% by Mermet®: PVC coated fiberglass wrapped in polyester thread in a plain weave. Fire rating: NFPA 701-10 TM#1, California U.S. Title 19, CAN/ULC-S109-03 Small & Large Flame Test. Environmental Benefits: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. RoHS compliant – lead free. Bacterial and fungal resistance: ASTM E2180, ASTM G21. ASTM E2180 and ASTM G21. Environmental benefits: RoHS – lead free. 4 percent open, .037 inches thick, 18.9 oz/square yard.
 - 14) S Screen Naturals™ 5% by Mermet®: PVC coated fiberglass wrapped in polyester thread in a fancy weave. Fire rating: NFPA 701-10 TM#1, California U.S. Title 19, CAN/ULC-S109-03 Small & Large Flame Test. Environmental Benefits: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor

- air during product usage. RoHS compliant – lead free. Bacterial and fungal resistance: ASTM E2180, ASTM G21. 5 percent open, .042 inches thick 15 oz/square yard.
- 15) SheerWeave® Series SW2000 by Phifer®: 500 denier fiberglass, vinyl coated and woven into a 2 by 2 basket weave. Fire rating: California U.S. Title 19 (small scale), NFPA 701 TM#1 (small scale), NFPA 101 (Class A Rating), IBC Section 803.1.1 (Class A Rating), BS 5867 Part 2 Type B Performance, NFPA 701 TM#2 (large scale), CAN/ULC-S 109 (large and small scale), CAN/CGSB2-4.162-M80. Bacteria and fungal resistance: ASTM E 2180, ASTM G21, ASTM G22, AATCC30 Part 3, ASTM D 3273, UL GREENGUARD® Mold and Bacteria Standard ASTM 6329; includes Microban® antimicrobial additives. Environmental certification: Certified to UL GREENGUARD and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Safe use: RoHS/Directive 2002/95/EC, US Consumer Product Safety Commission Section 101 and ANSI/WCMA A 100.1-2007 for lead content and REACH (EC 1907/2006) compliant. 14.26 oz/sq yd, .019 inches thick. Series SW2000 average 5 percent open.
 - 16) SheerWeave® Series SW2100 by Phifer®: 500 denier fiberglass, vinyl coated and woven into a 2 by 2 basket weave. Fire rating: California U.S. Title 19 (small scale), NFPA 701 TM#1 (small scale), NFPA 101 (Class A Rating), IBC Section 803.1.1 (Class A Rating), BS 5867 Part 2 Type B Performance, NFPA 701 TM#2 (large scale), CAN/ULC-S 109 (large and small scale), CAN/CGSB2-4.162-M80. Bacteria and fungal resistance: ASTM E 2180, ASTM G21, ASTM G22, AATCC30 Part 3, ASTM D 3273, UL GREENGUARD® Mold and Bacteria Standard ASTM 6329; includes Microban® antimicrobial additives. Environmental certification: Certified to UL GREENGUARD and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Safe use: RoHS/Directive 2002/95/EC, US Consumer Product Safety Commission Section 101 and ANSI/WCMA A 100.1-2007 for lead content and REACH (EC 1907/2006) compliant. 14.26 oz/sq yd, .019 inches thick. Series SW2100 average 10 percent open.
 - 17) SheerWeave® Series SW2400 (2410) by Phifer®: 500 denier fiberglass, vinyl coated and woven into a 2 x 2 basket weave. Fire rating: California U.S. Title 19 (small scale), NFPA 701 TM#1 (small scale), NFPA 101 (Class A Rating), IBC Section 803.1.1 (Class A Rating), BS 5867 Part 2 Type B Performance, NFPA 701 TM#2 (large scale), CAN/ULC-S 109 (large and small scale), CAN/CGSB2-4.162-M80. Bacteria and fungal resistance: ASTM E 2180, ASTM G21, ASTM G22, AATCC30 Part 3, ASTM D 3273, UL GREENGUARD® Mold and Bacteria Standard ASTM 6329; includes Microban® antimicrobial additives. Environmental certification: Certified to UL GREENGUARD and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Safe use: RoHS/Directive 2002/95/EC, US Consumer Product Safety Commission Section 101 and ANSI/WCMA A 100.1-2007 for lead content and REACH (EC 1907/2006) compliant. 3 percent open .019 inches thick. 14.1 oz/square yard.
 - 18) SheerWeave® Series SW2500 by Phifer®: 500 denier fiberglass, vinyl coated and woven into a 2 x 2 basket weave. Fire rating: California U.S. Title 19 (small scale), NFPA 701 TM#1 (small scale), NFPA 101 (Class A Rating), IBC Section 803.1.1 (Class A Rating), BS 5867 Part 2 Type B Performance, NFPA 701 TM#2 (large scale), CAN/ULC-S 109 (large and small scale), CAN/CGSB2-4.162-M80. Bacteria and fungal resistance:

ASTM E 2180, ASTM G21, ASTM G22, AATCC30 Part 3, ASTM D 3273, UL GREENGUARD® Mold and Bacteria Standard ASTM 6329; includes Microban® antimicrobial additives. Environmental certification: Certified to UL GREENGUARD and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Safe use: RoHS/Directive 2002/95/EC, US Consumer Product Safety Commission Section 101 and ANSI/WCMA A 100.1-2007 for lead content and REACH (EC 1907/2006) compliant. 1 percent open, .024 inches thick. 16.39 oz/square yard.

- 19) SheerWeave® Series SW2600 (2360) by Phifer®: 500 denier fiberglass, vinyl coated and woven into a 2 x 2 basket weave. Fire rating: California U.S. Title 19 (small scale), NFPA 701 TM#1 (small scale), NFPA 101 (Class A Rating), IBC Section 803.1.1 (Class A Rating), BS 5867 Part 2 Type B Performance, NFPA 701 TM#2 (large scale), CAN/ULC-S 109 (large and small scale), CAN/CGSB2-4.162-M80. Bacteria and fungal resistance: ASTM E 2180, ASTM G21, ASTM G22, AATCC30 Part 3, ASTM D 3273, GREENGUARD® Mold and Bacteria Standard ASTM 6329; includes Microban® antimicrobial additives. Environmental certification: Certified to UL GREENGUARD and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Safe use: RoHS/Directive 2002/95/EC, US Consumer Product Safety Commission Section 101 and ANSI/WCMA A 100.1-2007 for lead content and REACH (EC 1907/2006) compliant. 10 percent open, .017 inches thick. 10.4 oz/square yard.
- 20) SheerWeave® Series SW2900 (2390) by Phifer®: 500 denier fiberglass, vinyl coated and woven into a 2 x 2 basket weave. Fire rating: California U.S. Title 19 (small scale), NFPA 101 (Class A Rating), BS 5867 Part 2 Type B Performance, CAN/ULC-S 109 (large and small scale), CAN/CGSB2-4.162-M80, NFPA 701 TM#1 (small scale), IBC Section 803.1.1 (Class A Rating), NFPA 701 TM#2 (large scale). Bacteria and fungal resistance: ASTM E 2180, ASTM G21, ASTM G22, AATCC30 Part 3, ASTM D 3273, GREENGUARD® Mold and Bacteria Standard ASTM 6329; includes Microban® antimicrobial additives. Environmental certification: Certified to UL GREENGUARD and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Safe use: RoHS/Directive 2002/95/EC, US Consumer Product Safety Commission Section 101 and ANSI/WCMA A 100.1-2007 for lead content and REACH (EC 1907/2006) compliant. 5 percent open. .017 inches thick. 11.8 oz/square yard.
- 21) SheerWeave® Basic 3% by Phifer®. An economical alternative to traditional solar screen fabrics. Fire Rating: California U.S. Title 19 (small scale), NFPA 701 TM#1 (small scale), NFPA 101 (Class A Rating), IBC Section 803.1.1 (Class A Rating), BS 5867 Part 2 Type B Performance, CAN/ULC-S 109 (large and small scale), NFPA 701 TM#2 (large scale), CAN/CGSB2-4.162-M80. Bacteria and Fungal Resistance ASTM E 2180, ASTM G21, ASTM G22, AATCC30 Part 3, ASTM D 3273, UL GREENGUARD® Mold and Bacteria Standard ASTM 6329; includes Microban® antimicrobial additives. Environmental Certification: Certified to UL GREENGUARD and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Safe use: RoHS/Directive 2002/95/EC, US Consumer Product Safety Commission Section 101, ANSI/WCMA A 100.1-2007 for lead content and REACH (EC 1907/2006) compliant. Average 3 percent Openness. Average

Fabric Thickness: .025 inch. Average Fabric Weight: 16.4 ounces per square yard.

- 22) SheerWeave® Basic 5% by Phifer®. An economical alternative to traditional solar screen fabrics. Fire Rating: California U.S. Title 19 (small scale), NFPA 701 TM#1 (small scale), NFPA 101 (Class A Rating), IBC Section 803.1.1 (Class A Rating), BS 5867 Part 2 Type B Performance, CAN/ULC-S 109 (large and small scale), NFPA 701 TM#2 (large scale), CAN/CGSB2-4.162-M80. Bacteria and Fungal Resistance ASTM E 2180, ASTM G21, ASTM G22, AATCC30 Part 3, ASTM D 3273, UL GREENGUARD® Mold and Bacteria Standard ASTM 6329; includes Microban® antimicrobial additives. Environmental Certification: Certified to UL GREENGUARD and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Safe use: RoHS/Directive 2002/95/EC, US Consumer Product Safety Commission Section 101, ANSI/WCMA A 100.1-2007 for lead content and REACH (EC 1907/2006) compliant. Average 5 percent Openness. Average Fabric Thickness: 0.022 inch. Average Fabric Weight: 14.1 ounces per square yard.
- b. Ribbed Weave
- 1) M Screen™ 1% by Mermet®: PVC coated fiberglass in 1 by 2 ribbed weave. Fire rating: NFPA 701-10 TM#1, California U.S. Title 19, CAN/ULC-S109-03 Small & Large Flame Test. Environmental Benefits: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. RoHS compliant – lead free. Bacterial and fungal resistance: ASTM E2180, ASTM G21. 1 percent open, .022 inches thick, 13.12 oz/square yard.
 - 2) M Screen™ 3% by Mermet®: PVC coated fiberglass in 1 by 2 ribbed weave. Fire rating: NFPA 701-10 TM#1, California U.S. Title 19, CAN/ULC-S109-03 Small & Large Flame Test. Environmental Benefits: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. RoHS compliant – lead free. Bacterial and fungal resistance: ASTM E2180, ASTM G21. 3 percent open, .022 inches thick, 12.27 oz/square yard.
 - 3) M Screen™ 5% by Mermet®: PVC coated fiberglass in 1 by 2 ribbed weave. Fire rating: NFPA 701-10 TM#1, California U.S. Title 19, CAN/ULC-S109-03 Small & Large Flame Test. Environmental Benefits: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. RoHS compliant – lead free. Bacterial and fungal resistance: ASTM E2180, ASTM G21. 5 percent open, .022 inches thick, 11.3 oz/square yard.
 - 4) M Screen Deco™ 5% by Mermet®: PVC coated fiberglass in 1 by 2 ribbed weave. Fire rating: NFPA 701-10 TM#1, California U.S. Title 19, CAN/ULC-S109-03 Small & Large Flame Test. Environmental Benefits: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. RoHS compliant – lead free. Bacterial and fungal resistance: ASTM E2180, ASTM G21. 5 percent open, .020 inches thick, 11.3 oz/square yd.
 - 5) SheerWeave® Series SW1000 SunScreen® by Phifer. PVC coated fiberglass in a ribbed weave. Fire Classification: California U.S. Title 19 (small scale), NFPA 701 TM#1 (small scale), NFPA 101 (Class A Rating), IBC Section 803.1.1 (Class A Rating), BS 5867 Part 2 Type B Performance, NFPA 701 TM#2 (large scale), CAN/ULC-S 109 (large scale). Bacteria and Fungal Resistance: ASTM E 2180, ASTM G21, AATCC30 Part 3, ASTM D 3273, GREENGUARD Mold and Bacteria

- Standard ASTM 6329; includes Microban® antimicrobial additives. Environmental: Certified to UL GREENGUARD® and GREENGUARD Gold® standards. Lead Free: RoHS/Directive 2002/95/EC, US Consumer Product Safety Commission Section 101, ANSI/WCMA A 100.1-2007 for lead content and REACH (EC 1907/2006) compliant. Approximate openness factor: 25%.
- 6) SheerWeave® Series SW3000 by Phifer®: Vinyl coated fiberglass and vinyl coated polyester woven into 62 by 20 mesh. Fire rating: NFPA 701 TM#1 (small scale), NFPA 101 (Class A Rating), IBC Section 803.1.1 (Class A Rating), NFPA 701 TM#2 (large scale). Bacteria and fungal resistance: ASTM E 2180, ASTM G21, ASTM G22, AATCC30 Part 3, ASTM D 3273, UL GREENGUARD® Mold and Bacteria Standard ASTM 6329; includes Microban® antimicrobial additives. Environmental certification: Certified to UL GREENGUARD and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Safe use: RoHS/Directive 2002/95/EC, US Consumer Product Safety Commission Section 101, ANSI/WCMA A 100.1-2007 for lead content and REACH (EC 1907/2006) compliant. 13.46 oz/sq yd, .028 inches thick. Average 14 percent open.
- c. Satin Weave
- 1) T Screen™ with KOOLBLACK® 1% by Mermet®: PVC coated fiberglass woven mesh. Dark on one side, light on the other. Fire rating: NFPA 701-10 TM#1, California U.S. Title 19, CAN/ULC-S109-03 Small & Large Flame Test. Environmental Benefits: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. RoHS compliant – lead free. Bacterial and fungal resistance: ASTM E2180, ASTM G21. Average 1 percent open, .024 inches thick, 13.54 oz/square yard.
- 2) T Screen™ with KOOLBLACK® 3% by Mermet®: PVC coated fiberglass woven mesh. Dark on one side, light on the other. Fire rating: NFPA 701-10 TM#1, California U.S. Title 19, CAN/ULC-S109-03 Small & Large Flame Test. Environmental Benefits: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. RoHS compliant – lead free. Bacterial and fungal resistance: ASTM E2180, ASTM G21. Average 3 percent open, .029 inches thick, 13.27 oz/square yard.
- 3) T Screen™ with KOOLBLACK®. 5 percent openness factor by Mermet®: PVC coated fiberglass woven mesh. Dark on one side, light on the other. Fire rating: NFPA 701-10 TM#1, California U.S. Title 19, CAN/ULC-S109-03 Small & Large Flame Test. Environmental Benefits: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. RoHS compliant – lead free. Bacterial and fungal resistance: ASTM E2180, ASTM G21. Average 5 percent open, .027 inches thick, 12.48 oz/ square yard.
- 4) T Screen Deco™ 1% by Mermet®: PVC coated fiberglass satin style. Fire rating: NFPA 701-10 TM#1, California U.S. Title 19, CAN/ULC-S109-03 Small & Large Flame Test. Environmental Benefits: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. RoHS compliant – lead free. Bacterial and fungal resistance: ASTM E2180, ASTM G21. Average 1 percent open, .028 inches thick, 13.76 oz/square yd.

- 5) T Screen Deco™ 3% by Mermet®: PVC coated fiberglass satin style. Fire rating: NFPA 701-10 TM#1, California U.S. Title 19, CAN/ULC-S109-03 Small & Large Flame Test. Environmental Benefits: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. RoHS compliant – lead free. Bacterial and fungal resistance: ASTM E2180, ASTM G21. Average 3 percent open, .028 inches thick, 12.98 oz/square yard.
- 6) T Screen Deco™ 5% by Mermet®: PVC coated fiberglass satin style. Fire rating: NFPA 701-10 TM#1, California U.S. Title 19, CAN/ULC-S109-03 Small & Large Flame Test. Environmental Benefits: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. RoHS compliant – lead free. Bacterial and fungal resistance: ASTM E2180, ASTM G21. Average 5 percent open, .028 inches thick, 11.89 oz/square yard.
- d. Twill Weave
 - 1) 9803 3% by Mermet®: PVC coated fiberglass woven mesh. Dark on one side, light on the other. Fire rating: NFPA 701-10 TM#1, California U.S. Title 19, CAN/ULC-S109-03 Small & Large Flame Test. Environmental Benefits: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. RoHS compliant – lead free. Bacterial and fungal resistance: ASTM E2180, ASTM G21. Average 3 percent open, .025 inches thick, 11.6 oz/square yard.
 - 2) SheerWeave® Series SW2701 by Phifer®: Duplex basketweave fabric—light exterior color combined with dark interior color for thermal comfort and view-through. Fire rating: California U.S. Title 19 (small scale), NFPA 701 TM#1 (small scale), NFPA 101 (Class A Rating), IBC Section 803.1.1 (Class A Rating), BS 5867 Part 2 Type B Performance, NFPA 701 TM#2 (large scale), CAN/ULC-S 109 (large and small scale), CAN/CGSB2-4. 162-M80. Bacteria and fungal resistance: ASTM E 2180, ASTM G21, ASTM G22, AATCC30 Part 3, ASTM D 3273, GREENGUARD® Mold and Bacteria Standard ASTM 6329; includes Microban® antimicrobial additives. Environmental Certification: Certified to UL GREENGUARD and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Safe use: RoHS/Directive 2002/95/EC, US Consumer Product Safety Commission Section 101, ANSI/WCMA A 100.1-2007 for lead content and REACH (EC 1907/2006) compliant. 1 percent open. .027 inches thick. 14.6 oz/square yard.
 - 3) SheerWeave® Series SW2703 by Phifer®: Duplex basketweave fabric—light exterior color combined with dark interior color for thermal comfort and view-through. Fire rating: California U.S. Title 19 (small scale), NFPA 701 TM#1 (small scale), NFPA 101 (Class A Rating), IBC Section 803.1.1 (Class A Rating), BS 5867 Part 2 Type B Performance, NFPA 701 TM#2 (large scale), CAN/ULC-S 109 (large and small scale), CAN/CGSB2-4. 162-M80, CAN/ULC S-102. Bacteria and fungal resistance: ASTM E 2180, ASTM G21, ASTM G22, AATCC30 Part 3, ASTM D 3273, UL GREENGUARD® Mold and Bacteria Standard ASTM 6329; includes Microban® antimicrobial additives. Environmental certification: Certified to UL GREENGUARD and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. 3 percent open. .028 inches thick. 14.0 oz/square yard.

- 4) SheerWeave® Series SW2705 by Phifer®: Duplex basketweave fabric—light exterior color combined with dark interior color for thermal comfort and view-through. GREENGUARD Gold®. Manufacturer to supply GREENGUARD Gold certificate. Fire rating: California U.S. Title 19 (small scale), NFPA 701 TM#1 (small scale), NFPA 101 (Class A Rating), IBC Section 803.1.1 (Class A Rating), BS 5867 Part 2 Type B Performance, NFPA 701 TM#2 (large scale), CAN/ULC-S 109 (large and small scale), CAN/CGSB2-4. 162-M80. Bacteria and fungal resistance: ASTM E 2180, ASTM G21, ASTM G22, AATCC30 Part 3, ASTM D 3273, UL GREENGUARD® Mold and Bacteria Standard ASTM 6329; includes Microban® antimicrobial additives. Environmental Certification: Certified to UL GREENGUARD and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Safe use: RoHS/Directive 2002/95/EC, US Consumer Product Safety Commission Section 101, ANSI/WCMA A 100.1-2007 for lead content and REACH (EC 1907/2006) compliant. 5 percent open. .025 inches thick. 11.8 oz/square yard.
 - 5) SheerWeave® Series SW2710 by Phifer®: Duplex basketweave fabric—light exterior color combined with dark interior color for thermal comfort and view-through. Fire rating: California U.S. Title 19 (small scale), NFPA 701 TM#1 (small scale), NFPA 101 (Class A Rating), IBC Section 803.1.1 (Class A Rating), BS 5867 Part 2 Type B Performance, NFPA 701 TM#2 (large scale), CAN/ULC-S 109 (large and small scale), CAN/CGSB2-4. 162-M80. Bacteria and fungal resistance: ASTM E 2180, ASTM G21, ASTM G22, AATCC30 Part 3, ASTM D 3273, UL GREENGUARD® Mold and Bacteria Standard ASTM 6329; includes Microban® antimicrobial additives. Environmental Certification: Certified to UL GREENGUARD and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Safe use: RoHS/Directive 2002/95/EC, US Consumer Product Safety Commission Section 101, ANSI/WCMA A 100.1-2007 for lead content and REACH (EC 1907/2006) compliant. 10 percent open. .023 inches thick. 10.4 oz/square yard.
 - 6) T Screen™ 1% by Mermet®: PVC coated fiberglass woven mesh. White, charcoal, or pearl backing color. Fire rating: NFPA 701-15 TM#1, California U.S. Title 19 CAN/ULC-S109-14 Small Flame Test. Environmental Benefits: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. RoHS compliant – lead free. Bacterial and fungal resistance: ASTM E2180, ASTM G21. Average 1 percent open, .028 inches thick, 13.83 oz/square yard.
2. Fiberglass
 - a. Mock Leno Weave
 - 1) GreenScreen® Nature™ 5%: GreenScreen Nature is an inherently fire-retardant fabric constructed of 100 percent fiberglass yarn in a mock leno weave. Additional fire retardancy chemicals are not required. Recyclable, halogen- and PVC-free. Red List compliant. Fire rating: NFPA 701-10 TM#1, California U.S. Title 19, CAN/ULC-S109 Small & Large Scale. Microbial Resistance, ASTM E2180 and ASTM G21: Pass. UL GREENGUARD®, GREENGUARD Gold®. Approximate Openness Factor: 5 percent. Average Fabric Thickness: 0.010 inch (.024 mm). Average Fabric Weight: 5.10 ounces per square yard (174 grams per square meter).
 - b. Ribbed Weave

- 1) Vizela™ < 1% by Mermet®: 100 percent fiberglass with an EVA coating and PVC free. Fire rating: NFPA 701-10 TM#1, California U.S. Title 19, CAN/ULC-S109-03 Small & Large Flame Test. Environmental Benefits: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. RoHS compliant – lead free. Bacterial and fungal resistance: ASTM E2180, ASTM G21. < 1% open, .013 inches thick, 8.7 oz/square yard.
 - 2) SilverScreen 4% by Verosol: 36 percent fiberglass and 64 percent vinyl with an ultra-fine layer of aluminum on the backside. Fire rating: NFP 92503 specification M1, NFPA 701, B5 5867 Part 2 Type B, AS 1530. Environmental Benefits: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. RoHS compliant - Lead Free, Formaldehyde free. 5 percent Open, 0.020 inches thick, 11.7974 oz/square yard.
3. Vinyl Coated Polyester
- a. Basketweave
- 1) SunTex® 90 by Phifer. Vinyl-coated polyester woven into a basketweave. For outdoor use. Fire Classification: NFPA 101 (Class A Rating), IBC Section 803.1.1 (Class A Rating), CFR 49V 571.302 (FMVSS 302), California Technical Bulletin 117, CAN/ULC S-109 (large scale) and ASTM E-662. Bacteria and Fungal Resistance: ASTM E 2180 and ASTM G21; includes Microban® antimicrobial additives. Environmental: Certified to UL GREENGUARD® and GREENGUARD Gold® standards. Lead Free: RoHS/Directive 2002/95/EC, US Consumer Product Safety Commission Section 101, ANSI/WCMA A 100.1-2007 for lead content and REACH (EC 1907/2006) compliant. Openness factor: approximately 10%. Thickness: 0.039 inches. Weight: 17.2 oz/square yard.
 - 2) SunTex® 95 by Phifer. Vinyl-coated polyester woven into a basketweave. For outdoor use. Fire Classification: NFPA 101 (Class A Rating), IBC Section 803.1.1 (Class A Rating), CFR 49V 571.302 (FMVSS 302), California Technical Bulletin 117, CAN/ULC S-109 (large scale) and ASTM E-662. Bacteria and Fungal Resistance: ASTM E 2180 and ASTM G21; includes Microban® antimicrobial additives. Environmental: Certified to UL GREENGUARD® and GREENGUARD Gold® standards. Lead Free: RoHS/Directive 2002/95/EC, US Consumer Product Safety Commission Section 101, ANSI/WCMA A 100.1-2007 for lead content and REACH (EC 1907/2006) compliant. Openness factor: approximately 5%. Thickness: 0.029 inches. Weight: 15.4 oz/square yard.
 - 3) SunTex® 97 by Phifer. Vinyl-coated polyester woven into a basketweave. For outdoor use. Fire Classification: NFPA 101 (Class A Rating), IBC Section 803.1.1 (Class A Rating), CFR 49V 571.302 (FMVSS 302), California Technical Bulletin 117, CAN/ULC S-109 (large scale) and ASTM E-662. Bacteria and Fungal Resistance: ASTM E 2180 and ASTM G21; includes Microban® antimicrobial additives. Environmental: Certified to UL GREENGUARD® and GREENGUARD Gold® standards. Lead Free: RoHS/Directive 2002/95/EC, US Consumer Product Safety Commission Section 101, ANSI/WCMA A 100.1-2007 for lead content and REACH (EC 1907/2006) compliant. Openness factor: approximately 3%. Thickness: 0.033 inches. Weight: 16.0 oz/square yard.
 - 4) SheerWeave® Series PW3500 (4000) by Phifer®: Vinyl coated polyester yarn woven into basketweave pattern. Uses DOW ECOLIBRIUM™ bio-

based, phthalate-free plasticizer. Fire rating: California U.S. Title 19 (small scale), NFPA 701 TM#1 (small scale), NFPA 101 (Class A Rating), IBC Section 803.1.1 (Class A Rating), BS 5867 Part 2 Type B Performance, NFPA 701 TM#2 (large scale), CAN/ULC-S 109 (large and small scale), CAN/CGSB2-4.162-M80. Bacteria and fungal resistance: ASTM E 2180, ASTM G21, ASTM G22, AATCC30 Part 3, ASTM D 3273, UL GREENGUARD® Mold and Bacteria Standard ASTM 6329; includes Microban® antimicrobial additives. Environmental Certification: Certified to UL GREENGUARD and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Safe use: RoHS/Directive 2002/95/EC, US Consumer Product Safety Commission Section 101 and ANSI/WCMA A 100.1-2007 for lead content, REACH (EC 1907/2006) compliant. Average 5 percent open, 19.2 oz/sq yd, .036 inches thick.

- 5) SheerWeave® Series PW4100 by Phifer®: Vinyl coated polyester yarn woven into basketweave pattern. Uses DOW ECOLIBRIUM™ bio-based, phthalate-free plasticizer. Fire rating: California U.S. Title 19 (small scale), NFPA 701 TM#1 (small scale), NFPA 101 (Class A Rating), IBC Section 803.1.1 (Class A Rating), BS 5867 Part 2 Type B Performance, NFPA 701 TM#2 (large scale), CAN/ULC-S 109 (large and small scale), CAN/CGSB2-4.162-M80. Bacteria and fungal resistance: ASTM E 2180, ASTM G21, ASTM G22, AATCC30 Part 3, ASTM D 3273, UL GREENGUARD® Mold and Bacteria Standard ASTM 6329; includes Microban® antimicrobial additives. Environmental Certification: Certified to UL GREENGUARD and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Safe use: RoHS/Directive 2002/95/EC, US Consumer Product Safety Commission Section 101 and ANSI/WCMA A 100.1-2007 for lead content, REACH (EC 1907/2006) compliant. Average 10 percent open, 17.5 oz/sq yd, .035 inches thick.
- 6) SheerWeave® Series PW4400 by Phifer®: Vinyl coated polyester yarn woven into basketweave pattern. Uses DOW ECOLIBRIUM™ bio-based, phthalate-free plasticizer. Fire rating: California U.S. Title 19 (small scale), NFPA 701 TM#1 (small scale), NFPA 101 (Class A Rating), IBC Section 803.1.1 (Class A Rating), BS 5867 Part 2 Type B Performance, NFPA 701 TM#2 (large scale), CAN/ULC-S 109 (large and small scale), CAN/CGSB2-4.162-M80. Bacteria and fungal resistance: ASTM E 2180, ASTM G21, ASTM G22, AATCC30 Part 3, ASTM D 3273, UL GREENGUARD® Mold and Bacteria Standard ASTM 6329; includes Microban® antimicrobial additives. Environmental Certification: Certified to UL GREENGUARD and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Safe use: RoHS/Directive 2002/95/EC, US Consumer Product Safety Commission Section 101 and ANSI/WCMA A 100.1-2007 for lead content, REACH (EC 1907/2006) compliant. Average 3 percent open, 20.7 oz/sq yd, .037 inches thick.
- 7) SheerWeave® Series PW4500 by Phifer®: Vinyl coated polyester yarn woven into basketweave pattern. Fire rating: California U.S. Title 19 (small scale), NFPA 701 TM#1 (small scale), NFPA 101 (Class A Rating), IBC Section 803.1.1 (Class A Rating), BS 5867 Part 2 Type B Performance, NFPA 701 TM#2 (large scale), CAN/ULC-S 109 (large and small scale). Bacteria and fungal resistance: ASTM E 2180, ASTM G21, ASTM G22, AATCC30 Part 3, ASTM D 3273, UL GREENGUARD® Mold and Bacteria Standard ASTM 6329; includes Microban® antimicrobial

- additives. Environmental certification: Certified to GREENGUARD and GREENGUARD UL Gold® standards for low chemical emissions into indoor air during product usage. Safe use: RoHS/Directive 2002/95/EC, US Consumer Product Safety Commission Section 101, ANSI/WCMA A 100.1-2007 for lead content and REACH (EC 1907/2006) compliant. Average 5 percent open, 14.4 oz/sq yd, .024 inches thick.
- 8) SheerWeave® Series PW4600 by Phifer®: Vinyl coated polyester yarn woven into basketweave pattern. Fire rating: Fire rating: California U.S. Title 19 (small scale), NFPA 701 TM#1 (small scale), NFPA 101 (Class A Rating), IBC Section 803.1.1 (Class A Rating), BS 5867 Part 2 Type B Performance, NFPA 701 TM#2 (large scale), CAN/ULC-S 109 (large and small scale). Bacteria and fungal resistance: ASTM E 2180, ASTM G21, ASTM G22, AATCC30 Part 3, ASTM D 3273, UL GREENGUARD® Mold and Bacteria Standard ASTM 6329; includes Microban® antimicrobial additives. Environmental certification: Certified to UL GREENGUARD and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Safe use: RoHS/Directive 2002/95/EC, US Consumer Product Safety Commission Section 101, ANSI/WCMA A 100.1-2007 for lead content and REACH (EC 1907/2006) compliant. Average 3 percent open, 17.4 oz/sq yd, .030 inches thick.
- 9) Soltis Harmony 88 by Ferrari. PVC-coated polyester with pre-tensioning process for dimensional stability. Flame Retardancy: B-s2,d0 / EN 13501-1, M1/NFP92-507, B1/DIN 4102-1, BS 7837, BS 5867, Schwerbrennbar Q1-Tr1/ONORM, A3800-1, CAN/ULC-S 109, M1/UNE 23727-90, Classe 1/EN 13773, CSFM T19, Method 1 & 2/ NFPA 701, Class A/ASTM E84, 1530.3/AS NZS, Group 1/AS NZS 3837, G1/GOST.30244.94. Environment: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Recyclable through TaxyLoop®. 8 percent open, .018 inches thick, 10.61 oz/square yard.
- 10) Soltis Horizon 86 by Ferrari. PVC-coated polyester with pre-tensioning process for dimensional stability. Flame Retardancy: B-s2,d0 / EN 13501-1, M1/NFP92-507, B1/DIN 4102-1, BS 7837, BS 5867, Schwerbrennbar Q1-Tr1/ONORM, A3800-1, CAN/ULC-S 109, M1/UNE 23727-90, Classe 1/EN 13773, CSFM T19, Method 1 & 2/ NFPA 701, Class A/ASTM E84, 1530.3/AS NZS, Group 1/AS NZS 3837, G1/GOST.30244.94. Environment: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Recyclable through TaxyLoop®. 14 percent open, .018 inches thick, 11.2 oz/square yard.
- 11) Soltis® Master 99 by Serge Ferrari®: PVC-coated polyester with silver backing on outside and pre-tensioning process for dimensional stability. Fire rating: Method 1/NFPA 701, CSFM T19, Class A/ ASTM E84. Environmental Benefits: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Recyclable through TaxyLoop®. 3 percent open, .0156 inches thick, 8.6 oz/ square yard.
- 12) Soltis® Perform 92 by Serge Ferrari®: PVC-coated polyester with silver backing on outside and pre-tensioning process for dimensional stability. Fire rating: Method 1/NFPA 701, CSFM T19, Class A/ ASTM E84. Environmental Benefits: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Recyclable through TaxyLoop®. 4 percent open, .018 inches thick, 12.4 oz/square yard.

b. Decorative Weave

- 1) SheerWeave® Series SW5000 by Phifer®: Polyester and vinyl coated polyester woven into a 42 by 20 mesh. Fire rating: California Technical Bulletin 117 Sect. E. Part 1/ /UBC (Class 1)/British Standard 5867. Varies depending on color. Bacteria and fungal resistance: ASTM E 2180, ASTM G21, ASTM G22, ASTM D3273, AATCC 30 Part 3, UL GREENGUARD® Mold and Bacteria Standard ASTM 6329; includes Microban® antimicrobial additives. Environmental certification: Certified to UL GREENGUARD and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Safe use: RoHS/Directive 2002/95/EC, US Consumer Product Safety Commission Section 101 and ANSI/WCMA A 100.1-2007 for lead content and REACH (EC 1907/2006) compliant. 12.3 to 14.5 oz/sq yd, .035 inches - .044 inches thick, depending on color. 5 to 10 percent open, depending on color.

c. Plain Weave

- 1) SheerWeave® PW4800 by Phifer®: Vinyl coated polyester with maximum UV blockage. Fire rating: California U.S. Title 19 (small scale), NFPA 701 TM#1 (small scale), NFPA 101 (Class A Rating), IBC Section 803.1.1 (Class A Rating), BS 5867 Part 2 Type B Performance, NFPA 701 TM#2 (large scale), CAN/ ULC-S 109 (large and small scale), CAN/CGSB2-4.162-M80. Bacteria and fungal resistance: ASTM E 2180, ASTM G21, ASTM G22, AATCC30 Part 3, ASTM D 3273, UL GREENGUARD® Mold and Bacteria Standard ASTM 6329; includes Microban® antimicrobial additives. Environmental certification: Certified to UL GREENGUARD and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Safe use: RoHS/Directive 2002/95/EC, US Consumer Product Safety Commission Section 101, ANSI/WCMA A 100.1-2007 for lead content and REACH (EC 1907/2006) compliant. 1 percent openness factor. 18.5 oz/sq yd, .036 inches thick.

d. Twill Weave

- 1) SheerWeave® Series PW4550 by Phifer®: Vinyl coated polyester yarn woven into basketweave pattern. Fire rating: California U.S. Title 19 (small scale), NFPA 701 TM#1 (small scale), NFPA 101 (Class A Rating), IBC Section 803.1.1 (Class A Rating), BS 5867 Part 2 Type B Performance, NFPA 701 TM#2 (large scale), CAN/ULC-S 109 (large and small scale). Bacteria and fungal Resistance. ASTM E 2180, ASTM G21, ASTM G22, AATCC30 Part 3, ASTM D 3273, UL GREENGUARD® Mold and Bacteria Standard ASTM 6329; includes Microban® antimicrobial additives. Environmental certification: Certified to UL GREENGUARD and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Safe use: RoHS/Directive 2002/95/EC, US Consumer Product Safety Commission Section 101, ANSI/WCMA A 100.1-2007 for lead content and REACH (EC 1907/2006) compliant. Average 5 percent open, 12.5 oz/sq yd, .025 inches thick.
- 2) SheerWeave® Series PW4650 by Phifer®: Vinyl coated polyester yarn woven into basketweave pattern. Fire rating: California U.S. Title 19 (small scale), NFPA 701 TM#1 (small scale), NFPA 101 (Class A Rating), IBC Section 803.1.1 (Class A Rating), BS 5867 Part 2 Type B Performance, NFPA 701 TM#2 (large scale), CAN/ULC-S 109 (large and small scale). Bacteria and fungal Resistance. ASTM E 2180, ASTM G21, ASTM G22, AATCC30 Part 3, ASTM D 3273, UL GREENGUARD® Mold and Bacteria Standard ASTM 6329; includes Microban® antimicrobial

additives. Environmental certification: Certified to UL GREENGUARD and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Safe use: RoHS/Directive 2002/95/EC, US Consumer Product Safety Commission Section 101, ANSI/WCMA A 100.1-2007 for lead content and REACH (EC 1907/2006) compliant.

Average. 3 percent open, 13.3 oz/sq yd, .026 inches thick.

- 3) SheerWeave® PW4901 by Phifer®: Vinyl coated polyester with maximum UV blockage. Fire rating: California U.S. Title 19 (small scale), NFPA 701 TM#1 (small scale), NFPA 101 (Class A Rating), IBC Section 803.1.1 (Class A Rating), BS 5867 Part 2 Type B Performance, NFPA 701 TM#2 (large scale), CAN/ ULC-S 109 (large and small scale), CAN/CGSB2-4. 162-M80. Bacteria and fungal resistance: ASTM E 2180, ASTM G21, ASTM G22, AATCC30 Part 3, ASTM D 3273, UL GREENGUARD® Mold and Bacteria Standard ASTM 6329; includes Microban® antimicrobial additives. Environmental certification: Certified to UL GREENGUARD and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Safe use: RoHS/Directive 2002/95/EC, US Consumer Product Safety Commission Section 101 and ANSI/WCMA A 100.1-2007 for lead content and REACH (EC 1907/2006) compliant. UV protection: Seal of Approval by the Melanoma International Foundation (MIF) for effectiveness in preventing sun damage to the skin or eyes. 1 percent openness factor. 15.85 oz/sq yd, .028 inches thick.
 - 4) SheerWeave® PW4903 by Phifer®: Vinyl coated polyester with maximum UV blockage. Fire rating: California U.S. Title 19 (small scale), NFPA 701 TM#1 (small scale), NFPA 101 (Class A Rating), IBC Section 803.1.1 (Class A Rating), BS 5867 Part 2 Type B Performance, NFPA 701 TM#2 (large scale), CAN/ ULC-S 109 (large and small scale), CAN/CGSB2-4. 162-M80. Bacteria and fungal resistance: ASTM E 2180, ASTM G21, ASTM G22, AATCC30 Part 3, ASTM D 3273, UL GREENGUARD® Mold and Bacteria Standard ASTM 6329; includes Microban® antimicrobial additives. Environmental certification: Certified to UL GREENGUARD and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Safe use: RoHS/Directive 2002/95/EC, US Consumer Product Safety Commission Section 101 and ANSI/WCMA A 100.1-2007 for lead content and REACH (EC 1907/2006) compliant. UV protection: Seal of Approval by the Melanoma International Foundation (MIF) for effectiveness in preventing sun damage to the skin or eyes. 3 percent openness factor. 14.9 oz/sq yd, .027 inches thick.
4. Polyester
 - a. Basketweave
 - 1) SheerWeave® Series SW8000 by Phifer®: PVC-free polyester. Fire rating: California U.S. Title 19 (small scale), BS 5867 2008 Part 2 Type B Performance, IBC Section 803.1.1 (Class A Rating), NFPA 701 TM#1 (small scale), NFPA 701 TM#2 (large scale), CAN/ULC-S 109 (large and small scale), CAN/CGSB2-4. 162-M80, B1 (DIN 4102-1), NFPA 101 (Class A Rating). Bacteria and fungal resistance: ASTM E 2180, ASTM G21. Environmental certification: Cradle to Cradle Certified™ Bronze and certified to ul GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Safe use: RoHS/Directive 2002/95/EC, ANSI/WCMA A 100.1-2007 for lead content, US Consumer Product Safety Commission Section 101and REACH (EC 1907/2006) compliant. UV Protection: Seal

of Approval by the Melanoma International Foundation (MIF) for effectiveness in preventing sun damage to the skin or eyes. Average 3% open. .019 inches thick. 7.35 oz/square yard.

b. Decorative Weave

- (1) SheerWeave® Series SW7450 by Phifer®: PVC-free polyester with acrylic coating. Fire rating: California Technical Bulletin 117, IBC Section 803.1.1 (Class A Rating), NFPA 101 (Class A Rating). Bacteria and Fungal Resistance: ASTM G21-96, AATCC 174-1998 Part II and III. Environmental Certification: Certified to GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Safe Use: RoHS/Directive 2002/95/EC, ANSI/WCMA A 100.1-2007 for lead content, US Consumer Product Safety Commission Section 101. UV Protection: Seal of Approval by the Melanoma International Foundation (MIF) for effectiveness in preventing sun damage to the skin or eyes. .026 inches thick, 6.54 oz/square yard.

c. Fancy Weave

- 1) Verona Daylight™ by Mermet. 100% polyester. Fire Classifications: NFPA 701-10 TM#1, California U.S. Title 19, CAN/ULC-S109-03 Small & Large Flame Test. Bacterial Resistance: ASTM E2180, ASTM G21. Environment: RoHS - Lead Free, certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Openness factor: less than 1%. .021 inches thick, 5.90 oz/square yard.

d. Diamond Knit

- 1) GreenScreen Evolve® 3%: GreenScreen Evolve is a fire retardant PVC-free fabric is constructed of 100 percent polyester yarn, with up to 78% Repreve polyester. Repreve is recycled and recyclable, contains low VOC's, and made in the USA. Fire rating: NFPA 701-99 TM#1, California U.S. Title 19, Cradle to Cradle Certified Silver, UL GREENGUARD®, GREENGUARD Gold®, PVC Free. Approximate Openness Factor: 3 percent. Average Fabric Thickness: 0.027 inch (.068 mm). Average Fabric Weight: 8.41 ounces per square yard. Microbial Resistance, ASTM E2180 and ASTM G21: Pass.
- 2) GreenScreen Revive® 1%. GreenScreen Revive is a fire retardant PVC-free fabric constructed of 100 percent polyester yarn, with a minimum of 89 percent Repreve polyester. Repreve is recycled and recyclable, contains low VOC's, and made in the USA. Fire rating: NFPA 701-99 TM#1, California U.S. Title 19, Cradle to Cradle Certified Silver, UL GREENGUARD®, GREENGUARD Gold®. Approximate Openness Factor: 1 percent. Average Fabric Thickness: 0.019 inch (0.48 mm). Average Fabric Weight: 5.87 ounces per square yard.
- 3) GreenScreen Revive® 5%. GreenScreen Revive is a fire retardant PVC-free fabric is constructed of 100 percent polyester yarn, with a minimum of 89 percent Repreve polyester. Repreve is recycled and recyclable, contains low VOC's, and made in the USA. Fire rating: NFPA 701-99 TM#1, California U.S. Title 19, Cradle to Cradle Certified Silver, UL GREENGUARD, GREENGUARD Gold, Green PVC Free. Approximate Openness Factor: 5 percent. Average Fabric Thickness: 0.017 inch (.043 mm). Average Fabric Weight: 5.01 ounces per square yard.

e. Linen Pattern

- 1) SheerWeave® Series SW7650 by Phifer®: PVC-free polyester. Fire rating: California U.S. Title 19 (small scale), NFPA 701 TM#1 (small scale), BS 5867 Part 2 Type B Performance, CAN/ULC-S 109 (large and small scale). Bacteria and fungal resistance: ASTM G21-96, AATCC 174-1998 Part II and III. Environmental certification: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Safe use: RoHS/Directive 2002/95/EC, ANSI/WCMA A 100.1-2007 for lead content, US Consumer Product Safety Commission Section 101. UV protection: Seal of Approval by the Melanoma International Foundation (MIF) for effectiveness in preventing sun damage to the skin or eyes. .014 inches thick, 6.2 oz/square yard.
 - f. Thermoplastic Olefin
 - g. Basketweave
 - 1) SheerWeave® Infinity2 1%: sustainable window treatment fabric eco-friendly basketweave. Core yarn and coating are PVC-free, lead-free and 100 percent recycable. Fire classification: ASTM E-84 (Class I), NFPA 701-2004 TM#1 (small scale), NFPA 101 (Class A Rating) and CAN/ULC-S 109-03 Large, UL GREENGUARD®, GREENGUARD Gold®. Average 1 percent open. Average Fabric Thickness: .033 inch (.838 mm) Average Fabric Weight: 14.63 ounces per square yard.
 - 2) SheerWeave® Infinity2 3%: sustainable window treatment fabric eco-friendly basketweave. Core yarn and coating are PVC-free, lead-free and 100 percent recycable. Fire classification: ASTM E-84 (Class I), NFPA 701-2004 TM#1 (small scale), NFPA 101 (Class A Rating) and CAN/ULC-S 109-03 Large, UL GREENGUARD®, GREENGUARD Gold®. Average 3 percent open. Average Fabric Thickness: .031 inch (.79 mm) Average Fabric Weight: 13.69 ounces per square yard.
 - 3) SheerWeave® Infinity2 5%: sustainable window treatment fabric eco-friendly basketweave. Core yarn and coating are PVC-free, lead-free and 100 percent recycable. Fire classification: ASTM E-84 (Class I), NFPA 701-2004 TM#1 (small scale), NFPA 101 (Class A Rating) and CAN/ULC-S 109-03 Large, UL GREENGUARD®, GREENGUARD Gold®. Average 5 percent open. Average Fabric Thickness: .03 inch (.76 mm). Average Fabric Weight: 12.82 ounces per square yard.
- B. Room Darkening Fabrics
1. Opaque
 - a. PVC Coated Fiberglass
 - 1) SheerWeave® Series SW7100 Blackout by Phifer®: PVC-coated Fiberglass laminated with a 2-ply PVC film. Fire rating: NFPA 701 TM#1 (small scale), NFPA 701 TM#2 (large scale), BS 5867 Part 2 Type B Performance, CAN/ULC-S 109 (large and small scale), NFPA 101 (Class B Rating), IBC Section 803.1.1 (Class B Rating). Bacterial and fungal resistance: ASTM E 2180, ASTM G21, ASTM G22, AATCC30 Part 3, ASTM D 3273, GREENGUARD® Mold and Bacterial Standard ASTM 6329; Style 2000 face includes Microban® antimicrobial additives. Environmental certification: Certified to UL GREENGUARD and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Safe Use: RoHS/Directive 2002/95/EC, US Consumer Product Safety Commission Section 101, ANSI/WCMA A 100.1-2007 for lead content and REACH (EC 1907/2006) compliant. Opaque, .025 inches thick, 21.6 oz/square yard, opaque.
 - b. Fiberglass

- 1) Apagón Style III is a 3-ply opaque shade fabric consisting of vinyl, fiberglass, and a proprietary coating for maximum blackout. Thread Count: 59 threads per square inch. Fire rating: NFPA 701-2019 Test Method 1. Environmental Benefits: ASTM D3335 85a - Lead Testing. Bacterial and fungal resistance: ASTM Method G-21-15 – Resistance to Fungi. Opaque, .0131 inches thick, 12.8 oz/square yard.
- 2) Flocké® by Mermet®: Opaque, PVC-free fiberglass textile with acrylic flocked backing. Antistatic treated. Fire rating: NFPA 701-10 TM#1, California U.S. Title 19, CAN/ULC-S109-03 Small & Large Flame Test. Environmental Benefits: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. RoHS compliant – lead free. Bacterial and fungal resistance: ASTM E2180, ASTM G21. Draper shades made with this fabric are GreenSpec® listed. Opaque, .020 inches thick, 15.93 oz/square yard.
- 3) SunBloc Series SB9000: Close woven fiberglass base textile with sun-resistant vinyl film bonded to each side, opaque with minimum tensile strength of 190 pounds for warp and 180 pounds for fill. Fire rating: NFPA 701 1006-Test 1, California U.S. Title 19. Environmental Benefits: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. REACH and RoHS compliant - Lead Free. Bacterial and fungal resistance: ASTM E2180, ASTM G21. Washable and stain resistant. Same color both sides. Opaque, .015 inches thick, 12 oz/square yard.
- 4) SunBloc Series SB9100: Close woven fiberglass base textile with sun-resistant vinyl film bonded to each side, opaque with minimum tensile strength of 190 pounds for warp and 180 pounds for fill. Fire rating: NFPA 701 1006-Test 1, California U.S. Title 19. Environmental Benefits: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. REACH and RoHS compliant - Lead Free. Bacterial and fungal resistance: ASTM E2180, ASTM G21. Washable and stain resistant. White exterior in all colors. Opaque, .013 inches thick, 12 oz/square yard.
- c. PVC Coated Polyester.
 - 1) Soltis® Opaque B92 by Serge Ferrari®. PVC-coated polyester with silver backing on outside and pre-tensioning process for dimensional stability. Fire rating: Method 1 and 2/NFPA 701, Class A / ASTM E84. Environmental Benefits: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. RoHS compliant – lead free. Recyclable through TaxyLoop®. 0 percent open, .0312 inches thick, 19.1 oz/square yard.
- d. Polyester
 - 1) SheerWeave® Series SW7000 Blackout by Phifer®: PVC-free polyester with acrylic foamed backing. Fire rating: California U.S. Title 19 (small scale), BS 5867 Part 2 Type B Performance, IBC Section 803.1.1 (Class A Rating), NFPA 101 (Class A Rating), NFPA 701 TM#1 (small scale), CAN/ULC-S 109 (large and small scale), CAN/CGSB2-4. 162-M80. Bacteria and fungal resistance: ASTM G21, AATCC 174-1998 Part II and III. Environmental certification: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Safe use: RoHS/Directive 2002/95/EC, US Consumer Product Safety Commission Section 101 and ANSI/WCMA A

- 100.1-2007 for lead content. Draper shades made with this fabric are GreenSpec® listed. Opaque, .030 inches thick, 13.92 oz/square yard.
- 2) SheerWeave® Series SW7400 by Phifer®: PVC-free polyester with acrylic foamed backing. Fire rating: California U.S. Title 19 (small scale), CAN/ULC-S 109 (large and small scale), CAN/CGSB 2-4.162-M80, NFPA 701 TM#1 (small scale), NFPA 701 TM#2 (large scale). Bacteria and Fungal Resistance: ASTM G21-96, AATCC 174-1998 Part II and III. Environmental Certification: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Safe Use: RoHS/Directive 2002/95/EC, ANSI/WCMA A 100.1-2007 for lead content, US Consumer Product Safety Commission Section 101. UV Protection: Seal of Approval by the Melanoma International Foundation (MIF) for effectiveness in preventing sun damage to the skin or eyes. Opaque, .029 inches thick, 12.53 oz/square yard.
 - 3) SheerWeave® Series SW7500 by Phifer®: PVC-free polyester with an acrylic coating. Fire rating: California U.S. Title 19 (small scale), NFPA 101 (Class A Rating), NFPA 701 TM#1 (small scale), BS 5867 Part 2 Type B Performance, CAN/ULC-S 109 (large and small scale), IBC Section 803.1.1 (Class A Rating), CAN/CGSB 2-4.162-M80. Bacterial and fungal resistance: ASTM E 2180 and ASTM G21. Environmental certification: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Safe use: RoHS/Directive 2002/95/EC, US Consumer Product Safety Commission Section 101 and ANSI/WCMA A 100.1-2007 for lead content. Opaque, .016 inches thick, 12.14 oz/square yard.
 - 4) SheerWeave® Series SW7600 by Phifer®: PVC-free polyester with an acrylic foamed backing. Fire rating: California U.S. Title 19 (small scale), NFPA 701 TM#1 (small scale), BS 5867 Part 2 Type B Performance, CAN/ULC-S 109 (large and small scale). Bacterial and fungal resistance: ASTM G21-96, AATCC 174-1998 Part II and III. Environmental certification: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. Safe use: RoHS/Directive 2002/95/EC, ANSI/WCMA A 100.1-2007 for lead content, US Consumer Product Safety Commission Section 101. UV protection: Seal of approval by the Melanoma International Foundation (MIF) for effectiveness in preventing sun damage to the skin or eyes. Opaque, .020 inches thick, 11.8 oz/square yard.
 - 5) Verona Twilight™ by Mermet®. 50 percent Polyester and 50 percent acrylic with foam backing. Duraguard fabric protector and Sanitized Antimicrobial Protection. Plain weave that is 100% PVC free. Fire rating: NFPA 701-10 TM#1, California U.S. Title 19, CAN/ULC-S109-03 Small & Large Flame Test. Environmental Benefits: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. RoHS compliant – lead free. Bacterial and fungal resistance: ASTM E2180. 0% open, .024 inches thick, 11.65 oz/square yard.

C. Color and pattern: As selected by Architect from manufacturer's standard range..

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Coordinate requirements for blocking and structural supports to ensure adequate means for installation of window shades.
- B. Coordinate requirements for blocking, construction of shade pockets, and structural supports to ensure adequate means for installation of window shades.
- C. Coordinate installation of recessed shade pockets with construction of suspended acoustical panel ceilings specified in Section 09510.
- D. Coordinate installation of recessed shade pockets with construction of suspended gypsum board ceilings specified in Section 09260.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install roller shades level, plumb, square, and true. Allow proper clearances for window operation hardware.
- C. Shade pockets:
 - 1. Install shade pockets prior to installation of suspended ceiling system. Attach to supporting structure with screws through top of pocket at 24 inches (610 mm) minimum centers.
 - 2. Install shade pockets in conjunction with installation of suspended ceiling system. Attach to supporting structure with screws through top of pocket at 24 inches (610 mm) minimum centers.
 - 3. Install corner pieces securely and in alignment with pockets.
 - 4. Install pocket ends securely and in alignment with pockets.
 - 5. After interior construction is essentially complete, install shade and operating mechanism in pocket.
- D. Install the following items to conceal roller and operating mechanism. Do not use exposed fasteners.
 - 1. Fascias.
 - 2. Closure panels.
 - 3. Endcaps.
- E. Install headbox, side channels, and sill channel with sealant specified in Section 07900 - Joint Sealers to eliminate light leaks at perimeter of shade system.
- F. Position shades level, plumb, and at proper height relative to adjacent construction. Secure with fasteners recommended by manufacturer.

3.4 TESTING AND DEMONSTRATION

- A. Test window shades to verify that operating mechanism and other operating components are functional. Correct deficiencies.
- B. Demonstrate operation of shades to Owner's designated representatives.

3.5 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair, or replace damaged products before Substantial Completion.

3.6 SCHEDULES

- A. Refer to Drawings for shade types and locations.

END OF SECTION

SECTION 23 05 00

MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide all labor, tools, materials, accessories, parts, transportation, taxes, and related items, essential for installation of the work and necessary to make work, complete, and operational. Provide new equipment and material unless otherwise called for. References to codes, specifications and standards called for in the specification sections and on the drawings mean, the latest edition, amendment and revision of such referenced standard in effect on the date of these contract documents. All materials and equipment shall be installed in accordance with the manufacturer's recommendations.

1.2 LICENSING

- A. The Contractor shall hold a license to perform the work as issued by the authority having jurisdiction.
- B. Plumbing contract work shall be performed by, or under, the direct supervision of a licensed master plumber.
- C. Electrical contract work shall be performed by, or under, the direct supervision of a licensed electrician.

1.3 PERMITS

- A. Apply for and obtain all required permits and inspections, pay all fees and charges including all service charges. Provide certificate of approval from the Authorities Having Jurisdiction prior to request for final payment.
- B. Provide electrical inspection certificate of approval from Middle Department Inspection Agency, Commonwealth Inspection Agency, or an Engineer approved Inspection Agency prior to request for final payment.

1.4 CODE COMPLIANCE

- A. Provide work in compliance with the following Codes and Standards based on the current edition in effect at project location:
 - 1. Building, Code of New York State.
 - 2. Existing Building Code of New York State.
 - 3. Fire Code of New York State.
 - 4. Plumbing Code of New York State.
 - 5. Mechanical Code of New York State.

6. Fuel Gas Code of New York State.
7. Property Maintenance Code of New York State.
8. Energy Conservation Code of New York State.
9. Accessible and Usable Buildings and Facilities, ICC A117.1.
10. New York State Department of Labor Rules and Regulations.
11. New York State Department of Health.
12. National Electrical Code (NEC).
13. Occupational Safety and Health Administration (OSHA).
14. Local Codes and Ordinances.
15. Life Safety Code, NFPA 101.

1.5 GLOSSARY

ACI	American Concrete Institute
AGA	American Gas Association
AGCA	Associated General Contractors of America, Inc.
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AFBMA	Anti-Friction Bearing Manufacturer's Association
AMCA	Air Moving and Conditioning Association, Inc.
ANSI	American National Standards Institute
ARI	Air Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.
ASME	American Society of Mechanical Engineers
ASPE	American Society of Plumbing Engineers
ASTM	American Society for Testing Materials
AWSC	American Welding Society Code
AWWA	American Water Works Association
FM	Factory Mutual Insurance Company
IBR	Institute of Boiler & Radiation Manufacturers
IEEE	Institute of Electrical and Electronics Engineers

IRI	Industrial Risk Insurers
NEC	National Electrical Code
NEMA	National Electrical Manufacturer's Association
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
NYS/DEC	New York State Department of Environmental Conservation
SBI	Steel Boiler Institute
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
UFPO	Underground Facilities Protective Organization
UL	Underwriter's Laboratories, Inc.
OSHA	Occupational Safety and Health Administration
XL - GAP	XL Global Asset Protection Services

1.6 DEFINITIONS

Acceptance	Owner acceptance of the project from Contractor upon certification by Owner's Representative.
As Specified	Materials, equipment including the execution specified/shown in the contract documents.
Basis of Design	Equipment, materials, installation, etc. on which the design is based. (Refer to the article, Equipment Arrangements, and the article, Substitutions.)
Code Requirements	Minimum requirements.
Concealed	Work installed in pipe and duct shafts, chases or recesses, inside walls, above ceilings, in slabs or below grade.
Coordination Drawings	Show the relationship and integration of different construction elements and trades that require careful coordination during fabrication or installation, to fit in the space provided or to function as intended.
Delegated-Design Services	Performance and Design criteria for Contractor provided professional services. Where professional design services or certifications by a design professional are specifically required of a Contractor, by the Contract Documents. Provide products and systems with the specific design criteria indicated. If criteria indicated is insufficient to perform services or certification required, submit a written request for additional information to the Engineer. Submit wet signed and sealed certification by the licensed design professional for each product and system specifically assigned to the Contractor to be designed or certified by a design professional. Examples: structural maintenance ladders, stairs and platforms, pipe anchors, seismic compliant system, wind, structural supports for material equipment, sprinkler hydraulic calculations.

Equal, Equivalent, Equal To, Equivalent To, As Directed and As Required	Shall all be interpreted and should be taken to mean "to the satisfaction of the Engineer".
Exposed	Work not identified as concealed.
Extract	Carefully dismantle and store where directed by Owner's Representative and/or reinstall as indicated on drawings or as described in specifications.
Furnish	Purchase and deliver to job site, location as directed by the Owner's Representative.
Inspection	Visual observations by Owner's site Representative.
Install	Store at job site if required, proper placement within building construction including miscellaneous items needed to affect placement as required and protect during construction. Take responsibility to mount, connect, start-up and make fully functional.
Labeled	Refers to classification by a standards agency.
Manufacturers	Refer to the article, Equipment Arrangements, and the article, Substitutions.
Prime Professional	Architect or Engineer having a contract directly with the Owner for professional services.
Product Data	Illustrations, standard schedules, performance charts, instructions, brochures, wiring diagrams, finishes, or other information furnished by the Contractor to illustrate materials or equipment for some portion of the work.
Provide (Furnish and Install)	Contractor shall furnish all labor, materials, equipment and supplies necessary to install and place in operating condition, unless otherwise specifically stated.
Relocate	Disassemble, disconnect, and transport equipment to new locations, then clean, test, and install ready for use.
Remove	Dismantle and take away from premises without added cost to Owner, and dispose of in a legal manner.
Review and Reviewed	Should be taken to mean to be followed by "for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents".
Roughing	Pipe, duct, conduit, equipment layout and installation.
Samples	Physical full scale examples which illustrate materials, finishes, coatings, equipment or workmanship, and establishes standards by which work will be judged.
Satisfactory	As specified in contract documents.
Shop Drawings	Fabrication drawings, diagrams, schedules and other instruments, specifically prepared for the work by the Contractor or a Sub-contractor, manufacturer, supplier or distributor to illustrate some portion of the work.
Site Representative	Owner's Inspector or "Clerk of Works" at the work site.
Submittals Defined	Any item required to be delivered to the Engineer for review as requirement

(Technical) of the Contract Documents.

The purpose of technical submittals is to demonstrate for those portions of the work for which a submittal is required, the manner in which the Contractor proposes to conform to the information given and design concepts expressed and required by the Contract Documents.

1.7 EXISTING CONDITIONS

- A. Contractor shall review all available record documents of existing construction or other existing conditions and hazardous material information. Owner does not guarantee that existing conditions are the same as those indicated in these documents. Contractor shall record existing conditions via measured drawings and preconstruction photographs or video. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage, removal or construction operations.
- B. Owner will occupy portions of the building immediately adjacent to the area(s) of removals. Conduct removals so Owner's operations are not disrupted. Contractor shall locate, identify, disconnect and seal or cap mechanical, plumbing, fire protection and/or electrical systems serving areas of removals, unless noted otherwise in the contract documents. Contractor shall arrange shut-down of systems with the Owner. Piping and ductwork indicated to be removed shall be removed and capped or plugged with compatible materials. If services/systems are required to be removed, relocated or abandoned, provide temporary services/systems the bypass area(s) of removals to maintain continuity of services/systems to other parts of the building, as required.

1.8 SHOP DRAWINGS/PRODUCT DATA/SAMPLES

- A. Provide submittals on all items of equipment and materials to be furnished and installed. Submittals shall be accompanied by a transmittal letter, stating name of project and contractor, name of vendor supplying equipment, number of drawings, titles, specification sections (name and number) and other pertinent data called for in individual sections. Submittals shall have individual cover sheets that shall be dated and contain: Name of project; name of prime professional; name of prime contractor; description or names of equipment, materials and items; and complete identification of locations at which materials or equipment are to be installed. Individual piecemeal or incomplete submittals will not be accepted. Similar items, (all types specified) shall be submitted at under one cover sheet per specification section (e.g. lighting fixtures, valves, plumbing fixtures, etc.). Submittals shall include all required documentation for each product listed in the specification section at the same time as a complete package. Number each submittal by trade. Indicate deviations from contract requirements on Letter of Transmittal. Submittals will be given a general review only. Corrections or comments made on the Submittals during the review do not relieve Contractor from compliance with requirements of the drawings and specifications. The Contractor is responsible for: confirming and correcting all quantities; checking electrical characteristics and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner. If submitting hard copies, submit four (4) copies for review.

- B. The Engineer will review up to two (2) submissions of any single submittal. The Contractor will be invoiced on an hourly rate basis for the time spent reviewing the same shop drawing in excess of twice.
- C. If submittals are to be submitted electronically, all requirements in Item A apply. Submittals shall be emailed in PDF format to specific email address provided by the Construction Manager, General Contractor, Architect or Project Manager. Name of project shall be in subject line of email. Send emails to mealbasubmittalclerk@meengineering.com
- D. Refer to Division 01 for additional requirements.

1.9 PROTECTION OF PERSONS AND PROPERTY

- A. Contractor shall assume responsibility for construction safety at all times and provide, as part of contract, all trench or building shoring, scaffolding, shielding, dust/fume protection, mechanical/electrical protection, special grounding, safety railings, barriers, and other safety feature required to provide safe conditions for all workmen and site visitors.

1.10 EQUIPMENT ARRANGEMENTS

- A. The contract documents are prepared using one manufacturer as the Basis of Design, even though other manufacturers' names are listed. If Contractor elects to use one of the listed manufacturers other than Basis of Design or if the physical size, performance or electrical characteristics for the Basis of Design equipment differs from what is indicated in the contract documents, submit detailed drawings, indicating proposed installation of equipment. Show maintenance clearances, service removal space required, and other pertinent revisions to the design arrangement. Make required changes in the work of other trades, at no increase in any contract. Provide larger motors, feeders, breakers, and equipment, additional control devices, valves, fittings and other miscellaneous equipment required for proper operation, and assume responsibility for proper location of roughing and connections by other trades. Remove and replace doorframes, access doors, walls, ceilings, or floors required to install. If revised arrangement submittal is rejected, revise and resubmit specified Basis of Design item which conforms to Contract Documents.

1.11 SUBSTITUTIONS

- A. Refer to Division 01 for additional requirements.

1.12 CONTINUITY OF SERVICES

- A. The building will be in use during construction operations. Maintain existing systems in operation within all rooms of building at all times. Refer to "General Conditions of the Contract for Construction" for temporary facilities for additional contract requirements. Schedules for various phases of contract work shall be coordinated with all other trades and with Owner's Representative. Provide, as part of contract, temporary mechanical and electrical connections and relocations as required to accomplish the above. Obtain approval in writing as to date, time, and location for shutdown of existing mechanical/electrical facilities or services.

1.13 ROUGHING

- A. The Contract Drawings have been prepared in order to convey design intent and are diagrammatic only. Drawings shall not be interpreted to be fully coordinated for construction.
- B. Due to small scale of Drawings, it is not possible to indicate all offsets, fittings, changes in elevation, interferences, etc. Make necessary changes in contract work, equipment locations, etc., as part of a contract to accommodate work to avoid obstacles and interferences encountered. Before installing, verify exact location and elevations at work site. **DO NOT SCALE** plans. If field conditions, details, changes in equipment or shop drawing information require an important rearrangement, report same to Owner's Representative for review. Obtain written approval for all major changes before installing.
- C. Install work so that items both existing and new are operable and serviceable. Eliminate interference with removal of coils, motors, filters, belt guards and/or operation of doors. Provide easy, safe, and code mandated clearances at controllers, motor starters, valve access, and other equipment requiring maintenance and operation. Provide new materials, including new piping and insulation for relocated work.
- D. Coordinate work with other trades and determine exact route or location of each duct, pipe, conduit, etc., before fabrication and installation. Coordinate with Architectural Drawings. Obtain from Owner's Representative exact location of all equipment in finished areas, such as thermostat, fixture, and switch mounting heights, and equipment mounting heights. Coordinate all work with the architectural reflected ceiling plans and/or existing Architecture. Mechanical and electrical drawings show design arrangement only for diffusers, grilles, registers, air terminals, lighting fixtures, sprinklers, speakers, and other items. Do not rough-in contract work without reflected ceiling location plans.
- E. Before roughing for equipment furnished by Owner or in other Divisions, obtain from Owner and other Divisions, approved roughing drawings giving exact location for each piece of equipment. Do not "rough in" services without final layout drawings approved for construction. Cooperate with other trades to insure proper location and size of connections to insure proper functioning of all systems and equipment. For equipment and connections provided in this contract, prepare roughing drawing as follows:
 - 1. Existing Equipment: Measure the existing equipment and prepare for installation in new location.
 - 2. New Equipment: Obtain equipment roughing drawings and dimensions, then prepare roughing-in-drawings. If such information is not available in time, obtain an acknowledgement in writing, then make space arrangements as required with Owner's Representative.

1.14 REMOVAL WORK

- A. Refer to Division 02 for additional information regarding hazardous materials.

1.15 REFRIGERANT RECOVERY

- A. Existing equipment to be removed, as shown on the plans may contain refrigerant and refrigerant oils. This refrigerant and refrigerant oil must be handled in accordance with Federal, State and Local law requirements.
- B. Removal and recovery of refrigerant shall be in accordance with the current edition of Section 608 of the Clean Air Act of 1990, including all final regulations.
- C. Refrigerant recovery must be performed by a technician, certified by an EPA-approved certification program, using refrigerant recovery and recycling equipment certified by an EPA-approved testing organization.
- D. Owner "reserves the right of first refusal" on ownership of recovered refrigerant. Should Owner choose to maintain ownership of refrigerant, refrigerant shall be reclaimed, cleaned by this Contractor to ARI 700-1993 Standard of Purity, by an EPA certified refrigerant reclaimer. Refrigerant shall be turned over to the Owner in suitable marked containers to be stored on site, at a place of the Owner's choosing.

1.16 EQUIPMENT AND MATERIAL REQUIREMENTS

- A. Provide materials that meet the following minimum requirements:
 - 1. Materials shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less, in accordance with NFPA 255.
 - 2. All equipment and material for which there is a listing service shall bear a UL label.
 - 3. Potable water systems and equipment shall be built according to AWWA Standards.
 - 4. Gas-fired equipment and system shall meet AGA Regulations and shall have AGA label.
 - 5. All electrical equipment and systems, as a whole, shall be tested and listed by an OSHA approved Nationally Recognized Testing Laboratory (NRTL) for the intended use in accordance with the applicable standards and have a physical label indicating such.
 - 6. Fire protection equipment shall be UL listed and FM approved.
- B. Exterior and wet locations shall utilize materials, equipment supports, mounting, etc. suitable for the intended locations. Metals shall be stainless steel, galvanized or with baked enamel finish as a minimum. Finishes and coatings shall be continuous and any surface damaged or cut ends shall be field corrected in accordance with the manufacturer's recommendations. Hardware (screws, bolts, nuts, washers, supports, fasteners, etc.) shall be:
 - 1. Stainless steel where the associated system or equipment material is stainless steel or aluminum.

2. Hot dipped galvanized or stainless steel where the associated system or equipment is steel, galvanized steel or other.

1.17 CUTTING AND PATCHING

- A. Each trade shall include their required cutting and patching work unless shown as part of the General Construction Contract. Refer to General Conditions of the Contract for Construction, for additional requirements. Cut and drill from both sides of walls and/or floors to eliminate splaying. Patch cut or abandoned holes left by removals of equipment or fixtures. Patch adjacent existing work disturbed by installation of new work including insulation, walls and wall covering, ceiling and floor covering, other finished surfaces. Patch openings and damaged areas equal to existing surface finish. Cut openings in prefabricated construction units in accordance with manufacturer's instructions.

1.18 PAINTING

- A. Refer to Division 9 - Finishes, for additional information.

1.19 EXISTING CEILING REMOVAL AND RE-INSTALLATION

- A. In a renovation project, any existing ceiling removal and re-installation work required for the completion of a Contractors or Subcontractors work, shall be removed and re-installed by that Contractor or Subcontractor. This applies in any areas not called for to have a new ceiling installed.
- B. The ceiling removal and re-installation shall include lay-in ceiling tile and grid, to the extent necessary to accomplish the work. Removed ceiling tile and grid shall be safely stored during the course of the work, and it shall be re-installed to the original existing condition.
- C. The ceiling removal and re-installation shall include gypsum board or plaster ceilings and the associated suspension systems. Removed ceiling areas shall be patched with materials to match the existing ceiling, and painted to match. If paint cannot be matched exactly, paint the entire ceiling a similar color.

1.20 CONCEALMENT

- A. **Conceal all contract work** above ceilings and in walls, below slabs, and elsewhere throughout building. If concealment is impossible or impractical, notify Owner's Representative before starting that part of the work and install only after their review. In areas with no ceilings, install only after Owner's Representative reviews and comments on arrangement and appearance.

1.21 CHASES

- A. In Existing Buildings:
 1. Drill holes for floor and/or roof slab openings.
 2. Multiple pipes smaller than 1 in. properly spaced and supported may pass through one 6 in. or smaller diameter opening.

3. Seal voids in fire rated assemblies with a fire-stopping seal system to maintain the fire resistance of the assembly. Provide 18 gauge galvanized sleeves at fire rated assemblies. Extend sleeves 2 in. above floors.
4. In wall openings, drill or cut holes to suit. Provide 18 gauge galvanized sleeves at shafts and fire rated assemblies. Provide fire-stopping seal between sleeves and wall in drywall construction. Provide fire stopping similar to that for floor openings.

1.22 PENETRATION FIRESTOPPING

A. Fire-Stopping for Openings Through Fire and Smoke Rated Wall and Floor Assemblies:

1. Provide materials and products listed or classified by an approved independent testing laboratory for "Penetration Fire-Stop Systems". The system shall meet the requirements of "Fire Tests of Penetrations Fire-Stops" designated ASTM E814.
2. Provide fire-stop system seals at all locations where piping, tubing, conduit, electrical busways/cables/wires, ductwork and similar utilities pass through or penetrate fire rated wall or floor assembly. Provide fire-stop seal between sleeve and wall for drywall construction.
3. The minimum required fire resistance ratings of the wall or floor assembly shall be maintained by the fire-stop system. The installation shall provide an air and watertight seal.
4. The methods used shall incorporate qualities which permit the easy removal or addition of electrical conduits or cables without drilling or use of special tools. The product shall adhere to itself to allow repairs to be made with the same material and permit the vibration, expansion, and/or contraction of any items passing through the penetration without cracking, crumbling and resulting reduction in fire rating.
5. Plastic pipe/conduit materials shall be installed utilizing intumescent collars.
6. Provide a submittal including products intended for use, manufacturer's installation instructions, and the UL details for all applicable types of wall and floor penetrations.
7. Fire-stopping products shall not be used for sealing of penetrations of non-rated walls or floors.
8. Piping insulation is allowed to be reduced in thickness only when a specific UL assembly detail for piping passing thru a rated wall indicates a maximum insulation thickness that is less than the insulation specification section calls for. In this case reduce the insulation thickness just for the rated wall penetration. The reduction of insulation thickness shall be limited to the length of the penetration only.

B. Acceptable Manufacturers:

1. Dow Corning Fire-Stop System Foams and Sealants.
2. Nelson Electric Fire-Stop System Putty, CLK and WRP.
3. S-100 FS500/600, Thomas & Betts.
4. Carborundum Fyre Putty.
5. 3-M Fire Products.
6. Hilti Corporation.

1.23 NON-RATED WALL PENETRATIONS

- A. Each trade shall be responsible for sealing wall penetrations related to their installed work, including but not limited to ductwork, piping, conduits, etc. See individual specification sections for requirements.

1.24 SUPPORTS

- A. Provide required supports, beams, angles, hangers, rods, bases, braces, and other items to properly support contract work. Modify studs, add studs, add framing, or otherwise reinforce studs in metal stud walls and partitions as required to suit contract work. If necessary, in stud walls, provide special supports from floor to structure above.
- B. For precast panels/planks and metal decks, support mechanical/electrical work as determined by manufacturer and the Engineer. Provide heavy gauge steel mounting plates for mounting contract work. Mounting plates shall span two or more studs. Size, gauge, and strength of mounting plates shall be sufficient for equipment size, weight, and desired rigidity.
- C. For finished areas without a finished ceiling system such as classrooms, offices, conference rooms, etc., where decking and structure is exposed, and ductwork/piping/conduit is exposed: All mounting brackets, channel support systems and mounting hardware for ductwork, piping, lighting, etc. shall be concealed and approved by the Architect/Engineer prior to the installation. AirCraft cable style hanging for ductwork is required. It is recommended that room mockups be done and receive Architect/Engineer approval prior to proceeding with installation.
- D. Equipment, piping, conduit, raceway, etc. supports shall be installed to minimize the generation and transmission of vibration.
- E. Materials and equipment shall be solely supported by the building structure and connected framing. Gypboard, ceilings, other finishes, etc. shall not be used for support of materials and equipment.

1.25 ACCESS PANELS

- A. Provide access panels for required access to respective trade's work. Location and size shall be the responsibility of each trade. Access panels provided for equipment shall provide an opening not smaller than 22 in. by 22 in. Panels shall be capable of opening a minimum of 90 degrees. Bear cost of construction changes necessary due to improper information or failure to provide proper information in ample time. Access panels over 324 square inches shall have two cam locks. Provide proper frame and door type for various wall or ceiling finishes. Access panels shall be equal to "Milcor" as manufactured by Inland Steel Products Co., Milwaukee, Wisconsin. Provide General Construction trade with a set of architectural plans with size and locations of access panels.

1.26 CONCRETE BASES

- A. Provide concrete bases for all floor mounted equipment. Provide 3,000 lb. concrete, chamfer edges, trowel finish, and securely bond to floor by roughening slab and coating with cement grout. Bases 4 in. high (unless otherwise indicated); shape and size to accommodate equipment. Provide anchor bolts in equipment bases for all equipment provided for the project, whether mounted on new concrete bases or existing concrete bases.

1.27 HVAC EQUIPMENT CONNECTIONS

- A. Contractor is responsible for draining, filling, venting, chemically treating and restarting any systems which are affected by work shown on the Contract Documents unless specifically noted otherwise.
- B. Provide final steam, condensate, hot water, glycol, chilled and condenser water, drain, vent and gas connections to all equipment as required by the equipment. Provide final connections, including domestic water piping, wiring, controls, and devices from equipment to outlets left by other trades. Provide equipment waste, drip, overflow and drain connections extended to floor drains.
- C. Provide for Owner furnished and Contractor furnished equipment all valves, piping, piping accessories, traps, pressure reducing valves, gauges, relief valves, vents, drains, insulation, sheet metal work, controls, dampers, as required.

1.28 PLUMBING EQUIPMENT CONNECTIONS

- A. Contractor is responsible for draining, filling, venting, chemically treating and restarting any systems which are affected by work shown on the Contract Documents unless specifically noted otherwise.

- B. Provide roughing and final water, waste, vent, gas connections to all equipment. Provide loose key stops, sanitary "P" traps, tailpiece, adapters, gas or air cocks, and all necessary piping and fittings from roughing point to equipment. Provide installation of sinks, faucets, traps, tailpiece furnished by others. Provide cold water line with gate valve and backflow prevention device at locations called for. Provide continuation of piping and connection to equipment that is furnished by others. Provide relief valve discharge piping from equipment relief valves.
- C. Provide valved water outlet adjacent to equipment requiring same. Provide equipment type floor drains, or drain hubs, adjacent to equipment.
- D. Install controls and devices furnished by others.
- E. Refer to Contract Documents for roughing schedules, and equipment and lists indicating scope of connections required.
- F. Provide for Owner furnished and Contractor furnished equipment all valves, piping, piping accessories, traps, pressure reducing valves, gauges, relief valves, vents, drains, as required.

1.29 ELECTRICAL EQUIPMENT CONNECTIONS

- A. Provide complete power connections to all electrical equipment. Provide control connections to equipment. Heavy duty NEC rated disconnect ahead of each piece of equipment. Ground all equipment in accordance with NEC.
- B. Provide for Owner furnished and Contractor furnished equipment all power wiring, electric equipment, control wiring, switches, lights, receptacles, and connections as required.

1.30 STORAGE AND PROTECTION OF MATERIALS AND EQUIPMENT

- A. Store Materials on dry base, at least 6 in. aboveground or floor. Store so as not to interfere with other work or obstruct access to buildings or facilities. Provide waterproof/windproof covering. Remove and provide special storage for items subject to moisture damage. Protect against theft or damage from any cause. Replace items stolen or damaged, at no cost to Owner.
- B. Refer to Division 01 for additional information.

1.31 FREEZING AND WATER DAMAGE

- A. Take all necessary precautions with equipment, systems and building to prevent damage due to freezing and/or water damage. Repair or replace, at no change in contract, any such damage to equipment, systems, and building. Perform first seasons winterizing in presence of Owner's operating staff.

1.32 LUBRICATION CHART

- A. Provide lubrication chart, 8-1/2 in. x 11 in. minimum size, typed in capital letters, mounted under clear laminated plastic; secure to wall in area of equipment. List all

motors and equipment in contract. Obtain and list necessary information by name/location of equipment, manufacturer recommended types of lubrication and schedule. Lubricate motors as soon as installed and perform lubrication maintenance until final acceptance. Divisions 22 and 26 shall add contract items to the chart provided by Division 23 or provide separate charts.

1.33 OWNER INSTRUCTIONS

- A. Before final acceptance of the work, furnish necessary skilled labor to operate all systems by seasons. Instruct designated person on proper operation, and care of systems/equipment. Repeat instructions, if necessary. Obtain written acknowledgement from person instructed prior to final payment. Contractor is fully responsible for system until final acceptance, even though operated by Owner's personnel, unless otherwise agreed in writing. List under clear plastic, operating, maintenance, and starting precautions procedures to be followed by Owner for operating systems and equipment.

1.34 OPERATION AND MAINTENANCE MANUALS

- A. Submit by email (preferred) or digital media, thru the normal project submittal process. Include a copy of each final approved Shop Drawing, wiring diagrams, piping diagrams, spare parts lists, final testing and balancing report, as-built drawings and manufacturer's instructions. Include typewritten instructions, describing equipment, starting/operating procedures, emergency operating instructions, summer-winter changeover, freeze protection, precautions and recommended maintenance procedures. Include name, address, and telephone number of installing contractor and of supplier manufacturer Representative and service agency for all major equipment items. Provide a table of contents page and dividers based upon specification section numbers. Submit in a compiled and bookmarked PDF format as outlined below. Each item listed in the table of contents shall include a hyperlink to the associated section of the O&M Manual, in addition to the bookmarking.
- B. Provide content for Operation and Maintenance Manuals as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Engineer will comment on whether content of operation and maintenance submittals is acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- C. Submit Operation and Maintenance Manuals in the following format:
 - 1. Submit by uploading to web-based project software site, or by email to Architect, as a formal project submittal in conformance with the project specific submittal procedures. Enable reviewer comments on draft submittals.
 - 2. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.

3. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in the table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- D. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing Owner training. Engineer will comment on whether general scope and content of manual are acceptable.
- E. Final Manual Submittal: Submit O&M manual in final form prior to requesting inspection for Substantial Completion and at least 2 weeks before commencing Owner training. Engineer will return copy with review comments.
 1. Correct or revise O&M manual to comply with Engineer's comments. Submit copies of each corrected manual within 2 weeks of receipt of Engineer's comments.
- F. Refer to Division 01 for additional requirements.

1.35 RECORD DRAWINGS

- A. The Contractor shall obtain at his expense one (1) set of construction Contract Drawings, (including non-reproduction black and white prints or electronic files) for the purpose of recording as-built conditions.
- B. The Contractor shall perform all survey work required for the location and construction of the work and to record information necessary for completion of the record drawings. Record drawings shall show the actual location of the constructed facilities in the same manner as was shown on the bid drawings. All elevations and dimensions shown on the drawings shall be verified or corrected so as to provide a complete and accurate record of the facilities as constructed.
- C. It shall be the responsibility of the Contractor to mark **EACH** sheet of the contract documents in red and to record thereon in a legible manner, any and all approved field changes and conditions as they occur. A complete file of approved field sketches, diagrams, and other changes shall also be maintained. At completion of the work, the complete set of red marked contract documents, plus all approved field sketches and diagrams shall be submitted to the engineer and used in preparation of the record drawings.
- D. A complete set of red marked contract drawings shall be submitted, at one time, as the "Record" set. If there are no changes to a specific drawing, the contractor shall indicate "NO CHANGES" on that drawing. ALL drawings shall be included in the "Record" set.
- E. The complete set of red marked Contract Documents or electronic files shall be certified by the Contractor as reflecting record conditions and submitted to the engineer for review.

F. The Contractor shall have the marked up set scanned, if they are not already electronic files, and then submit them to the Engineer as the "Record Set".

G. Refer to Division 01 for additional requirements.

1.36 FINAL INSPECTION

A. Upon completion of all Engineering Site Observation list items, the Contractor shall provide a copy of the Engineering Site Observation Report back to the Engineer with each items noted as completed or the current status of the item.

1.37 COMMISSIONING

A. Refer to General Commissioning Requirements in Division 01 for additional requirements.

1.38 TEMPORARY HEATING AND COOLING

A. Refer to the General Conditions of the Contract for Construction and Supplemental General Conditions.

1.39 MAINTENANCE OF HVAC SYSTEMS DURING TEMPORARY USE PERIODS

A. Provide each air handling system with a set of prefilters in addition to the permanent filters. Furnish four sets of prefilters for each system for use when system is operated for temporary heating or cooling. During such use, change prefilters as often as directed by Owner's Representative. Provide MERV-8 filters in all open ended ducts, return grilles and registers to keep dust out of ductwork. Change as often as necessary. Remove all such temporary filters upon completion. Use supply fans only. Do not operate return fans.

B. Blank-off outside air intake opening during temporary heating period. Install first set of permanent filters and prefilters.

C. Adjust dampers on supply system.

D. Set all heating coil control valves for manual operation.

E. Do not install any grilles or diffusers at room terminal ends of ducts until permission is given.

F. Assume responsibility for systems and equipment at all times, even though used for temporary heat or ventilating. Repair or replace all dented, scratched or damaged parts of systems prior to final acceptance.

G. Remove concrete, rust, paint spots, other blemishes, then clean.

H. Just prior to final acceptance, remove used final filter and install new set. Deliver all unused sets of prefilters to the Owner and obtain written receipt. Properly lubricate system bearings before and during temporary use. Maintain thermostats, freeze stats, overload devices, and all other safety controls in operating condition.

1.40 TEMPORARY FACILITIES

- A. Refer to the Division 01 Sections, General Conditions and Supplemental General Conditions.

1.41 TEMPORARY LIGHT AND POWER

- A. Refer to the Division 01 Sections, General Conditions and Supplemental General Conditions.

1.42 CLEANING

- A. It is the Contractor's responsibility to keep clean all equipment and fixtures provided under this contract for the duration of the project. Each trade shall keep the premises free from an accumulation of waste material or rubbish caused by his operations. The facilities require an environment of extreme cleanliness, and it is the Contractor's responsibility to adhere to the strict regulations regarding procedures on the existing premises. After all tests are made and installations completed satisfactorily:
 - 1. Thoroughly clean entire installation, both exposed surfaces and interiors.
 - 2. Remove all debris caused by work.
 - 3. Remove tools, surplus, materials, when work is finally accepted.

1.43 TRANSFER OF ELECTRONIC FILES

- A. M/E Engineering, P.C. will provide electronic files for the Contractor's use in the preparation of sheet metal shop drawings, coordination drawings, or record drawings related to the project, and the following terms and conditions:
 - 1. The Contractor shall submit a formal request for electronic drawing files on the M/E Engineering, P.C. website, by utilizing the following website link:
<http://www.meengineering.com/contact-pages/contractor-request>
 - 2. M/E Engineering, P.C. makes no representation as to the compatibility of these files with the Contractor's hardware or the Contractor's software beyond the specific release of the referenced specifications.
 - 3. M/E Engineering can only provide CAD files of M/E/P/FP drawing levels for which we are the Engineer of Record. CAD files of Architectural backgrounds, reflected ceiling plans, structural plans, etc. must be obtained separately from the Architect of Record.
 - 4. Data contained on these electronic files is part of M/E Engineering, P.C.'s instruments of service shall not be used by the Contractor or anyone else receiving data through or from the Contractor for any purpose other than as convenience in the preparation of shop drawings for the referenced project. Any other use or reuse by the Contractor or by others will be at the Contractor's sole risk and without liability or legal exposure to M/E Engineering, P.C. The Contractor agrees to make no claim and hereby waive, to the fullest extent

permitted by law, any claim or cause of action of any nature against M/E Engineering, P.C., its officers, directors, employees, agents or sub-consultants which may arise out of or in connection with the Contractor's use of the electronic files.

5. Furthermore, the Contractor shall, to the fullest extent permitted by law, indemnify and hold harmless, M/E Engineering, P.C. from all claims, damages, losses and expenses, including attorney's fees arising out of or resulting from the Contractor's use of these electronic files.
6. These electronic files are not contract documents. Significant difference may arise between these electronic files and corresponding hard copy contract documents due to addenda, change orders or other revisions. M/E Engineering, P.C. makes no representation regarding the accuracy or completeness of the electronic files the Contractor receives. In the event that a conflict arises between the signed contract documents prepared by M/E Engineering, P.C. and electronic files, the signed contract documents shall govern. The Contractor is responsible for determining if any conflicts exist. By the Contractor's use of these electronic files the Contractor is not relieved of the Contractor's duty to comply with the contract documents, including and without limitation, the need to check, confirm and coordinate all dimensions and details, take field measurements, field verify conditions and coordinate the Contractor's work with that of other contractors for the project.

END OF SECTION 23 05 00

SECTION 23 05 04

ELECTRIC WIRING

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services for the complete installation of motor control wiring and temperature control wiring as required in Contract Documents. Provide wiring and conduit, required to connect devices furnished as part of or adjunctive to the automatic temperature control system and for motor control regardless of the source of supply. Control wiring includes 120 volt and lower voltage wiring for control signals directing equipment operation. Control circuits shall be 120 volt maximum. Provide wiring in accordance with requirements specified in Division 26, "Electrical" and the National Electrical Code. Provide devices required for proper system operation, including special electrical switches, transformers, disconnect switches, relays, and circuit breaker protection.
- B. Coordinate all work with Division 26, "Electrical".

1.2 WORK NOT INCLUDED

- A. Power wiring for motors, motor starters and associated starting and control equipment, as well as the motor starters (except in the case of equipment specified to have packaged control/starters), are included in Division 26, "Electrical", unless otherwise called for.

1.3 QUALIFICATIONS

- A. Wiring shall be installed in compliance with all requirements of Division 26, "Electrical".

1.4 SUBMITTALS

- A. Provide complete wiring diagrams for equipment systems. Deliver wiring diagrams to proper trades in time for roughing of conduit, equipment connections, and avoid delay in construction schedule. Wiring diagrams and roughing information to be wired as part of the Work of Division 26, "Electrical", shall be clearly indicated.

PART 2 - PRODUCTS

2.1 PRODUCTS

- A. Refer to Division 26 specifications for required wiring materials.

PART 3 - EXECUTION

3.1 GENERAL

- A. Check electrical wiring pertaining to equipment for completeness and correctness of connections. Correct any misapplied motor and/or motor starter, improper thermal overload device, or device which fails to function and resultant damage, whether due to incorrect connections or improper information on wiring diagrams.

3.2 WIRING FOR CONTROL SYSTEMS

- A. Provide motor control and temperature control wiring for equipment. All wiring shall be in conduit, unless otherwise noted below, supported on 5ft. centers. Refer to Section 260501 for type of conduit to be used in specific applications.
 - 1. Provide 18 in. length flexible conduit at motors and devices subject to vibration.
 - 2. Do not attach directly to hot surfaces, piping, or ductwork.
 - 3. Control wiring shall be in separate conduit from all other wiring.
 - 4. Where allowable by Code and contract documents, temperature control wiring may be installed without conduit. Installation and wire insulation types shall be as described by NEC, Article 725. All low voltage wiring circuits 50 volt and under shall:
 - a. Have the proper insulation and meet the requirements of NEC Article 300-22 when installed in plenums or other spaces used for environmental air.
 - b. Be adequately supported using bridle rings spaced a maximum of 3 ft. on centers or other approved method when installed horizontally above accessible ceilings or run exposed in unfinished areas.
 - c. Be run in wall cavity or surface metal raceway where no access is available to wall cavity, in finished areas.
 - d. Be installed in conduit when installed vertically in Mechanical/Utility Rooms from panels and devices up to above ceiling, or 10 ft. above finished floor if no ceiling, then run exposed.
 - e. Be installed in conduit in all cases not specifically covered by the above cases, or where subject to physical damage.
- B. Provide pushbutton stations, pilot lights, selector switches, auxiliary starter contacts, and other devices required to provide specified functions.
 - 1. Provide green grounding wire circuited from starter, and run ground wire through conduit to each remote auxiliary relay, pushbutton station, remote panel heating device, thermostat, or device with potentials in excess of 50 volts. Size ground wire as required by NEC.

3.3 EQUIPMENT WIRING

- A. Provide power and control wiring between sections of electrical radiation units, between shipping splits, and between remote panels, thermostats, disconnect switches, and their respective units. Provide control wiring from the package control system, to each respective electric heat coil, reheat coil or motor. Properly mount control package. Power wiring to and including disconnect switch shall be by Division 26 "Electrical".

3.4 FIELD WIRING IN STARTERS, CONTROLLERS AND PANELS

- A. Wiring within starters, controllers, and temperature control panels, shall be routed neatly in gutter space, away from moving and/or heat producing parts. Provide suitably rated terminal blocks. Do not place more than two wire connections on pilot device or relay terminal. Where more than two circuit connections are required, use terminal blocks. Provide nylon insulated, ring spade terminal for all control wires. Cables and wires shall be neatly bundled and lashed with nylon cable straps.

END OF SECTION 23 05 04

SECTION 23 05 13

MOTORS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Provide labor, materials, equipment and services as required for the complete installation designed in Contract Documents.

1.2 SUBMITTALS

- A. Submit manufacturer's product data on all motors.
- B. Product Data: For each motor, provide dimensions; mounting arrangements; frame type, enclosure type, location for conduit entries; shipping and operating weights; and manufacturer's technical data on features, performance, electrical ratings and characteristics.
- C. Motor Performance Data: For each motor, include the following manufacturers' data:
 - 1. Motor Performance: Percent Efficiency, Power Factor, Torque, RPM, Duty Rating and Design Category.

1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. Motor manufacturer shall be based and headquartered in the United States of America and shall design and manufacture motors in the United States.
 - 2. Motor manufacturer shall have over fifteen (15) years-experience in the motor industry and shall maintain active company-wide quality assurance program.
 - 3. Motor manufacturer shall maintain an authorized service center within 60 miles of the project site, capable of providing training, parts and emergency maintenance and repairs.
- B. Motor performance shall be warranted against material and workmanship defects by manufacturer's limited warranty and service policy for the period of at least 18 months from the day of shipment from the factory or the manufacturer's warehouse.
 - 1. Premium efficiency motors shall be warranted for 36 months.
 - 2. Severe duty motors (as applicable) shall be warranted for 60 months.
 - 3. Extended warranty shall be offered for certain products or as agreed by additional terms and specified elsewhere.

PART 2 - PRODUCTS

2.1 MOTORS

A. General Requirements:

1. Motors built for 60 Hz operation, three phase for 1/2 HP and larger; single phase for 1/3 HP and smaller.
 - a. In compliance with NEMA Standards, wound specifically for nameplate voltage, and selected for appropriate duty and environment.
 - b. 1.15 minimum service factor at rated voltage and frequency. 1.0 service factor for inverter duty motors.
 - c. Bearings: Bearings shall have a rated fatigue life of L-10 (B-10) of 150,000 hours for direct-coupled applications and 50,000 hours for belted applications minimum. Belted rating shall be based on radial loads and pulley sizes called out in NEMA MG 1-14.43. The calculation will be determined from the pulley centerline being at the end of the motor shaft.
 - d. V-belt connected motors with adjustable slide rail bases and pulleys.
 - e. Motors shall have Class F insulation system, with Class B temperature rise, insulation meeting NEMA MG 1 Part 31. Maximum allowable motor temperature rise for open drip-proof (ODP) or totally enclosed fan cooled (TEFC) type at 1.15 service factor shall be 105°C above 40°C ambient with a total temperature rating of 155°C.
 - f. NEMA locked rotor kVA code as required to match unit equipment torque characteristics.
 - g. Single-phase motors shall be capacitor start, induction run, or split phase type.
 - h. Polyphase motors shall be constant speed, squirrel cage, unless otherwise specified.
 - i. Nameplates shall have as a minimum, all information as described in NEMA Standard MG-1-20.60. Motor nameplate shall be mounted on enclosure with stainless steel fastening pins.
2. Motors for use with adjustable speed drive applications shall be premium efficiency inverter duty rated in accordance with NEMA and be capable of a 20:1 turndown.
 - a. These motors shall meet NEMA corona inception voltage requirements, withstanding peak voltages up to 1600 volts, and be manufactured in accordance with NEMA MG 1 Part 30 and 31.

- b. All motors controlled by adjustable speed drives shall be equipped with circumferential micro-fiber shaft grounding rings to provide protection from electrical bearing damage, to meet NEMA MG 1, 31.4.4.3. Provide AEGIS Bearing Protection Ring Kit (or equal), installed in accordance with the manufacturer's recommendation. For motors controlled by adjustable speed drives and 50hp or greater the motor shall have a ceramic electrically insulating bearing assembly on the opposite end of the grounding brushes.

3. EC Motors:

- a. The motor shall be DC rated with permanent magnet rotor and automatically resetting integral overload protection.
- b. The unit shall meet the scheduled voltage, phase, control and other requirements indicated.
- c. Input Control: The unit shall have the following control features as a minimum:
 - 1) Packaged Unit controls: DDC input to include start/stop/status/general trouble.
 - 2) External Control: Minimum of Modbus and/or BACnet digital start/stop, digital trouble, 0-10VDC and 4-20mA speed control input.
- d. Unit insulation shall be Class H.
- e. Electrical termination lugs shall be suitable for the intended feed circuit.
- f. Ratings shall be 90% minimum power factor and 10% maximum total harmonic distortion.
- g. Speed control suitable for 100% to 10% operational capability.
- h. Fully programmable and reviewable settings and parameters.
- i. Suitable for operation at ambient conditions of 32 to 104 degrees F.
- j. The power circuiting shall be separated from the low voltage control circuiting.
- k. Output parameters where indicated:
 - 1) Speed.
 - 2) Trouble indication.
 - 3) Overload indication.

4. Three phase motors rated 1 HP and greater shall be copper winding, re-lubable ball bearings, 1.15 service factor (1.0 service factor for inverter duty motors), premium efficiency, energy-saver type with a guaranteed NEMA nominal full-load efficiency, by IEEE Standard 112 Test Method "B". Efficiency rating shall appear on nameplate, and shall be not less than as follows; per NEMA MG 1 Part 12, Table 12-12, nominal minimum efficiencies:

MINIMUM NOMINAL FULL-LOAD MOTOR EFFICIENCY						
HP	ODP MOTORS (RPM)			TEFC MOTORS (RPM)		
	1200	1800	3600	1200	1800	3600
1.0	82.5	85.5	77.0	82.5	85.5	77.0
1.5	86.5	86.5	84.0	87.5	86.5	84.0

5. Nominal Motor Voltage Table:

Nominal System Voltage	Motor Nameplate
480V - 3 phase	460 volt
240V - 1 phase and 3 phase	230 volt
208V - 1 phase and 3 phase	200 volt
120V - 1 phase	115 volt

6. Motor Application; Provide the following enclosure types unless noted otherwise:

Environment/Location	Motor Enclosure Type
General Purpose	Open drip-proof, TEFC with cast iron frame, or encapsulated
Outdoors, below grade or high humidity	TEFC with cast iron frame
Hazardous	Explosion-proof
Packaged Refrigeration Compressors	Hermetic or semi-hermetic

7. Acceptable Manufacturers: Motors need not all be of the same manufacturer. Subject to the requirements of this section provide products by the following:

- a. General Electric Energy & Saver NEMA Premium Efficiency/(ODP); General Electric XSD Ultra NEMA Premium Efficiency (TEFC).
- b. Century/A.O. Smith Speed Plus
- c. Baldor-Reliance Super E.
- d. Lincoln Ultimate E CTAC.
- e. Marathon XRI.
- f. Siemens GO100A.
- g. Nidec Motor Co. (U.S. Motors) Premium Efficient.

PART 3 - EXECUTION

3.1 MOTORS

- A. Furnished by equipment manufacturer and especially manufactured and/or selected, mounted, and installed for intended use. Install motors accessible for maintenance and belt adjustment.

END OF SECTION

SECTION 23 05 14

MOTOR CONTROLLERS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Provide labor, materials, equipment and services as required for the complete installation and full operation of separately enclosed, preassembled, motor controls, rated 600V and less.

1.2 DEFINITIONS

- A. ASD: Adjustable speed drive motor controller.
- B. CPT: Control power transformer.
- C. DDC: Direct digital control. Building management/control system.
- D. EMI: Electromagnetic interference.
- E. PWM: Pulse width modulated.
- F. RFI: Radio-frequency interference.

1.3 SUBMITTALS

- A. Submit manufacturer's product data for each type and rating of motor controller indicated.
 - 1. Include dimensions, weights, enclosure types, rating capacities, operating characteristics, electrical characteristics, furnished specialties and accessories, mounting and attachment details, method of field assembly, components, and location / size of each field connection.
 - 2. Include diagrams for power, signal, and control wiring.
- B. As part of Operation and Maintenance Data, provide manufacturer's written instructions for testing, adjusting, and reprogramming microprocessor control modules, setting field-adjustable timers, controls, and status and alarm points, and setting field-adjustable overload relays.

1.4 QUALITY ASSURANCE

- A. All methods of construction, details of workmanship, that are not specifically described or indicated in the contract documents, shall be subject to the control and approval of the Owner's Representative. Equipment and materials shall be of the quality and manufacture indicated in their respective sections of the specifications. The equipment specified is based upon the acceptable manufacturers listed. Equipment types, device ratings, dimensions, etc., correspond to the nomenclature dictated by those

manufacturers. Where "or equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval. All equipment shall be tested at the factory. Unless specified elsewhere, standard factory inspection and operational tests will be acceptable.

- B. Installation shall be in accordance with the manufacturer's recommendations, NFPA-70 (National Electrical Code), National Electrical Safety Code (NESC), state codes, local codes, and requirements of authority having jurisdiction.
- C. Equipment shall be designed, manufactured, assembled, and tested in accordance with the latest revisions of applicable published ANSI, NEMA, UL and IEEE Standards.
- D. Equipment and systems shall be NRTL tested and labeled.

1.5 WARRANTY

- A. Provide full system warranty (labor, travel, equipment, etc.) in accordance with Division 1 with a minimum of one (1) year from acceptance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable manufacturers include:
- B. Adjustable Speed Drives (ASDs):
 - 1. ABB (Design Make - ACH580)
 - 2. Yaskawa
 - 3. Square D
 - 4. Allen-Bradley
 - 5. Eaton Corporation
 - 6. Emerson
- C. Manual and Magnetic Motor Controllers:
 - 1. Square-D
 - 2. Cutler Hammer
 - 3. General Electric
 - 4. Allen-Bradley
 - 5. Siemens

2.2 ADJUSTABLE SPEED DRIVE MOTOR CONTROLLER

A. General Requirements for ASDs:

1. ASD Description: adjustable speed drive, consisting of power converter that employs pulse-width-modulated inverter, factory built and tested in an enclosure, with integral disconnecting means and overcurrent and overload protection; arranged to provide self-protection, motor protection, and variable-speed control of one or more induction motors by adjusting output voltage and frequency. Comply with NEMA ICS 7, NEMA ICS 61800-2, and UL 508. Suitable for operation of NEMA MG 1, Design A and Design B motors, as defined by NEMA MG 1.

B. Unit Operating Requirements:

1. ASD shall provide full rated output from a line voltage of plus 10% and minus 10% of nominal voltage. ASD shall continue to operate without faulting from a +30% to -35% of nominal line voltage.
2. Input AC Voltage Unbalance: Not exceeding 5 percent.
3. Input Frequency Tolerance: Plus or minus 5 percent of ASD frequency rating.
4. Minimum Efficiency: 98 percent at 60 Hz, full load.
5. Minimum Primary-Side Power Factor: 98 percent under any load or speed condition.
6. Minimum Short-Circuit Current (Withstand) Rating: 100kA.
7. Ambient Operating Temperature Rating: 5 deg F (-15 deg C) to 104 deg F (40 deg C) minimum.
8. Humidity Rating: To 95 percent (noncondensing) minimum.
9. Altitude Rating: Suitable for intended location with 3300 feet minimum.
10. Vibration Withstand: Comply with NEMA ICS 61800-2.
11. Overload Capability: 1.1 times the base load current for 60 seconds; minimum of 1.3 times the base load current for two seconds.
12. Starting Torque: Minimum 140 percent of rated torque from 3 to 60 Hz.
13. Output Carrier Frequency: Selectable; 1 to 12.5 kHz.
14. Stop Modes: Programmable including fast, free-wheel, and dc injection braking.

- C. Inverter: ASD shall employ a 6 PWM power electronic system, consisting of:
 - 1. Input Section:
 - a. ASD input power stage shall convert three-phase AC line power into a fixed DC voltage via a solid state full wave diode rectifier.
 - 2. Intermediate Section:
 - a. DC bus as a supply to the ASD output Section shall maintain a fixed voltage with filtering and short circuit protection.
 - b. DC bus shall be interfaced with the ASD diagnostic logic circuit, for continuous monitoring and protection of the power components.
 - 3. Output Section:
 - a. Insulated Gate Bipolar Transistors (IGBTs) shall convert DC bus voltage to variable frequency and voltage.
 - b. The ASD shall employ pulse width modulated output technology to power the motor.
- D. Isolated Control Interface: ASDs control input to follow remote-control signal (selectable 0-10VDC, 4-20mA, 0-20mA, and network) over a minimum 40:1 speed range with electrical signal.
- E. Internal Adjustability Capabilities:
 - 1. Minimum Speed: 5 to 25 percent of maximum rpm.
 - 2. Maximum Speed: 80 to 100 percent of maximum rpm.
 - 3. Acceleration: 0.1 to 6000 seconds.
 - 4. Deceleration: 0.1 to 6000 seconds.
 - 5. Current Limit: 30 to minimum of 150 percent of maximum rating.
- F. Self-Protection and Reliability Features:
 - 1. Surge Suppression: Factory installed as an integral part of the ASD, complying with UL 1449 SPD, Type 1 or Type 2.
 - 2. Loss of Input Signal Protection: Selectable response strategy, including speed default to a percent of the most recent speed, a preset speed, or stop; with alarm.
 - 3. Under and overvoltage protection.
 - 4. Inverter overcurrent protection.

5. ASD and Motor-Overload/Over temperature Protection: Microprocessor-based thermal protection system for monitoring ASDs and motor thermal characteristics, and for providing ASD over temperature and motor-overload alarm and trip. The settings shall be selectable utilizing the keypad.
 6. Critical frequency rejection, with three selectable, adjustable dead bands.
 7. Instantaneous line-to-line and line-to-ground overcurrent trips.
 8. Loss-of-phase protection.
 9. Reverse-phase protection.
 10. Short-circuit protection.
 11. Motor over-temperature fault.
 12. Shut down on indication of motor local disconnect switch open position.
- G. Automatic Reset/Restart: Attempt three restarts after drive fault or on return of power after an interruption and before shutting down for manual reset or fault correction; adjustable delay time between restart attempts. Field adjustable for manual restart.
- H. Power-Interruption Protection: To prevent motor from re-energizing after a power interruption until motor has stopped, unless "Bidirectional Autospeed Search" feature is available and engaged.
- I. Bidirectional Autospeed Search: Capable of starting ASD into rotating loads spinning in either direction and returning motor to set speed in proper direction, without causing damage to drive, motor, or load.
- J. Torque Boost: Automatically varies starting and continuous torque to at least 1.5 times the minimum torque to ensure high-starting torque and increased torque at slow speeds.
- K. Motor Temperature Compensation at Slow Speeds: Adjustable current fall-back based on output frequency for temperature protection of self-cooled, fan-ventilated motors at slow speeds.
- L. Integral Input Disconnecting Means: magnetic circuit breaker with pad-lockable, door-mounted handle mechanism.
- M. The ASD shall include a motor flux optimization circuit that will automatically reduce applied motor voltage to the motor to optimize energy consumption and reduce audible motor noise.
- N. The ASD shall provide a programmable loss-of-load (broken belt / broken coupling) Form-C relay output. The drive shall be programmable to signal the loss-of-load condition via keypad warning, Form-C relay output, or over serial communication bus.

- O. Unit Mounted Operator Station: front-accessible, sealed keypad and plain-English-language digital display; allows complete programming, program copying, operating, monitoring, and diagnostic capability.
 - 1. Keypad: In addition to required programming and control keys, include keys for HAND, OFF, and AUTO modes.
 - 2. Security Access: Provide electronic security access to controls through identification and password with at least three levels of access: View only; view and operate; and view, operate, and service. Coordinate the access codes with the Owner.
- P. Status indicators displaying the following conditions:
 - 1. Power on.
 - 2. Run.
 - 3. Overvoltage.
 - 4. Line fault.
 - 5. Overcurrent.
 - 6. External fault.
- Q. Historical Logging Information and Displays
 - 1. Real time clock with current time and date.
 - 2. Running log of total power versus time
 - 3. Total run time.
 - 4. Fault log, maintaining faults with time and date stamp for each.
 - 5. kWh.
- R. Indicating Devices: Digital display mounted flush in ASD door and connected to display ASD parameters including, but not limited to:
 - 1. Output frequency (Hz).
 - 2. Motor speed (rpm).
 - 3. Motor status (running, stop, fault).
 - 4. Motor current (amperes).
 - 5. Motor torque (percent).

6. Fault or alarming status (code).
 7. PID feedback signal (percent).
 8. DC-link voltage (V dc).
 9. Set point frequency (Hz).
 10. Motor output voltage (V ac).
- S. Control Signal Interfaces:
1. Electric Input Signal Interface:
 - a. A minimum of two programmable analog inputs field selectable for 0- to 10-V dc or 4- to 20-mA dc.
 - b. A minimum of six multifunction programmable digital inputs.
 2. Remote Signal Inputs: Capability to accept any of the following speed-setting input signals from the DDC system for HVAC or other control systems:
 - a. 0- to 10-V dc.
 - b. 4- to 20-mA dc.
 - c. Potentiometer using up/down digital inputs.
 - d. Fixed frequencies using digital inputs.
 3. Output Signal Interface: A minimum of one programmable analog output signal (0- to 10-V dc or 4- to 20-mA dc), which can be configured for any of the following:
 - a. Output frequency (Hz).
 - b. Output current (load).
 - c. DC-link voltage (V dc).
 - d. Motor torque (percent).
 - e. Motor speed (rpm).
 - f. Set point frequency (Hz).
 - g. Any aux contacts.

4. Remote Indication Interface: A minimum of three programmable dry-circuit relay outputs (120-VAC, 1 A) for remote indication of the following:
 - a. Motor running.
 - b. Set point speed reached.
 - c. Fault and warning indication (overtemperature or overcurrent).
- T. Interface with DDC System for HVAC: Factory-installed hardware and software shall interface with DDC system for HVAC to monitor, control, display, and record data for use in processing reports. ASD settings shall be retained within ASD's nonvolatile memory.
 1. Provide EIA-485 port as standard. The standard protocols shall be BACnet MS/TP, Modbus RTU and N2. Provide additional ports for any other protocols that are utilized in the project.
- U. Interface so ASD has indication of downstream disconnect switch(es) status (open-closed) and operates accordingly.
- V. ASDs shall have an input inductive reactance either via 5% impedance AC line reactor or a pair of balanced DC chokes, one on the positive and one on the negative side of the DC bus, with an effective input impedance equivalent to a 5% AC line reactor. Any ASDs that do not meet this requirement must have a 5% AC line reactor added, with the reactor mounted in the same enclosure as the ASD.
- W. EMI/RFI Filtering: Onboard filters shall allow ASD assembly to be CE marked; certify compliance with IEC 61800-3 for Category C2.
- X. Accessories:
 1. General Requirements for Control-Circuit and Pilot Devices: NEMA ICS 5; factory installed in ASD enclosure cover unless otherwise indicated.
 2. Reversible NC/NO bypass contactor auxiliary contact(s).
 3. Control Relays: Auxiliary and adjustable solid-state time-delay relays.

2.3 MOTOR STARTERS

- A. Provide motor starters as listed on the Electric Equipment and Control Schedule on the drawings.
- B. Starters, contactors and controllers shall comply with NEMA standards having general purpose NEMA 1 or 1B enclosure unless otherwise called for. Provide explosion proof, weather resistant or watertight construction as required. Starters shall be minimum NEMA size 0 with solid state overloads in each phase sized per NEC, motor full load amperage, service factor, and motor operating conditions.

- C. Pad lock arrangements shall be provided to lock the disconnect device in the "off" position. Magnetic starters shall be provided with a control power transformer with 120V secondary and primary and secondary fusing and be sized to accept the loads imposed there on. Starters shall have LED type pilot lights. Each starter subject to electrical interlock and/or automatic control shall have necessary auxiliary contacts.
- D. Auxiliary Devices: Provide pushbutton stations, pilot lights, devices, relays, transformers, selector switches, electric thermostats, auxiliary starter contacts as required for functions called for. Provide separate relay for each speed to operate electric dampers or other devices as required for multispeed motor circuit.
- E. Manual Motor Starter:
 - 1. Provide all starters with thermal overload(s); and pilot light(s), and handle lock-out provisions. Gang starter with selector switch for multispeed applications. Provide single or 2-pole as required:
 - a. 120 volt, single-pole, surface mounted: Square-D FG-5P and handle guard.
 - b. 120 volt, single-pole, flush mounted: Square-D FS-1P and handle guard.
- F. Manual Motor Starter - Speed Controller: Shall be similar to "Manual Motor Starter," above, except two-gang with motor speed control sized to handle motor indicated, with positive full on and full off bypass of speed control unit.
- G. Manual Starter with Relay: Shall be similar to "Manual Motor Starter," above, except to include a two-gang box with relay sized for load indicated, and hand-off-automatic switch. Connect relay for 120V operation on load side of starter in "automatic" mode. Coordinate connection of Form C maintained contact for control with Mechanical Contractor.
- H. Packaged Control Unit: Shall be furnished and mounted by others, and connected by Electrical Contractor. Generally consists of one or more starters, disconnect switches and additional control devices prewired.

2.4 ENCLOSURES

- A. Enclosures: NEMA 250, to comply with environmental conditions at installed location. Provide Type 1 for dry and clean indoor locations, Type 4X for outdoor locations, Type 4X stainless steel for kitchen and wash-down areas, and Type 12 for areas subject to dust, falling dirt, and dripping non corrosive liquids.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, surfaces, and substrates to receive motor controllers, with installer present, for compliance with requirements for installation tolerances, and other conditions affecting performance of the Work.

- B. Examine motor controllers before installation. Reject motor controllers that are wet, moisture damaged, or mold damaged.
- C. Examine roughing-in for conduit systems to verify actual locations of conduit connections before motor controller installation.
- D. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Wall-Mounted ASDs: Install with tops at uniform height and with disconnect operating handles not higher than 79 inches above finished floor, unless otherwise indicated, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall. For controllers not on walls, provide freestanding racks.
- B. Wall-Mounted Manual and Magnetic Controllers: Install on walls with tops at uniform height, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall. For controllers not at walls, provide freestanding racks.
- C. Floor-Mounting Controllers: Install ASDs on 4-inch nominal thickness concrete base.
 - 1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
 - 2. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - 3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 4. Install anchor bolts to elevations required for proper attachment to supported equipment.
- D. Roof-Mounting Controllers: Install ASD on roofs with tops at uniform height and with disconnect operating handles not higher than 79 inches above finished roof surface unless otherwise indicated, and by bolting units to curbs or mounting on freestanding, lightweight, structural-steel channels bolted to curbs. Seal roof penetrations after raceways are installed.
- E. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- F. Install fuses, heaters in thermal-overload relays (based on actual nameplate full-load amperes) after motors are installed, and install, connect, and fuse thermal-protector monitoring relays furnished with motor-driven equipment.

- G. Maintain minimum clearances and workspace at equipment according to manufacturer's written instructions and NFPA 70.
- H. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.
- I. Setting of Overload Relays: Select and set overloads on the basis of full-load current rating as shown on motor nameplate. Adjust setting value for special motors as required by NFPA 70 for motors that are high-torque, high-efficiency, and so on.
- J. Comply with NECA 1.

3.3 CONTROL WIRING INSTALLATION

- A. Install wiring between ASDs and remote devices and facility's central-control system.
- B. Bundle, train, and support wiring in enclosures.
- C. Connect selector switches and other automatic-control devices where applicable.
- D. Connect selector switches to bypass only those manual- and automatic-control devices that have no safety functions when switches are in manual-control position.
- E. Connect selector switches with control circuit in both manual and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor-overload protectors.

3.4 IDENTIFICATION

- A. Identify motor controllers, components, and control wiring. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs. Label each ASD with engraved nameplate. Label each enclosure-mounted control and pilot device. Identify all items as described in Section 260501

3.5 FIELD QUALITY CONTROL

- A. Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- B. Tests and Inspections for ASDs:
 - 1. Inspect ASDs, wiring, components, connections, and equipment installation.
 - 2. Test insulation resistance for each ASD element, component, connecting motor supply, feeder, and control circuits.
 - 3. Test continuity of each circuit.

4. Verify that voltages at ASD locations are within 10 percent of motor nameplate rated voltages. If outside this range for any motor, notify Owner's Representative before starting the motor(s).
 5. Test each motor for proper phase rotation.
 6. Perform tests according to the Inspection and Test Procedures for Adjustable Speed Drives stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 7. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
 8. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Tests and Inspections for Manual and Magnetic Motor Controllers:
1. Comply with the provisions of NFPA 70B, "Testing and Test Methods" Chapter.
 2. Visual and Mechanical Inspection:
 - a. Compare equipment nameplate data with drawings and specifications.
 - b. Inspect physical and mechanical condition, anchorage, alignment, and grounding, and that the controller is clean.
 - c. Inspect contactors: Verify mechanical operation and contact gap, wipe, alignment, and pressure are according to manufacturer's published data.
 - d. Motor-Running Protection: Verify overload element rating is correct for its application and if protection is provided by fuses, verify correct fuse rating.
 - e. Inspect bolted electrical connections for high resistance using one of the two following methods:
 - 1) Use a low-resistance ohmmeter. Compare bolted connection resistance values with values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
 - 2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method according to manufacturer's published data or NETA ATS Table 100.12. Bolt-torque levels shall be according to manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.
 - f. Verify appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.

- D. Motor controllers will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports, including a certified report that identifies the ASD and describes results. Include notation of deficiencies detected, remedial action taken, and observations made after remedial action.

3.6 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service. Complete installation and startup checks according to manufacturer's written instructions.

3.7 ADJUSTING

- A. Program microprocessors for required operational sequences, status indications, alarms, event recording, and display features. Clear events memory after final acceptance testing and prior to Substantial Completion.
- B. Set field-adjustable switches, auxiliary relays, time-delay relays, timers, and overload-relay pickup and trip ranges.
- C. Adjust carrier frequency for optimal operation with load and conditions.
- D. Adjust the trip settings of instantaneous-only circuit breakers and thermal-magnetic circuit breakers with adjustable, instantaneous trip elements. Initially adjust to 6 times the motor nameplate full-load amperes and attempt to start motors several times, allowing for motor cool-down between starts. If tripping occurs on motor inrush, adjust settings in increments until motors start without tripping. Do not exceed 8 times the motor full-load amperes (or 11 times for NEMA Premium Efficient motors if required). Where these maximum settings do not allow starting of a motor, notify Owner's Representative before increasing settings.

3.8 DEMONSTRATION

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

END OF SECTION

SECTION 23 05 23

VALVES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services as required for the complete installation and related Work designed in Contract Documents.

1.2 SUBMITTAL

- A. Submit product data for valves and accessories.

PART 2 - PRODUCTS

2.1 VALVES

- A. General: Valves shall have following requirements:
 - 1. Working pressure stamped or cast on bodies.
 - 2. Stem packing serviceable without removing valve from line.
 - 3. Valves on insulated services shall have handle extensions so that the handle is fully beyond the insulation jacketing.
 - 4. Where possible, all valves of like type shall be of a single manufacturer.
- B. Acceptable Manufacturers:
 - 1. Gate, Globe, and Check Valves: Apollo, Hammond, Milwaukee, Nibco, Watts,.
 - 2. Ball Valves: Apollo, Hammond, Jamesbury, Milwaukee, Watts, Nibco, .
 - 3. To establish a standard of quality and to identify features, certain manufacturer's numbers are given in the following paragraphs.
- C. Gate Valves:
 - 1. 2 in. and Smaller: Bronze body, bronze solid wedge disc, rising stem, threaded or union bonnet, threaded ends, 125 SWP, Milwaukee 1152.
- D. Globe Valves:
 - 1. 2 in. and Smaller: Bronze body, renewable composition or bronze disc, union bonnet, rising stem, threaded or soldered ends, 150 SWP, Milwaukee 590.

E. Check Valves:

1. 2 in. and Smaller: Bronze, swing check, threaded or soldered ends, 125 SWP, Milwaukee 1509.

F. Ball Valves for Water Service:

1. For chilled and hot water systems 3 in. and under: Bronze body with hardened chrome-plated brass ball, glass reinforced PTFE seats, full porting, 600 lb., W.O.G., adjustable packing gland, insulated handle, screwed or soldered ends, blowout proof stem. Provide handle extension on insulated services.
2. Provide extended operations handle on non-thermal conductive material and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.

G. Hose Thread Drain Valves:

1. Ball valve, bronze body, hardened chrome ball with hose thread end, cap and chain.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Provide valves of type called for and where required to service equipment.
2. Provide at major building and systems sections.
3. Provide chain wheels, guides, and chain loops for valves, where called for or in Mechanical Rooms where valves are mounted higher than 8'-0" AFF.
4. Isolating valves for individual fan convectors, room units, terminal units, or other similar apparatus may be inside cabinet or at connection to branch mains where accessible.
5. Locate valves with handles at horizontal position when 5 ft. or more above the floor, for greater visibility and easier use. Otherwise, locate valves with handles at or above horizontal position. Swing check valves in upright position only.
6. Ball valves may be used for water service through 3 in., unless otherwise noted.
7. Provide hose threaded valves at low points, strainers, equipment, and as called for.

END OF SECTION

SECTION 23 05 93

TESTING, ADJUSTING AND BALANCING

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services to perform operations required for complete adjusting and balancing Work as required in Contract Documents.
- B. This Section specifies the requirements and procedures of mechanical systems testing, adjusting, and balancing. Requirements include measurement and establishment of the fluid quantities of the mechanical systems as required to meet design specifications, and recording and reporting the results.
- C. Test, adjust, and balance the following mechanical systems:
 - 1. Airside
 - a. Supply air systems, all pressure ranges; including constant volume and variable volume systems.
 - b. Return air systems.
 - c. Exhaust air systems.
 - 2. Hydronics
 - a. Constant flow systems.
 - b. Variable flow systems.
- D. This Section does not include:
 - 1. Testing boilers and pressure vessels for compliance with safety codes;
 - 2. Specifications for materials for patching mechanical systems;
 - 3. Specifications for materials and installation of adjusting and balancing devices. If devices must be added to achieve proper adjusting and balancing, refer to the respective system sections for materials and installation requirements.
 - 4. Requirements and procedures for piping and ductwork systems leakage tests.

1.2 SUBMITTALS

- A. Provide information in report form listing items required by specifications. Results shall be guaranteed. Contractor shall be subject to recall to site to verify report information before acceptance of the report by the Owner's Representative.

- B. Strategies and Procedures Plan: Within thirty (30) days of Contractor's Notice to Proceed, submit testing and balancing strategies and step-by-step procedures as specified in Section 3.1.B, "Preparation", and consistent with those listed in Part 3 of this specification.
- C. System Readiness Checklists: Within thirty (30) days of Contractor's Notice to Proceed, AABC agency shall provide system readiness checklists as specified in Section 3.1.C, "Preparation", to be used and filled out by the installing contractors verifying that systems are ready for Testing and Balancing.
- D. Examination Report: Provide a summary report of the examination review required in Section 3.1.D to the Engineer, documenting issues that may preclude the proper testing and balancing of the systems.
- E. Certified report format shall consist of the following:
 - 1. Title sheet with job name, contractor, engineer, date, balance contractor's name, address, telephone number and contact person's name and the balancing technician's name.
 - 2. Individual test sheets for air handlers, terminal units, air distribution, exhaust fans, duct traverses, pumps, air handling coils, reheat coils, radiation, convectors, cabinet unit heaters and unit ventilators.
 - 3. Manufacturer's pump and fan curves for equipment installed with design and actual operating conditions indicated.
 - 4. TAB Report Forms: Use standard forms from AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems" or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" or TABB's "Testing, Adjusting and Balancing Bureau".

1.3 DEFINITIONS

- A. System testing, adjusting and balancing is the process of checking and adjusting all the building environmental systems to produce the design objectives. It includes:
 - 1. The balance of air and water distribution;
 - 2. Adjustment of total system to provide design quantities;
 - 3. Electrical measurement;
 - 4. Verification of performance of all equipment and automatic controls.
- B. Test: To determine quantitative performance of equipment.
- C. Adjust: To regulate the specified fluid flow rate and air patterns at the terminal equipment (e.g., reduce fan speed, throttling).

- D. Balance: To proportion flows within the distribution system (submains, branches, and terminals) according to specified design quantities.
- E. Procedure: Standardized approach and execution of sequence of work operations to yield reproducible results.
- F. Report Forms: Test data sheets arranged for collecting test data in logical order for submission and review. This data should also form the permanent record to be used as the basis for required future testing, adjusting, and balancing.
- G. Terminal: The point where the controlled fluid enters or leaves the distribution system. There are supply inlets on water terminals, supply outlets on air terminals, return outlets on water terminals, and exhaust or return supply or outside air inlets or outlets on terminals such as registers, grilles, diffusers, and louvers.
- H. Main: Duct or pipe containing the system's major or entire fluid flow.
- I. Submain: Duct or pipe containing part of the systems' capacity and serving two or more branch mains.
- J. Branch Main: Duct or pipe serving two or more terminals.
- K. Branch: Duct or pipe serving a single terminal.

1.4 QUALIFICATIONS

- A. Follow procedures and methods published by one or more of the following:
 - 1. Associated Air Balance Council (AABC) or National Environmental Balancing Bureau (NEBB) or Testing, Adjusting and Balancing Bureau (TABB).
 - 2. Individual manufacturer requirements and recommendations.
- B. Maintain qualified personnel at project for system operation and trouble shooting. TAB contractor shall change sheaves and perform mechanical adjustments in conjunction with balancing procedure.
- C. Balancing contractor shall be current member of AABC, NEBB, or TABB.
- D. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in the *AABC National Standards for Total System Balance and SMACNA TAB Procedural Guide*.

1.5 GENERAL REQUIREMENTS

- A. Before concealment of systems visit the job site to verify and advise on type and location of balancing devices and test points. Make changes as required to balance facilities.
- B. Place systems in satisfactory operating condition.
 - 1. Adjusting and balancing shall be accomplished as soon as the systems are complete and before Owner takes possession.

2. Initial adjustment and balancing to quantities as called for or as directed by the engineer, to satisfy job conditions.
3. All outdoor conditions (Db, Wb, and a description of the weather conditions) at the time of testing shall be documented in the report.
4. Airside
 - a. Prior to balancing, adjust balancing devices for full flow and replace temporary filters.
 - b. Provide sheaves and belts as required to meet system performance requirements for all belt-driven fan motors 10 HP and greater. Adjust and align sheaves to obtain proper settings and operation. Verify motors are not overloading.
 - c. Installing contractor shall replace dampers in new systems and identify dampers in existing systems that cannot be manipulated to satisfy balancing requirements.
 - d. Traverse main ducts to determine total system air quantities after all outlets have been set prior to final adjustment if the system does not meet design requirements. A sum of room CFM's is not acceptable.
 - e. If duct construction and/or installation prohibits proper traverse readings, provide coil measurements at main coils and/or fresh air intake traverse with units operating in 100% outside air mode (where applicable).
5. Hydronics
 - a. Prior to balancing, adjust balancing devices for full flow; fill, vent and clean hydronic systems, replace temporary strainers.
 - b. Installing contractor shall replace balancing cocks and flow balancers in new systems and identify flow balancers and balancing cocks in existing systems that cannot be manipulated to satisfy balancing requirements.

1.6 CONTRACTOR RESPONSIBILITIES

- A. Provide Testing and Balancing agency one complete set of contract documents, change orders, and approved submittals in digital and hard copy formats.
- B. Controls contractor shall provide required BAS hardware, software, personnel and assistance to Testing and Balancing agency as required to balance the systems. Controls Contractor shall also provide trending report to demonstrate that systems are complete.
- C. Coordinate meetings and assistance from suppliers and contractors as required by Testing and Balancing agency.
- D. Installing contractor shall replace or repair insulation as required by Testing and Balancing agency.

- E. Have the HVAC systems at complete operational readiness for Testing and Balancing to begin. As a minimum verify the following:
1. Airside:
 - a. Provide additional dampers, sheaves and belts as required by Testing and Balancing agency.
 - b. Flag all manual volume dampers with fluorescent or other high-visibility tape.
 - c. Provide access to all dampers, test ports, nameplates and other appurtenances as required by Testing and Balancing agency.
 - d. All ductwork is complete with all terminals installed.
 - e. All volume, smoke and fire dampers are open and functional.
 - f. Clean filters are installed.
 - g. All fans are operating, free of vibration, and rotating in correct direction.
 - h. ASD start-up is complete and all safeties are verified.
 - i. System readiness checklists are completed and returned to Testing and Balancing agency.
 2. Hydronics:
 - a. Provide additional valves as required by Testing and Balancing agency.
 - b. Provide access to all valves, test ports, nameplates and other appurtenances as required by Testing and Balancing agency.
 - c. Piping is complete with all terminals installed.
 - d. Water treatment is complete.
 - e. Systems are flushed, filled and air purged.
 - f. Strainers are pulled and cleaned.
 - g. Control valves are functioning per the sequence of operation.
 - h. All shutoff and balance valves have been verified to be 100% open.
 - i. Pumps are started, and proper rotation is verified.
 - j. Pump gauge connections are installed directly at the pump inlet and outlet flange or in discharge and suction pipe prior to any valves or strainers.

- k. ASD start-up is complete and all safeties have been verified.
 - l. System readiness checklists are completed and returned to Testing and Balancing agency.
- F. Promptly correct deficiencies identified during Testing and Balancing.
- G. Maintain a construction schedule that allows the Testing and Balancing agency to complete work prior to occupancy.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Provide tools, ladders, recording meters, gauges, thermometers, velometers, anemometers, Pitot tubes, inclined gauge manometers, magnehelic gauges, amprobes, voltmeters, psychrometers and tachometers required.
- B. Instrumentation Calibration: Calibrate instruments at least every six (6) months or more frequently if required by instrument manufacturer.
 - 1. Keep an updated record of instrument calibration that indicates date of calibration and the name of party performing instrument calibration.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine Bid Documents and submittals and notify Owner's Representative and Engineer of any questions regarding balancing.
 - 1. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper Testing and Balancing of systems and equipment.
 - 2. Examine the approved submittals for HVAC systems and equipment.
 - 3. Examine equipment performance data including fan and pump curves.
- B. Prepare a Testing and Balancing Strategies and Procedures Plan that includes:
 - 1. Equipment and systems to be tested.
 - 2. Strategies and step-by-step procedures for balancing the systems.
 - 3. Instrumentation to be used.
 - 4. Sample forms with specific identification for all equipment.

- C. Prepare system-readiness checklists, as described in the *AABC National Standards for Total System Balance and SMACNA TAB Procedural Guide*, for use by contractors in verifying system readiness for Testing and Balancing. These shall include, at a minimum:
1. Airside:
 - a. All ductwork is complete with all terminals installed.
 - b. All volume, smoke and fire dampers are open and functional.
 - c. Clean filters are installed.
 - d. All fans are operating, free of vibration, and rotating in correct direction.
 - e. Permanent electrical power wiring and ASD start-up is complete and all safeties are verified.
 - f. Automatic temperature-control systems are operational.
 - g. Ceilings are installed.
 - h. Windows and doors are installed.
 - i. Suitable access to balancing devices and equipment is provided.
 - j. Equipment and duct access doors are securely closed.
 2. Hydronics:
 - a. Piping is complete with all terminals installed.
 - b. Water treatment is complete.
 - c. Systems are flushed, filled and air purged.
 - d. Strainers are pulled and cleaned.
 - e. Control valves are functioning per the sequence of operation.
 - f. All shutoff and balance valves have been verified to be 100% open.
 - g. Pumps are started and proper rotation is verified.
 - h. Pump gauge connections are installed directly at the pump inlet and outlet flange or in discharge and suction pipe prior to any valves or strainers.
 - i. Permanent electrical power wiring and ASD start-up is complete and all safeties are verified.

- j. Suitable access to balancing devices and equipment is provided.
- D. Examine construction and notify Owner's Representative and Engineer of outstanding issues related to balancing, as part of "Examination Report" submittal.
 - 1. Examine HVAC equipment and verify that bearings are greased, belts are aligned and tight, clean permanent filters are installed, and controls are ready for operation.
 - 2. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected, configured by the controls contractor and functioning.
 - 3. Airside
 - a. Examine ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they are properly separated from adjacent areas.
 - b. Examine systems for installed balancing devices, such as test ports, gage cocks, flow-control devices, and manual volume dampers prior to pressure testing. Note the locations of devices that are not accessible for testing and balancing.
 - 4. Hydronics
 - a. Examine strainers to verify that Mechanical Contractor has replaced startup screens with permanent screens and that all strainers have been cleaned.
 - b. Examine two-way valves for proper installation and function.
 - c. Examine three-way valves for proper installation for their intended function of diverting or mixing fluid flows.
 - d. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
 - e. Examine air vents to verify that mechanical contractor has removed all air from all hydronic systems.
 - f. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings and weld-o-lets prior to pressure testing. Note the locations of devices that are not accessible for testing and balancing.

3.2 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems" or NEBB's "Procedural Standards for

Testing, Adjusting, and Balancing of Environmental Systems" or TABB's "SMACNA TAB Procedural Guide" and this Section.

- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to insulation Specifications for this Project.
- C. Mark equipment and balancing device settings with paint or other suitable, permanent identification material, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.3 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. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. For variable-air-volume systems, develop a plan to simulate diversity.
- D. Determine the best locations in main and branch ducts for accurate duct airflow measurements.
- E. Check airflow patterns from the outside-air louvers and dampers and the return and exhaust-air dampers, through the supply-fan discharge and mixing dampers.
- F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- G. Verify that motor starters are equipped with properly sized thermal protection.
- H. Check dampers for proper position to achieve desired airflow path.
- I. Check for airflow blockages.
- J. Check condensate drains for proper connections and function.
- K. Check for proper sealing of air-handling unit components.
- L. Check for proper sealing of air duct system.

3.4 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 fan static pressures to determine actual static pressure as follows:
 - a. Measure outlet static pressure as far downstream from the fan as practicable 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 duct as near the fan as possible, upstream from 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.
 2. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and treating equipment.
 3. Measure static pressures entering and leaving other devices such as sound traps, heat recovery equipment, and air washers, under final balanced conditions.
 4. Compare design data with installed conditions to determine variations in design static pressures versus actual static pressures. Compare actual system effect factors to identify where variations occur. Recommend corrective action to align design and actual conditions.
 5. Obtain approval from Engineer for adjustment of fan speed higher or lower than indicated speed. Make required adjustments to sheaves sizes, motor sizes, and electrical connections to accommodate fan-speed changes.
 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 modes to determine the maximum required brake horsepower.
- B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.
1. Measure static pressure at a point downstream from the balancing damper and adjust volume dampers until the proper static pressure is achieved.
 - a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.
 2. Re-measure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.

- C. Measure terminal outlets and inlets without making adjustments.
 - 1. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.
- D. Adjust terminal outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using volume dampers rather than extractors and the dampers at air terminals.
 - 1. 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.
 - 2. Adjust patterns of adjustable outlets for proper distribution without drafts.

3.5 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

- A. Prepare test reports for pumps, coils and heat exchangers. Obtain approved submittals and any manufacturer-recommended testing procedures. Cross check the summation of required coil and heat exchanger gpm's with pump design flow rate.
- B. Verify that hydronic systems are ready for testing and balancing:
 - 1. Check liquid level in expansion tank and verify that tank is set to specified pressure for system fill and expansion.
 - 2. Check that makeup water has adequate pressure to highest vent.
 - 3. Check that control valves are in their proper positions.
 - 4. Check that air has been purged from the system.
 - 5. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
 - 6. Verify that motor starters are equipped with properly sized thermal protection.

3.6 PROCEDURES FOR CONSTANT-FLOW HYDRONIC SYSTEMS

- A. Adjust pumps to deliver total design gpm.
 - 1. Measure total water flow.
 - a. Position valves for full flow through coils.
 - b. Measure flow by main flow meter, if installed.
 - c. If main flow meter is not installed, determine flow by pump total dynamic head (TDH) or exchanger pressure drop.

2. Measure pump TDH as follows:
 - a. Measure discharge pressure directly at the pump outlet flange or in discharge pipe prior to any valves or fittings.
 - b. Measure inlet pressure directly at the pump inlet flange or in suction pipe prior to any valves or strainers.
 - c. Convert pressure to head and correct for differences in gauge heights.
 - d. On single stage centrifugal pumps, verify pump impeller size by measuring the TDH with the discharge valve closed. Note the point on manufacturer's pump curve at zero flow and verify that the pump has the intended impeller size.
 - e. With all valves open, read pump TDH. Adjust pump discharge valve until design water flow is achieved.
 3. Monitor motor performance during procedures and do not operate motor in an overloaded condition.
- B. Adjust flow measuring devices installed in mains and branches to design water flows.
1. Measure flow in main and branch pipes.
 2. Adjust main and branch balance valves for design flow.
 3. Re-measure each main and branch after all have been adjusted
- C. Adjust flow measuring devices installed at terminals for each space to design water flows.
1. Measure flow at all terminals.
 2. Adjust each terminal to design flow.
 3. Re-measure each terminal after all have been adjusted, .
 4. Position control valves to bypass the coil and adjust the bypass valve to maintain design flow.
 5. Perform temperature tests after all flows have been balanced, .
- D. For systems with pressure-independent valves at the terminals:
1. Measure differential pressure and verify that it is within manufacturer's specified range.
 2. Perform temperature tests after all flows have been verified.

- E. For systems without pressure-independent valves or flow measuring devices at the terminals:
 - 1. Measure and balance coils by either coil pressure drop or temperature method.
 - 2. If balanced by coil pressure drop, perform temperature tests after all flows have been verified.
- F. Verify final system conditions as follows:
 - 1. Re-measure and confirm that total water flow is within design.
 - 2. Re-measure all final pump operating data, TDH, volts, amps, static profile.
 - 3. Mark all final settings.
- G. Verify that all memory stops have been set.

3.7 PROCEDURES FOR VARIABLE-FLOW HYDRONIC SYSTEMS

- A. Adjust the variable-flow hydronic system as follows:
 - 1. Verify that the differential pressure (DP) sensor is located per the Contract Documents.
 - 2. Determine if there is diversity in the system.
- B. For systems with no diversity:
 - 1. Follow procedures outlined for constant-flow hydronic systems.
 - 2. Prior to verifying final system conditions, determine the system DP setpoint.
 - 3. If the pump discharge valve was used to set total system flow with ASD at 60 Hz, at completion open discharge valve 100% and allow ASD to control system DP setpoint. Record pump data under both conditions.
 - 4. Mark all final settings and verify that all memory stops have been set.
- C. For systems with diversity:
 - 1. Determine diversity factor.
 - 2. Simulate system diversity by closing required number of control valves, as approved by the design Engineer.
 - 3. Follow procedures outlined for constant flow hydronic systems.
 - 4. Open control valves that were shut. Close a sufficient number of control valves that were previously open to maintain diversity, and balance the terminals that were just opened.

5. Prior to verifying final system conditions, determine the system DP setpoint.
 6. If the pump discharge valve was used to set total system flow with ASD at 60 Hz, at completion open discharge valve 100% and allow ASD to control system DP setpoint. Record pump data under both conditions.
 7. Mark all final settings and verify that all memory stops have been set.
- D. For systems with pressure-independent valves at the terminals:
1. Measure differential pressure and verify that it is within manufacturer's specified range.
 2. Perform temperature tests after all flows have been verified.

3.8 TOLERANCES

- A. Set HVAC system's flow rates within the following tolerances:
1. Airside
 - a. Supply, Return, and Exhaust Fans: Zero to plus 10 percent.
 - b. Air Outlets and Inlets: Plus or minus 10 percent.
 - c. Minimum Outside Air: Zero to plus 10 percent.
 - d. Maintaining pressure relationships as designed shall have priority over the tolerances specified above.
 2. Hydronics
 - a. Heating-Water Flow Rate: Plus or minus 10 percent.
 - b. Cooling-Water Flow Rate: Plus or minus 10 percent.

3.9 FINAL TEST AND BALANCE REPORT

- A. The report shall be a complete record of the HVAC system performance, including conditions of operation, items outstanding, and any deviations found during the Testing and Balancing process. The final report also provides a reference of actual operating conditions for the owner and/or operations personnel. All measurements and test results that appear in the reports must be made on site and dated by the technicians or Test and Balance Engineers.
- B. The report must be organized by systems and shall include the following information as a minimum:
1. Title Page:
 - a. AABC or NEBB Certified Company Name.

- b. Company Address.
 - c. Company Telephone Number.
 - d. Project Identification Number.
 - e. Location.
 - f. Project Architect.
 - g. Project Engineer.
 - h. Project Contractor.
 - i. Project Number.
 - j. Date of Report.
 - k. Certification Statement.
 - l. Name, Signature, and Certification Number.
 - 2. Table of Contents.
 - 3. National Performance Guaranty.
 - 4. Report Summary:
 - a. The summary shall include a list of items that do not meet design tolerances, with information that may be considered in resolving deficiencies.
 - 5. Instrument List:
 - a. Type
 - b. Manufacturer
 - c. Model
 - d. Serial Number
 - e. Calibration Date
- C. Required Airside data - Test, adjust and record the following:
- 1. Motors:
 - a. RPM
 - b. BHP
 - c. Full load amps
 - d. Sheave sizes, number and size of belts
 - e. Shaft diameter
 - f. Complete nameplate data

2. Fans:
 - a. Cfm
 - b. RPM
 - c. Suction static pressure
 - d. Discharge static pressure
 - e. Sheave sizes, number and size of belts, key sizes, shaft, diameter
 - f. Complete nameplate data
 - g. Sketch of system's inlet and outlet connections
 - h. Location of test port
3. Duct: Traverse Zones:
 - a. Cfm
 - b. Static Pressure
4. Fan coil units (In both minimum O.A. and economizer modes):
 - a. Minimum outdoor air Cfm
 - b. Total discharge and return Cfm
 - c. Static profile thru unit
 - d. Complete nameplate data
5. Coil:
 - a. Entering air temperature (DB/WB)
 - b. Leaving air temperature (DB/WB)
 - c. Static differential
 - d. Face velocity and area
 - e. Cfm
 - f. Complete nameplate data
6. Registers/Grilles/Diffusers:
 - a. Cfm
 - b. Set, adjust and record air flow pattern
7. Filter Banks:
 - a. Nameplate data
 - b. Static pressure drop
- D. Required Fluid Data: Test, adjust and record the following:
 1. Heat Transfer Devices: Including, but not limited to air handlers, convectors, fin tube radiation sections, unit ventilators, fan coils, cabinet heaters, unit heaters, heat pumps, heat exchangers.
 - a. GPM (coil and bypass)
 - b. Entering water temperature
 - c. Leaving water temperature

- d. Water pressure drop
 - e. Complete nameplate data
- E. The final test and balance report shall be provided as a formal project submittal for review by the Engineer of Record.

END OF SECTION 23 05 93

SECTION 23 07 10

INSULATION

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents.

1.2 SUBMITTAL

- A. Submit product data, product description, manufacturer's installation instructions.
- B. Submit schedule of types and thicknesses for each application, and location of materials.

1.3 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 232010 - Piping Systems and Accessories.

PART 2 - PRODUCTS

2.1 GENERAL

- A. See Exhibits at the end of this section for where insulating materials shall be applied, thickness, jacketing and remarks.
- B. Comply with 2020 Energy Conservation Code of New York State
- C. Insulation, jackets, adhesive, and coatings shall comply with the following:
 - 1. Products shall not contain asbestos, lead, mercury, or mercury compounds.
 - 2. Insulation, including jackets, finishes and adhesives on the exterior surfaces of ducts, pipes, and equipment, shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less, when tested in accordance with ASTM E84 or UL 723.
 - a. Plenums: Insulation materials shall be noncombustible or listed and labeled per ASTM E84 or UL 723.
 - b. Treatment of jackets or facing for flame and smoke safety must be permanent. Water-soluble treatments are not permitted.
 - 3. All adhesives, coatings and sealants used for insulation in the interior of the building shall comply with the maximum Volatile Organic Compound (VOC) limits as called for in the current version of U.S. Green Building Council LEED Credits EQ 4.1 and EQ 4.2.

4. Provide materials which are the standard products of manufacturers regularly engaged in the manufacture of such products and that essentially duplicate items that have been in satisfactory use for at least two (2) years prior to bid opening. Provide insulation systems in accordance with the approved MICA or NAIMA Insulation Standards.
5. Insulation shall be clearly marked with manufacturer's name, identification of installed thermal resistance (R) value, out-of-package R value, flame spread and smoke developed indexes in accordance with Energy Code requirements.
6. Products that come into contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested in accordance with ASTM C 871.
7. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable in accordance with ASTM C 795.

2.2 ACCEPTABLE MANUFACTURERS

- A. Flexible Elastomeric: Armacell AP ArmaFlex/FS (Indoor and Outdoor), Aeroflex (Indoor and Outdoor), K-Flex Insul-Lock (Indoors) or approved equal.
- B. Fiberglass: Johns Manville, Knauf/Manson, Owen-Corning, or approved equal.
- C. Polyisocyanurate: Johns Manville Trymer 25-50 PIR (Indoors), 2000XP (Outdoors), HiTherm, or approved equal.
- D. Jacketing: Johns Manville (PVC, Aluminum,), Polyguard Pro (Alumaguard), or approved equal.
- E. Adhesives, Coatings, Mastics, Sealants: Childers, Foster, or approved equal.

2.3 FLEXIBLE ELASTOMERIC

- A. Closed-cellular, sponge or expanded-rubber with integral vapor barrier.
- B. Tube and Sheet:
 1. Product meeting ASTM C 534, Type I/II Grade 1.
 2. 'K' Value at 75°F mean temperature
 - a. 0.245 BTU-in/ft² hr. °F (up to 1 in. wall thickness).
 - b. 0.28 BTU-in/ft² hr. °F (1-1/2 in. to 2 in. wall thickness).
 3. Density: As required to meet specified R-value in Exhibit, unless otherwise noted.

2.4 FLEXIBLE FIBERGLASS

- A. Glass fibers bonded with a resin.
- B. Blanket:
 - 1. Product meeting ASTM C 553 Types I, II and III, and ASTM C 1290; Greenguard compliant.
 - 2. 'K' Value: 0.27 BTU-in/ft² hr. °F at 75°F mean temperature.
 - 3. Maximum Service Temperature (Faced): 250°F.
 - 4. Vapor Retarder Jacket: FSK conforming to ASTM C 1136 Type II.
 - 5. Density: As required to meet specified R-value in Exhibit, unless otherwise noted.

2.5 RIGID FIBERGLASS

- A. Pre-formed glass fibers bonded with a thermosetting resin.
- B. Pipe:
 - 1. Product meeting ASTM C 547, ASTM C 585, and ASTM C 795; rigid, molded, noncombustible.
 - 2. 'K' Value: 0.23 BTU-in/ft² hr. °F at 75°F mean temperature.
 - 3. Maximum Service Temperature: 1000°F.
 - 4. Vapor Retarder Jacket: Factory applied ASJ/SSL conforming to ASTM C 1136 Type I, secured with self-sealing longitudinal laps and butt strips.
 - 5. Density: As required to meet specified R-value in Exhibit, unless otherwise noted.
 - 6. Field applied PVC Fitting Covers with Flexible Fiberglass Insulation: Proto Corporation 25/50 or Indoor/Outdoor, UV resistant fittings, jacketing and accessories, white or colored. Fitting cover system consists of pre-molded, high-impact PVC materials with blanket type fiberglass wrap inserts. Blanket fiberglass wrap inserts shall have a thermal conductivity ('K') of 0.26 at 75°F mean temperature. Closures to be stainless steel tacks, matching PVC tape, or PVC adhesive per manufacturer's recommendations.
- C. Board:
 - 1. Product meeting ASTM C 612 Type IA and IB. Maximum Service Temperature: 450° F.
 - 2. 'K' Value: 0.24 BTU-in/ft² hr. °F at 75°F mean temperature.

3. Vapor Retarder Jacket:
 - a. ASJ conforming to ASTM C 1136 Type I
 - b. FSK or PSK conforming to ASTM C 1136 Type II.
4. Density: As required to meet specified R-value in Exhibit, unless otherwise noted.

2.6 FIELD APPLIED JACKETS

- A. PVC: High-impact UV resistant PVC; roll stock ready for shop or field cutting and forming.
 1. Thickness: 30 mil.
 2. PVC Jacket Color: White.

2.7 ADHESIVES, COATINGS, MASTICS, SEALANTS

- A. Provide per manufacturer product requirements for associated system and application/installation location.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

- A. All materials shall be installed by skilled labor regularly engaged in this type of work and installed in strict accordance with manufacturer's recommendations, building codes, and industry standards. Install insulation materials, forms, vapor barriers or retarders, jackets, and of thicknesses required for each item of pipe system per manufacturer requirements. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- B. Locate insulation and cover seams in the least visible location. All surface finishes shall be extended in such a manner as to protect all raw edges, ends and surfaces of insulation. No glass fibers shall be exposed to the air. Install insulation with longitudinal seams at top and bottom of horizontal runs. Install multiple layers of insulation with longitudinal and end seams staggered and with the least number of joints possible.
- C. All pipe and duct insulation shall be continuous through hangers.
- D. Provide thermal insulation on clean, dry surfaces and after piping, ductwork and equipment (as applicable) have been tested. Do not cover pipe joints with insulation until required tests are completed.
- E. All cold surfaces that may "sweat" must be insulated. Vapor barrier must be maintained; insulation shall be applied with a continuous, unbroken moisture and vapor seal. All hangers, supports, anchors, or other projections that are secured to cold surfaces shall be insulated and vapor sealed to prevent condensation.

- F. Items such as boiler manholes, handholds, clean-outs, ASME stamp, and manufacturers' nameplates, may be left uninsulated unless omitting insulation would cause a condensation problem. When such is the case, appropriate tagging shall be provided to identify the presence of these items. Provide neatly beveled edges at interruptions of insulation.
- G. Provide protective insulation as required to prevent personnel injury: Piping from zero to seven feet above all floors and access platforms including hot (above 140°F) piping and any other related hot surface.
- H. If any insulation material has become wet because of transit or job site exposure to moisture or water, the contractor shall not install such material, and shall remove it from the job site.
- I. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- J. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches in similar fashion to butt joints.
- K. For above-ambient services, do not install insulation to the following:
 - 1. Vibration-control devices.
 - 2. Testing agency labels and stamps.
 - 3. Nameplates and data plates.

3.2 PENETRATIONS

- A. Aboveground Exterior Wall and Roof Penetrations: Install insulation continuously through penetrations.
 - 1. Seal penetrations with flashing sealant.
 - 2. For applications requiring only indoor insulation, terminate insulation above through surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 - 3. Extend jacket of outdoor insulation outside wall/roof flashing at least 2-in. beyond flashing. Seal jacket to flashing with flashing sealant per roofing manufacturer requirements.
- B. Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.
- C. Interior Floor, Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

- D. Fire-Rated Floor, Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

3.3 PIPE INSULATION

- A. All pipes shall be individually insulated. Cover valves, fittings and similar items in each piping system with insulation as applied to adjoining pipe run. Extra care must be taken on piping appurtenances to insure a tight fit to the piping system.
- B. Piping insulation is allowed to be reduced in thickness only when a specific UL assembly detail for piping passing thru a rated wall indicates a maximum insulation thickness that is less than this specification section calls for. In this case reduce the insulation thickness just for the rated wall penetration. The reduction of insulation thickness shall be limited to the length of the penetration only.
- C. Coordinate insulation installation requirements for heat tracing that may apply.

3.4 DUCTWORK INSULATION

- A. Provide external thermal insulation for ductwork. Not required where ducts have internal acoustical insulation. Make special provisions at dampers, damper motors, thermometers, instruments, and access doors.
- B. Provide factory ASJ jacket for ductwork required to be insulated and to be painted.

3.5 EXISTING INSULATION

- A. Patch existing insulation damaged during the course of the work.

EXHIBIT "I" - PIPE INSULATION MATERIALS

<u>SERVICE</u>	<u>INSULATION MATERIAL</u>	<u>THICKNESS</u>	<u>REMARKS</u>
Dual temperature water (greater than 40°F and less than 200°F)	Rigid Fiberglass	1-1/2 in. and Larger: 2 in. 1-1/4 in. and Smaller: 1-1/2 in.	Provide with vapor barrier per cold water service requirements.
Refrigeration Suction Line Piping (Heating mode; temperature up to 200°F)	Flexible Elastomeric	1-1/2 in. and Larger: 2 in. 1-1/4 in. and Smaller: 1-1/2 in.	
Refrigeration Suction Line Piping (Cooling only mode; temperature up to 60°F)	Flexible Elastomeric	7/8 in. and Larger: 1 in. 3/4 in. and Smaller: 1/2 in.	
Refrigeration Liquid Line Piping (Heating or cooling mode; temperature up to 140°F)	Flexible Elastomeric	1-1/2 in. and Larger: 1-1/2 in. 1-1/4 in. and Smaller: 1 in.	
Concealed AC unit condensate drains	Flexible Elastomeric	All Sizes: 1/2 in.	

END OF SECTION

SECTION 23 09 23

BUILDING MANAGEMENT SYSTEM - DDC LOGIC

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Provide labor, materials, equipment and services as required for the complete installation designed in Contract Drawings. Extend existing Building Management System (BMS), to perform the functions described in this Section. All new equipment shall be compatible with the existing system. Provide wiring and conduit required to connect devices furnished as a part of, or accessory to, this automatic control system. Control wiring is defined as wiring up to and including 120 volts. Install wiring in accordance with requirements of "Electrical Wiring" in Section 230504, and the National Electrical Code. Provide all required devices for proper system operation, including special electrical switches, transformers, relays, pushbutton stations, etc.
1. All Actuation of valves and dampers shall be electric unless specifically called out elsewhere in the specifications or drawings.
- B. The BMS System shall have the following capabilities as described in these specifications:
1. The network controllers and operator's workstations shall be connected directly to the Owner's Ethernet Network. The network controller shall also contain SNMP for integration to the Owner's Network Controllers System.
 2. Off site access for Owner's personnel shall be provided and shall have full workstation capability from remote location. Identical graphical displays shall be provided for offsite access to match the displays at the on-site Operator's Workstation. Connection to the site shall be via a high speed Ethernet connection.
 3. The Network Controller must act directly as the WEB server. It must directly generate the HTML code to the requesting user (i.e. WEB browser), eliminating the need and reliance on any PC-based WEB server hardware or software.
 4. The system shall be capable of sending both emails and text messages for alarms. A minimum of six (6) email addresses and phone numbers (for text messages) must be supported by the system. Coordinate with the Owner for email addresses, phone numbers and alarms.
 5. All system variables in the temperature control system shall be Microsoft variables allowing them to be displayed and manipulated in other Microsoft products.
 6. Network controllers shall all be flash upgradeable and not require changing chips for upgrades.

7. Short term logging of historical data shall be provided for every DDC input and output in the system. Each point shall be capable of being logged for a minimum of two (2) weeks.
- C. The BMS shall consist of PC-based workstations and microcomputer controllers of modular design providing distributed processing capability, and allowing future expansion of both input/output points and processing/control functions. Further, the system shall be the backbone framework for the Security/Card Access/CCTV system through the front-end software.
- D. The system shall consist of the following components:
 1. Provide Ethernet-based network controllers as described in this specification. Controllers shall connect directly to the Operator Workstation over Ethernet, provide communication to the Standalone Digital Control Units and/or other Input/Output Modules and serve as a gateway to equipment furnished by others.
 2. Provide the necessary quantity and types of standalone controllers to meet the requirements of the project for mechanical equipment control including air handlers, central plant control, and terminal unit control. Each standalone controller shall operate completely standalone, containing all of the I/O and programs to control its associated equipment.
 3. A high speed Ethernet connection to the site shall be used for offsite access to the site. Coordinate with the Owner's IT professionals for high speed system access and shall comply with Owner's requirements to maintain the level of security required by the Owner. Coordinate with Owner and provide VPN (Virtual Private Network) as required, to comply with the Owner's IT professionals requirements.
 4. BACnet Protocol Integration - BACnet:
 - a. The neutral protocol used between systems will be BACnet over Ethernet and comply with ASHRAE BACnet standard 135-2003.
 - b. A complete Protocol Implementation Conformance Statement shall be provided for all BACnet system devices.
 - c. The ability to command share point object data, change of state data and schedules between the host and BACnet systems shall be provided.

1.2 QUALITY ASSURANCE

- A. The complete automatic temperature control system shall be comprised of electric control devices with a microprocessor based Direct Digital Control System. All work shall be installed only by skilled mechanics employed by the BMS Contractor or Subcontractor.
- B. The BMS Contractor/Subcontractor shall have a minimum of five (5) years experience in systems of similar size, type and complexity installed within a 100 mile radius.

- C. The BMS Contractor/Subcontractor shall have a local service department (within a 50 mile radius) and have available a minimum of three (3) factory trained technicians within a 24 hour period.
- D. All components shall be fully tested and documented to operate as a complete system.
- E. Supplier must guarantee that all replacement parts will be carried in stock for a period of ten (10) years minimum from the date that the system is commissioned.
- F. Electrical standards: Provide electrical products that comply with the following agency approvals:
 - 1. UL 916; Energy Management Systems for Temperature Control components and ancillary equipment.
 - 2. UL 873; Temperature Indication and Regulating Equipment.
 - 3. FCC, Part 15, Subpart J, Class A Computing Devices.
- G. All products shall be labeled with the appropriate approval markings. System installation shall comply with NFPA, NEMA, Local and National codes.

1.3 ACCEPTABLE MAKES

- A. The complete Building Management System is designed and based on that manufactured by Johnson Controls. Acceptable Make: Johnson Controls

1.4 SUBMITTALS

- A. Submit for review, a brochure containing the following:
 - 1. Detailed piping and wiring control diagrams and systems description for each system under control.
 - 2. Detailed layout and nameplate list for component control panels and DDC panels.
 - 3. Submit a valve and damper schedule showing size, pressure drop configuration, capacity, and locations. Provide apparatus bulletins and data sheets for all control system components.
 - 4. A complete listing of input and output points, control loops and/or routines, including time of day functions, and facilities management system functions for each controlled system. This listing shall include point logical names, identifiers, and alarmable ranges.
 - 5. Provide as part of a separate submittal a hard copy of all graphics showing system components, sensor locations, setpoints and fixed/variable data. Engineer shall review and approve graphic format prior to final acceptance of system.

1.5 SCOPE OF WORK

- A. Except as otherwise noted, the control system shall consist of all Ethernet Network Controllers, Standalone Digital Control Units, workstations, software, sensors, transducers, relays, valves, dampers, damper operators and other accessory equipment, along with a complete system of electrical interlocking wiring as required to fill the intent of the specification and provide for a complete and operable system.
- B. The BMS Contractor/Subcontractor shall review and study all HVAC drawings and the entire specification to familiarize themselves with the equipment and system operation and to verify the quantities and types of dampers, operators, alarms, etc. to be provided.
- C. All interlocking, wiring and installation of control devices associated with the equipment shall be provided under this Contract. The BMS Contractor/Subcontractor shall demonstrate the operation of the system to the Owner and prove that it complies with the intent of the drawings and specifications.

1.6 WORK INCIDENTAL TO TEMPERATURE CONTROL CONTRACTOR

- A. The BMS Contractor/Subcontractor shall furnish the following materials, installation by the HVAC Contractor:
 - 1. For piping work:
 - a. Control valves in piping.
 - b. Immersion sensing wells in piping systems.
 - c. Valved pressure taps.
 - 2. For sheet metal work:
 - a. All automatic dampers, the BMS Contractor/Subcontractor shall assemble multiple section dampers with required interconnecting linkages and extend required number of shafts through duct for external mounting of damper and motors.
 - b. The HVAC Contractor shall provide access doors or other means of access through ducts or ceilings and walls for service and adjustment of controllers, valves, and dampers.
- B. Control manufacturer shall furnish written details, instructions and supervision for the above trades to ensure proper installation size, and location of any equipment furnished for installation by others.

1.7 CONTROL SYSTEM GUARANTEES

- A. Guarantee the new control system to be free from defects in material and workmanship, for a period of one (1) year after final acceptance. Guarantee system to:
 - 1. Maintain temperatures within 1°F above and below setting.

2. Humidity devices shall maintain relative humidity conditions within 3% of span 0-100% RH.
- B. Provide one (1) year maintenance service of control components, to start concurrently with the guarantee specified above. Such service shall include software updates and 24 hour, 7 day emergency and seasonal inspection and adjustment of operating controls and replacement of parts or instruments found deficient and defective during this period.
- C. Provide monitoring of the DDC system as soon as the system is operating and then for a minimum of one (1) year (24 hours/day, 7 days/week) after the acceptance date. A monthly report will be sent to the Owner with a description of general system status and any alarms or off-normal conditions.
- D. Guarantee future availability of continuous, 24 hour, 7 day a week service for the systems through available maintenance contracts.

1.8 SYSTEM ADJUSTMENT AND CALIBRATION

- A. When the Work has been completed, completely adjust and calibrate the control system. Review the operation of each system input and output, control loops and/or software routings, timing functions, operator entered constants and facilities management functions and observe that they perform their intended functions. When above procedure has been completed and the control system is operating satisfactorily, submit a letter with one (1) copy of completed values and points log to the Owner's Representative advising them that the control system is 100% complete and operates in accordance with the Contract Documents.
- B. After review and approval of points log by the Engineer, the BMS Contractor shall schedule a technician on site for field review of system components, operation and graphics as part of final system appearance.

PART 2 - PRODUCTS

2.1 CONTROL DEVICES

- A. Control Valves:
 1. Sized by BMS Contractor/Subcontractor and guaranteed to meet the heating and cooling requirements. Water valves shall be sized on the basis of 15% of the total system pressure drop, but not more than 10 ft. of head drop. Steam valves shall be sized for no more than a 5 psig pressure drop, or 30% (max.) of design steam pressure, whichever is smaller. Pressure drop for valves shall be submitted for review, including all CV values.
 2. Valves shall be equal percentage type, equipped with characteristic type throttling plug, #316, stainless steel or Monel stem, removable composition discs, and rubber diaphragms. Provide with necessary features to operate in sequence with other valves or damper operators and adjustable throttling range as required by the sequence of operations.

3. Valves in 2 in. and smaller shall be screwed bodies; 2-1/2 in. and larger shall be flanged bodies; designed for 125 psi operating pressure. Arranged to fail-safe as called for; tight closing and quiet operating.
 4. Electric Operators:
 - a. Provide 24 VAC control operators which are 0-10 VDC input proportional with spring return as needed by control sequence and designed for water service valve bodies. Operator shall be synchronous motor driven with up to 150 in. lb. force and force sensor safety stop.
- B. Temperature Sensors:
1. All temperature devices shall use precision thermistors accurate to $\pm 0.36^{\circ}\text{F}$ over a range of -30 to 230°F .
 2. Standard space sensors shall be provided in an off white, or white, enclosure for mounting on a standard electrical box.
 3. Provide manual adjustment slider with $\pm$ programmable scale. Programmable scale shall have the capability to be limited via the DDC System.
 4. Provide a local LCD display for viewing the space temperature.
 5. Duct temperature sensors shall incorporate a thermistor bead embedded at the tip of a stainless steel tube. Probe style duct sensors shall be used in air handling applications where the air stream temperature is consistent and is not stratified. Averaging sensors shall be employed in all mixing plenum and coil discharge applications and in any other application where the temperature might otherwise be stratified. The averaging sensor tube shall contain at least four thermistor sensors.
 6. Immersion sensors shall be employed for measurement of temperature in all chilled water, hot water and glycol applications. Thermal wells shall be brass or stainless steel for non-corrosive fluids below 250°F and 300 series stainless steel for all other applications.
- C. Humidity Sensors:
1. Humidity sensors shall be polymer resistance type.
 2. Duct sensors and Outdoor air humidity sensors shall have a sensing range of 5 to 95% RH with accuracy of $\pm 3\%$ RH. Sensors shall be suitable for ambient temperature conditions of -40 to 212°F .

D. Electric Thermostats:

1. Provide a low voltage thermostat for control of single zone heating and air conditioning unit as specified in the sequence of operation. Electric thermostats shall include a display of the current space temperature as well as a mechanism for adjusting the setpoint locally. Aquastats on unit heaters shall stop the fan when the water temperature is below 100°F.

E. Electric Operators (Damper):

1. Provide 24 VAC control operators which are 0-10 VDC input proportional or two position with spring return as needed by control sequence and designed to operate control dampers. Operator shall be by synchronous motor driven with up to 150 in. lb. force sensor safety stop and return as required.

F. Current Measurement Devices:

1. Measurement of three-phase power shall be accomplished with a kW/kWh transducer. The instrument shall utilize direct current transformer inputs to calculate the instantaneous value (kW) and a pulsed output proportional to the energy usage (kWh). Provide Veris Model 6000 Power Transducer or approved equal.

G. Safety/Status Devices:

1. Low Limit Detector: Electric type, with 20 ft. long serpentine element, with manual reset and auxiliary contacts to the DDC, set for 37°F for "freeze" protection and 55°F for fan discharge application. Provide a 20 ft. long element for every 25 sq. ft. of coil face area.
2. High Limit Detector: High limit thermostats shall be located as directed, and shall be manual reset type set at 120°F in the return and 180°F in the discharge. Thermostats shall be double pole so as to provide input capability for alarm at the temperature control system.
3. Pump status shall be provided through adjustable range current sensing element on pump motor.
4. Fan status shall be provided through adjustable range current sensing element on the fan motor.

H. Miscellaneous Devices:

1. Provide necessary, relays, transformers, required for a complete and operable system.

2.2 CONTROL CABINETS

- A. BMS control panels shall be fully enclosed cabinet, baked enamel, steel, aluminum or composite material construction and shall meet the requirements of NEMA 1 enclosures.

Panels shall have hinged door with a locking latch. Cover exposed electrical connections. Each component on front panel shall have an appropriate engraved label describing its function. Components inside the panel shall be appropriately labeled for ease of identification. Stick-on labels are not acceptable. Panels shall be either free-standing or wall-mounted. Provide support steel framing.

2.3 BUILDING MANAGEMENT SYSTEM

- A. The BMS system shall consist of Network Controllers, standalone or application specific controllers, input/output unit modules, operator workstations, and file servers to support system configurations. The BMS system shall provide control, alarm detection, scheduling, reporting and information management for the entire facility.
- B. The BMS shall be capable of being segmented, through software, into multiple local area networks per floor of building, distributed over a wide area network or sharing a single file server. This enables workstations to manage wide area network, and/or the entire system with all devices being updated and sharing the most current database. In the case of a single workstation system, the workstation shall contain the entire database - with no need for a separate file server.
- C. For multi-workstation systems, a file server shall be utilized capable of residing directly on the Owner's Ethernet TCP/IP preferred network with no required gateways. This network may be dedicated for temperature control systems only so it does not interfere with other networks.
- D. In addition to the above local area network and wide area network, the workstation software shall be capable of managing remote systems via remote high speed network as a standard component of the software.
- E. The BMS system shall be scalable and expandable at all levels of the system using the same software interface and controllers.
 - 1. The system shall use the same application programming language for all equipment: Operator Workstation, Network Controllers, Remote Site Controllers and Standalone, or application specific, Digital Controllers.
- F. The BMS system design shall include solutions for the integration of the following "open systems" protocols: BACnet, LonTalk and digital data communication to third party microprocessors such as chiller controllers, fire panels and variable frequency drives (VFD's).
 - 1. The system shall also provide the ability to program custom ASCII communication drivers, which shall reside in the network control unit, for communication to third party systems and devices. These drivers shall provide real time monitoring and control of the third party systems.

2.4 NETWORK CONTROLLERS

- A. Network Controllers shall be microprocessor based, multi-tasking, multi-user, and employ a real time operating system. Each Network Controller panel shall consist of

modular hardware including power supply, CPU board, and input/output modules. A sufficient number of Network Controllers shall be supplied to fully meet the requirements of this specification and the point list on the drawings.

- B. All Network Controllers on the Ethernet TCP/IP LAN/WAN shall be capable, out-of-the box, to be set up as a Web Server. The Network Controllers shall have the ability to store HTML code and "serve" pages to a web browser. This provides the ability for any computing device utilizing a TCP/IP Ethernet connection and capable of running a standard Internet browser (Microsoft Internet Explorer, Netscape Navigator, etc.) to access real-time data from the entire Temperature Control System via any Network Controllers.

1. Graphics and text-based web pages shall be constructed using standard HTML code. The interface shall allow the user to choose any of the standard text or graphics-based HTML editors for page creation. It shall also allow the operator to generate custom graphical pages and forms.
2. The WEB server interface shall be capable of password security, including validation of the requesting PC's IP address. The WEB server interface shall allow the sharing of data or information between any controller or process or network interface (BACnet, LonTalk and TCP/IP) that the Temperature Control System has knowledge of, regardless of where the point is connected on the Temperature Control System network or where it is acquired from.
3. The network controller shall act directly as the WEB server. It shall directly generate HTML code to the requesting user (i.e. WEB browser), eliminating the need for and reliance on any PC-based WEB server hardware or software. To simplify graphic image space allocation, HTML graphic images, if desired, shall be stored in any shared network device. The Web server shall have the ability to acquire any necessary graphics using standard pathing syntax within the HTML code mounted within the Temperature Control System WEB server. External WEB server hardware and software are not acceptable.

- C. Hardware Specifications:

1. A minimum of 4MB of RAM shall be provided for Network Controllers with expansion up to 8MB.
2. Each Network Controller shall provide communication to both the Workstation(s) and the field buses. In addition, each Network Controller shall have at least three other communications ports that support a telephone modem, portable service tool, serial printer and connection to third party controllers such as a chiller control panel. On a LAN/WAN system, the Network Controller shall be provided with a 10Mbps plug-in Ethernet TCP/IP network interface card (NIC).
3. Input/Output (I/O): Each Network Controller shall support the addition of the following types of inputs and outputs:
 - a. Digital Inputs for status/alarm contacts.

- b. Counter Inputs for summing pulses from meters.
 - c. Thermistor inputs for measuring temperatures in space, ducts and thermowells.
 - d. Analog inputs for pressure, humidity, flow and position measurements.
 - e. Digital Outputs for on/off equipment control.
 - f. Analog Outputs for valve and damper position control, and capacity control of primary equipment.
- 4. The system shall employ a modular I/O design to allow easy expansion. Input and output capacity is to be provided through plug-in modules of various types or DIN-mountable IOU modules. It shall be possible to combine I/O modules as desired to meet the I/O requirements for individual control applications.
 - 5. Each Network Controller shall include a battery-backed, real time clock, accurate to 10 seconds per day. The Real Time Clock shall provide the following: time of day, day, month, year, and day of week. In normal operation, the system clock shall be based on the frequency of the AC power. The system shall automatically correct for daylight savings time and leap years.
 - 6. The power supply for the Network Controllers shall be auto sensing, 120-220VAC, 60/50 Hz power, with a tolerance of $\pm 20\%$. The controller shall contain over voltage surge protection, and require no additional AC power signal conditioning. Optionally, if indicated on the drawings, the power supply shall accept an input voltage of (-48 VDC).
 - 7. Upon restoration of power after an outage, the Network Controller shall automatically and without human intervention: Update all monitored functions; resume operation based on current, synchronized time and status, and implement special start-up strategies as required.
 - 8. Each Network Controller with the standard 120-220VAC power supply shall include a programmable DC power backup system rated for a minimum of 72 hours of battery backup to maintain all volatile memory or, a minimum of two (2) hours of full UPS including modem power. This power backup system shall be configurable such that at the end of a settable timeframe of running on full UPS, the unit shall shut off full UPS and switch to memory retention-only mode for the remainder of the battery power. The system shall allow the simple addition of more batteries to extend the above minimum battery backup times.

D. Software:

- 1. The Network Controller shall contain flash ROM as the resident operating system. Application software shall be RAM resident. Application software shall only be limited by the amount of RAM memory. There shall be no restrictions placed on the type of application programs in the system. Each Network Controller shall be capable of parallel processing, executing all control programs

simultaneously. Any program may affect the operation of any other program. Each program shall have the full access of all I/O facilities of the processor. This execution of control function shall not be interrupted due to normal user communications including interrogation, program entry, printout of the program for storage.

2. The application software shall be user programmable. This includes all strategies, sequences of operation, control algorithms, parameters, and setpoints. The source program shall be English language-based and programmable by the user. The language shall be structured to allow for the easy configuration of control programs, schedules, alarms, reports, telecommunications, local displays, mathematical calculations, passwords, and histories. The language shall be self-documenting. Users shall be able to place comments anywhere in the body of a program. Program listings shall be configurable by the user in logical groupings.

E. Control Software:

1. The Network Controller shall have the ability to perform the following pre-tested control algorithms:
 - a. Proportional, Integral plus Derivative Control (PID).
 - b. Two Position Control.
 - c. Digital Filter.
 - d. Ratio Calculator.
 - e. Equipment Cycling Protection.
2. Mathematical Functions: Each controller shall be capable of performing basic mathematical functions (+, -, *, /), squares, square roots, exponential, logarithms, Boolean logic statements, or combinations of both. The controllers shall be capable of performing complex logical statements including operators such as >, <, =, and, or, exclusive or, etc. These shall be able to be used in the same equations with the mathematical operators and nested up to five parentheses deep.
3. Energy Management Applications: Network Controllers shall have the ability to perform any or all of the following energy management routines:
 - a. Time of Day Scheduling
 - b. Calendar Based Scheduling
 - c. Holiday Scheduling
 - d. Temporary Schedule Overrides
 - e. Optimal Start
 - f. Optimal Stop
 - g. Night Setback Control
 - h. Enthalpy Switchover (Economizer)
 - i. Peak Demand Limiting

- j. Temperature Compensated Duty Cycling
 - k. CFM Tracking
 - l. Heating/Cooling Interlock
 - m. Hot/Cold Deck Reset
 - n. Free Cooling
 - o. Hot Water Reset
 - p. Chilled Water Reset
 - q. Condenser Water Reset
 - r. Chiller Sequencing
 - s. Static Pressure Reset/Optimizing
 - t. Demand Controlled Ventilation
 - u. Supply Air Temperature Reset
4. Each controller shall be capable of logging any system variable over user defined time intervals ranging from 1 second to 1440 minutes. Any system variables (inputs, outputs, math calculations, flags, etc.) can be logged in history. A maximum of 25,000 values can be stored in each log. Each log can record either the instantaneous, average, minimum or maximum value of the point. Logs can be automatic or manual. Logged data shall be downloadable to the Operator Workstation for long term archiving based upon user-defined time intervals, or manual command.
5. Alarm Management: For each system point, alarms can be created based on high/low limits or conditional expressions. All alarms shall be tested each scan of the Network Controller and can result in the display of one or more alarm messages or reports.
- a. Up to eight (8) alarms can be configured for each point in the controller.
 - b. Messages and reports can be sent to a local terminal, to the front-end workstation(s), or via modem to a remote-computing device.
 - c. Alarms shall be generated based on their priority. A minimum of 255 priority levels shall be provided.
 - d. If communication with the Operator Workstation is temporarily interrupted, the alarm shall be buffered in the Network Controller. When communications return, the alarm shall be transmitted to the Operator Workstation if the point is still in the alarm condition.
6. The Network Controller shall be able to generate user-definable reports to a locally connected printer or terminal. The reports shall contain any combination of text and system variables. Report templates shall be able to be created by users in a word processing environment. Reports can be displayed based on any logical condition or through a user command.

2.5 STANDALONE CONTROLLERS

- A. Standalone Controllers shall provide control of HVAC and lighting. Each controller shall have its own control programs and shall continue to operate in the event of a failure or communication loss to its associated Network Controllers.
- B. Standalone Controllers programs shall be stored in battery backed-up RAM and EPROM. Each controller shall have a minimum of 32K bytes of user RAM memory and 128K bytes of EPROM.
- C. Standalone Controllers shall provide a communication port to the field bus. In addition, a port shall be provided for connection of a portable service tool to support local commissioning and parameter changes with or without the Network Controllers online. It shall be possible from a service port on any Standalone Controller to view, enable/disable, and modify values of any point or program on any controller on the local field bus, any Network Controller or any Standalone Controller on a different field bus.
- D. Support BACnet standard MS/TP bus protocol ASHRAE SS PC-15, Clause 9 on the control network.
- E. Each Standalone Controller shall support the addition of the following types of inputs and outputs:
 - 1. Digital Inputs for status/alarm contacts.
 - 2. Counter Inputs for summing pulses from meters.
 - 3. Thermistor Inputs for measuring temperatures in space, ducts and thermowells.
 - 4. Analog inputs for pressure, humidity, flow and position measurements.
 - 5. Digital Outputs for on/off equipment control.
 - 6. Analog Outputs for valve and damper position control, and capacity control of primary equipment.
- F. Input and output capacity shall be expandable through the use of plug-in modules. A minimum of two (2) modules shall be added to the base Standalone Controller before additional power is required.
- G. Each Standalone Controller shall be able to exchange information on a peer to peer basis with other Standalone Controllers during each field bus scan. Each Standalone Controller shall be capable of storing and referencing global variables (on the LAN) with or without any workstations online. Each Standalone Controller shall be able to have its program viewed and/or enabled/disabled either locally through a portable service tool or through a workstation connected to a Network Controller.
- H. Standalone Controllers shall have as a minimum, LED indication of CPU status, and field bus status.

- I. Standalone Controllers shall have a real time clock in either hardware or software. The accuracy shall be within 10 seconds per day. The Real Time Clock shall provide the following information: time of day, day, month, year, and day of week. Each Standalone Controller shall receive a signal over the network from the Network Controllers, which synchronizes all Standalone Controllers real time clocks.
- J. Upon restoration of power, the Standalone Controller shall automatically and without human intervention, update all monitored functions, resume operation based on current, synchronized time and status, and implement special start-up strategies as required.
- K. Each Standalone Controller shall have at least three (3) years of battery back up to maintain all volatile memory.
- L. For each system point, alarms can be created based on high/low limits or conditional expressions. All alarms shall be tested each scan of the Standalone Controllers and can result in the display of one or more alarm messages or reports.
 - 1. Up to eight (8) alarms can be configured for each point in the controller enabling the escalation of the alarm priority (urgency) based upon which alarm(s) is/are triggered.
 - 2. Alarm messages can be sent to a local terminal or modem connected to a Network Controller or to the Operator's Workstation(s).
 - 3. Alarms shall be generated based on their priority. A minimum of 255 priority levels shall be provided.
 - 4. If communication with the Network Controller is temporarily interrupted, the alarm shall be saved in the Standalone Controller. When communications return, the alarm shall be transmitted to the Network Controller if the point is still in the alarm condition.
- M. Air Handler Controllers shall be capable of meeting the requirements of the sequence of operation intended for each system and allow for future expansion.
 - 1. Air Handling Unit Controllers shall support all the necessary point inputs and outputs as required by the sequence and operate in a standalone fashion.
 - 2. Air Handling Unit Controllers shall be fully user programmable to allow for modification of the application software.
 - 3. An LCD display shall be optionally available for readout of point values and to allow operators to change setpoints and system parameters.
 - 4. A manual override switch shall be provided for all digital and analog outputs on the Air Handling Unit Controller. The position of the switch shall be monitored in software and available for operator displays and alarm notification.

N. Air Terminal Unit Controllers:

1. Air Terminal Unit Controllers shall support, but not be limited to the control of the following configurations of Air Terminal Units to address current requirements as described in the Execution portion of this specification, and for future expansion:
 - a. Single Duct Cooling Only
 - b. Single Duct Cooling with Reheat (Electric or Hot Water)
 - c. Fan Powered (Parallel or Series)
 - d. Dual Duct (Constant or Variable Volume)
 - e. Supply/Exhaust
2. Air Terminal Unit Controllers for single duct applications shall be provided with a built-in actuator for modulation of the air damper. The actuator shall have a minimum torque rating of 35 in.-lb., and contain an override mechanism for manual positioning of the damper during startup and service.
3. Air Terminal Unit Controllers shall contain an integral velocity sensor accurate to $\pm 5\%$ of the full range of the box's CFM rating.
4. Each controller shall perform the sequence of operation described in Part 3 of this specification, and have the capability for time of day scheduling, occupancy mode control, after hours operation, lighting control, alarming, and trending.
5. Air Terminal Unit Controllers shall be able to communicate with any other Standalone Controllers on the same field bus with or without communication to the Network Controllers managing the field bus. Systems that fail to provide this (true peer-to-peer) capability will be limited to a maximum of 32 Air Terminal Unit Controllers per field bus.

O. Unitary Controllers:

1. Unitary Controllers shall support, but not be limited to, the control of the following systems as described in the Execution portion of this specification, and for future expansion:
 - a. Unit Ventilators
 - b. Heat Pumps (Air to Air, Water to Water)
 - c. Packaged Rooftops
 - d. Fan Coils (2 or 4 Pipe)
2. The I/O of each Unitary Controller shall contain the sufficient quantity and types as required to meet the sequence of operation found in the Execution portion of this specification. In addition, each controller shall have the capability for time of day scheduling, occupancy mode control, after hour operation, lighting control, alarming, and trending.

2.6 OPERATOR HARDWARE

- A. The BMS workstation software shall be configurable as either a single workstation system (with a local database) or multi-workstation system where the database is located on a central file server. The client software on multi-workstation system shall access the file server database program via an Ethernet TCP/IP network running at either 100MBPS or 1024MBPS.
 - 1. All Workstations shall be Intel Core Processor based personal computers operating under the Microsoft Windows Server 2012 R2. The application software shall be capable of communication to all Network Controllers and Standalone Controllers, feature high-resolution color graphics, alarming, reporting, and be user configurable for all data collection and data presentation functions.
 - 2. For multi-workstation systems, a minimum of 256 workstations shall be allowed on the Ethernet network along with the central file server. In this client/server configuration, any changes or additions made from one workstation shall automatically appear on all other workstations without the requirement for manual copying of files. Multi-workstation systems with no central database will not be acceptable. Multi-workstation systems with distributed/tiered file servers and a central (master) database will be acceptable.

2.7 WORKSTATION SOFTWARE

- A. General Description:
 - 1. The software architecture shall be object-oriented in design, a true 32-bit application suite utilizing Microsoft's OLE, COM, DCOM and ODBC technologies. These technologies shall make it easy to fully utilize the power of the operating system to share, among applications (and therefore to the users of those applications), the data available from the Temperature Control System.
 - a. The workstation functions shall include monitoring and programming of all BMS controllers. Monitoring consists of alarming, reporting, graphic displays, long term data storage, automatic data collection, and operator-initiated control actions such as schedule and setpoint adjustments.
 - b. Programming of controllers shall be capable of being done either off-line or on-line from any operator workstation. All information shall be available in graphic or text displays. Graphic displays shall feature animation effects to enhance the presentation of the data, to alert operators of problems, and to facilitate location of information throughout the BMS system. All operator functions shall be selectable through a mouse.
 - 2. The file server database engine shall be Microsoft SQL Server, or another ODBC-compliant, relational database program. This ODBC (Open Database Connectivity) compliant database engine shall allow for an Owner to utilize "their" choice of database and due to its "open" architecture, shall allow an

Owner to write custom applications and/or reports that communicate directly with the database avoiding data transfer routines to update other applications. The system database shall contain all point configurations and programs in each of the controllers that have been assigned to the network. In addition, the database shall contain all workstation files including color graphic, alarm reports, text reports, historical data logs, schedules, and polling records.

3. The BMS workstation software shall allow the creation of a custom, browser-style interface linked to the user that has logged into the workstation software. This interface shall support the creation of "hot-spots" that the user may link to view/edit any object in the system or run any object editor or configuration tool contained in the software. Furthermore, this interface shall be able to be configured to become a user's "PC Desktop" - with all the links that a user needs to run other applications. This, along with the Microsoft Office Professional 2010 user security capabilities, shall enable a system administrator to setup workstation accounts that not only limit the capabilities of the user within the BMS software but may also limit what a user can do on the PC and/or LAN/WAN. This might be used to ensure, for example, that the user of an alarm monitoring workstation is unable to shutdown the active alarm viewer and/or unable to load software onto the PC.
4. The software shall be designed so that each user of the software can have a unique username and password. This username/password combination shall be linked to a set of capabilities within the software, set by and editable only by, a system administrator. The sets of capabilities shall range from View only, Acknowledge alarms, Enable/disable and change values, Program, and Administer. The system shall allow the above capabilities to be applied independently to each and every class of object in the system. The system shall allow a minimum of 256 users to be configured per workstation. There shall be an inactivity timer adjustable in software that automatically logs off the current operator after the timer has expired.
5. The workstation software shall use a familiar Windows Explorer style interface for an operator or programmer to view and/or edit any object (controller, point, alarm, report, schedule, etc.) in the entire system. In addition, this interface shall present a "network map" of all controllers and their associated points, programs, graphics, alarms, and reports in an easy to understand structure. All object names shall be alphanumeric and use Windows long filename conventions. Object names shall not be required to be unique throughout the system allowing for point naming convention consistency. For example, each Air Temperature Unit Controller can have an input called Space Temperature and a setpoint called CFM Setpoint.
 - a. The configuration interface shall also include support for template objects. These template objects shall be used as building blocks for the creation of the BMS database. The types of template objects supported shall include all data point types (input, output, string variables, setpoints, etc.), alarm algorithms, alarm notification objects, reports, graphics displays, schedules, and programs. Groups of template object types shall be able to be set up as template subsystems and systems. The

template system shall prompt for data entry if necessary. The template system shall maintain a link to all "child" objects created by each template. If a user wishes to make a change to a template object, the software shall ask the user if he/she wants to update all of child objects with the change. This template system shall facilitate configuration and programming consistency and afford the user a fast and simple method to make global changes to the BMS.

6. Color Graphic Displays: The system shall allow for the creation of user defined, color graphic displays for the viewing of mechanical and electrical systems, or building schematics. These graphics shall contain point information from the database including any attributes associated with the point (engineering units, etc.). In addition, operators shall be able to command equipment or change setpoints from a graphic using the mouse. Requirements of the color graphic subsystem include:
 - a. LCD active matrix, resolution 1366 x 768 displays. The user shall have the ability to import AutoCAD generated picture files as background displays.
 - b. A built-in library of animated objects such as dampers, fans, pumps, buttons, knobs, gauges, and graphs which can be "dropped" on a graphic using a software configuration "wizard". These objects shall enable operators to interact with the graphic displays in a manner that mimics their mechanical equivalents found on field installed control panels. Using the mouse, operators shall be able to adjust setpoints, start or stop equipment, modify PID loop parameters, or change schedules.
 - c. Status changes or alarm conditions shall be able to be highlighted by objects changing screen location, size, color, text, blinking or changing from one display to another.
 - d. Graphic panel objects shall be able to be configured with multiple "tabbed" pages allowing an operator to quickly view individual graphics of equipment, which make up a subsystem or system.
 - e. Ability to link graphic displays through user defined objects, alarm testing, or the result of a mathematical expression. Operators shall be able to change from one graphic to another by selecting an object with a mouse - no menus will be required.
7. The software shall allow for the automatic collection of data and reports from any controller through either a hardwire or modem communication link. The frequency of data collection shall be completely user-configurable.
8. The software shall be capable of accepting alarms directly from controllers, or generating alarms based on evaluation of data in controllers and comparing to limits or conditional equations configured through the software. Any alarm (regardless of its origination) shall be integrated into the overall alarm management system and shall appear in all standard alarm reports, be available

for operator acknowledgment, and have the option for displaying graphics, or reports. Alarm management features shall include:

- a. A minimum of 255 alarm notification levels, or classes of alarms. Each notification level shall establish a unique set of parameters for controlling alarm display, acknowledgment, keyboard annunciation, alarm printout and record keeping.
 - b. Automatic logging in the database of the alarm message, point name, point value, connected controller, timestamp, username and time of acknowledgement, username and time of alarm silence (soft acknowledgement).
 - c. Automatic printing of the alarm information or alarm report to an alarm printer or report printer.
 - d. Playing an audible beep or audio (wav) file on alarm initiation or return to normal.
 - e. Sending an email or text message to anyone listed in a workstation's email account address list on either the initial occurrence of an alarm and/or if the alarm is repeated because an operator has not acknowledged the alarm within a user-configurable timeframe. The ability to utilize email and texting of alarms shall be a standard feature of the software integrated with the operating system's mail application interface (MAPI). No special software interfaces shall be required.
 - f. Individual alarms shall be able to be re-routed to a workstation or workstations at user-specified times and dates. For example, a critical high temperature alarm can be configured to be routed to a Facilities Dept. workstation during normal working hours (7am-6pm, Mon-Fri) and to a Central Alarming workstation at all other times.
 - g. An active alarm viewer shall be included which can be customized for each user or user type to hide or display any alarm attributes.
 - h. The font type and color, and background color for each alarm notification level as seen in the active alarm viewer shall be customizable to allow easy identification of certain alarm types or alarm states.
 - i. The active alarm viewer can be configured such that an operator shall type in text in an alarm entry and/or pick from a drop-down list of user actions for certain alarms. This ensures accountability (audit trail) for the response to critical alarms.
9. The software shall contain a built-in custom report generator, featuring word processing tools for the creation of custom reports. These custom reports shall be able to be set up to automatically run or be generated on demand. Each workstation shall be able to associate reports with any word processing or spreadsheet program loaded on the machine. When the report is displayed, it

shall automatically spawn the associated report editor, which shall be the most recent version of Microsoft Office.

- a. Reports can be of any length and contain any point attributes from any controller on the network.
- b. The report generator shall have access to the user programming language in order to perform mathematical calculations inside the body of the report, control the display output of the report, or prompt the user for additional information needed by the report.
- c. It shall be possible to run other executable programs whenever a report is initiated.
- d. Report Generator activity can be tied to the alarm management system, so that any of the configured reports can be displayed in response to an alarm condition.
- e. Standard reports shall include:
 - 1) Points in each controller.
 - 2) Points in alarm.
 - 3) Disabled points.
 - 4) Overridden points.
 - 5) Operator activity report.
 - 6) Alarm history log.
 - 7) Program listing by controller with status.
 - 8) Network status of each controller.

10. Spreadsheet-Style Reports: The software shall allow the simple configuration of row/column (spreadsheet-style) reports on any class of object in the system. These reports shall be user-configurable and shall be able to extract live (controller) data and/or data from the database. The user shall be able to set up each report to display in any text font, color and background color. In addition, the report shall be able to be configured to filter data, sort data, and highlight data that meets user-defined criteria.
11. HTML Reporting: The above spreadsheet-style reports shall be able to be run to an HTML template file. This feature shall create an HTML "results" file in the directory of the HTML template. This directory can be shared with other computer users, which shall allow those users with access to the directory to "point" their web browser at the file and view the report.
12. Scheduling: It shall be possible to configure and download from the workstation schedules for any of the controllers on the network.
 - a. Time of day schedules shall be in a calendar style and shall be programmable for a minimum of one year in advance. Each standard day of the week and user-defined day types shall be able to be associated with a color so that when the schedule is viewed it is very easy, at-a-

glance, to determine the schedule for a particular day even from the yearly view. To change the schedule for a particular day, a user shall simply click on the day and then click on the day type.

- b. Each schedule shall appear on the screen viewable as the entire year, monthly, week and day. A simple mouse click shall allow switching between views. It shall also be possible to scroll from one month to the next and view or alter any of the schedule times.
 - c. Schedules shall be assigned to specific controllers and stored in their local RAM memory. Any changes made at the workstation shall be automatically updated to the corresponding schedule in the controller.
13. The programmer's environment shall include access to a superset of the same programming language supported in the controllers. In this environment, the programmer shall be able to configure application software off-line (if desired) for custom program development, write global control programs, system reports, wide area networking data collection routines, and custom alarm management software. On the same screen as the program editor, the programming environment shall include dockable debug and watch bars for program debugging and viewing updated values and point attributes during programming. In addition, a wizard tool shall be available for loading programs from a library file in the program editor.
14. The workstation software shall have an application to save and restore field controller memory files. This application shall not be limited to saving and reloading an entire controller - it shall also be able to save/reload individual objects in the controller. This allows off-line debugging of control programs, for example, and then reloading of just the modified information.
15. The workstation software shall have the capability to easily configure groups of data points with trend logs and display the trend log data. A group of data points shall be created by drag-and-drop method of the points into a folder. The trend log data shall be displayed through a simply menu selection. This data shall be able to be saved to file and/or printed.
16. The workstation software shall automatically log and timestamp every operation that a user performs at a workstation, from logging on and off a workstation to changing a point value, modifying a program, enabling/disabling an object, viewing a graphic display, running a report, modifying a schedule, etc.
17. Fault Tolerant File Server Operation: The system shall provide the option to provide fault tolerant operation in the event of the loss of the CPU, disk drives, or other hardware required to maintain the operational integrity of the system. Operational integrity includes all user interfaces, monitoring of alarm points and access points, and executing access control functions. Fault tolerant technology is not provided unless specifically stated.
- a. The switchover mechanism provided shall be automatic. Should the failure be caused by hardware, then the system shall immediately switch

to the Backup computer. Should the system failure be caused by software (instruction or data), the system shall not pass the faulted code to the Backup computer, otherwise the Backup shall fail in the same manner of the Primary computer.

- b. Switchover to the Backup computer shall be initiated and effective (complete) in a manner and time frame that precludes the loss of event data, and shall be transparent to the system users, except for an advisory alarm message indicating that the switchover has occurred.
- c. When the system fails-over from the Primary to the Backup computer, no alarm or other event shall be lost, and the Backup computer shall take control of all system functions.
- d. A single component failure in the system shall not cause the entire system to fail. All system users shall be informed of any detectable component failure via an alarm event. System users shall not be logged off as a result of a system failure or switchover.
- e. The Primary computer shall provide continual indication that the Backup computer is unavailable until such time that the fault has been purged.

2.8 WEB BROWSER INTERFACE

- A. Provide a web browser interface that will be accessible to any computer on the Owner's Intranet with Microsoft Internet Explorer 8.0 or higher. The system shall support a minimum of 5 simultaneous users to access the system. The Web Browser Interface shall include the following features.
 - 1. Day-to-day operation of the system shall be accessible through a standard web browser interface, allowing technicians and operators to view any site in the system from anywhere on the network.
 - 2. The browser-based interface must share the same graphical displays as the Operator Workstations, presenting dynamic data on site layouts, floor plans, and equipment graphics. The browser's graphics shall also support commands to change setpoints, enable/disable equipment and start/stop equipment.
 - 3. Through the browser interface, operators must be able to navigate through the entire system, and change the value or status of any point in any controller. Changes are effective immediately to the controller, with a copy stored in the system database.
 - 4. Through the browser interface, operators must be able to view pre-defined groups of points, with their values updated automatically.
 - 5. Through the browser interface, operators must be able to change schedules - change start and stop times, and add new times to a schedule.

6. Through the browser interface, operators must be able to create and edit card access personnel records, and assign the card to any and all sites for access, in any combination.
7. Through the browser interface, operators must be able to view reports of access events and access privileges. Reports must be available based on start and end time, door, area, and person. Invalid attempts must be color-coded red in the report.
8. Through the browser interface, operators must be able to view live and recorded video from any digital video recorder on the network. The interface must offer an easy method of selecting the camera to view, and for recorded video, must offer selections for start and stop time when searching video clips.
9. All commands and user activity through the browser interface shall be recorded in the system's activity log, which can be later searched and retrieved by user, date, or both.
10. The same user accounts shall be used for the browser interface and for the operator workstations. Operators must not be forced to memorize multiple passwords.
11. The system shall be expandable to up to 25 concurrent browser-based users per server.

2.9 UTILITY METERING

A. General Requirements:

1. The following meters shall be included in this system:
 - a. Electric Meter (Quantity one (1) per building).
 - b. Gas Meter (Quantity one (1) per building).
 - c. Water Meter (Quantity one (1) per building).
2. Provide all hardware, software, installation labor and information required to all contractors involved in the project to effect the installation of an Automated Controller Polling system as specified herein. The system shall be capable of providing information to the facility operational staff and others empowered to have and use the information as directed by the administration. The system shall be complete in every respect as specified and shall provide all information required to affect the output of the reports defined in the relevant section of this specification. The supplier shall provide two certifications that the system is tracking with the utility meters. One certification shall be provided as the system is turned over to the owner. The second certification shall be provided after six to eight months of operation. The protocol for the certification process is included in this specification and shall be rigidly adhered to. The system information sensors cross contract section responsibilities, and as such require coordination. The system supplier shall be responsible to coordinate the proper contractors to see that the utility sensors required by their respective sections are

provided and work properly. The system supplier is not responsible for the provision or installation of the primary sensing elements of this system. They are the responsibility of the section that provides the utility service to the facility and are specified under the appropriate sections. Further, it is not the responsibility of the system supplier to coordinate with the utility company to see that the sensors are supplied and are provided with the necessary information. That responsibility is also specified in the appropriate sections.

B. System Field Hardware and Installation:

1. Provide and install all hardware required to connect to utility primary meter auxiliary output sensors provided by others to collect information required to generate reports as defined in the report section of this document. The hardware shall collect and store data for retrieval by a central server through the facility intranet and over the Internet. A 10BaseT network tap with a Fixed IP address for the building controller shall be provided by others to provide system connectivity to the Intranet.
2. Contract with the utility companies to install auxiliary pulse contacts on all meters monitored.
3. The building controller shall be connected to an application controller that shall receive pulses proportional to utility use. Provide and install the application controller with necessary input characteristics to be compatible with the primary utility sensing equipment. Connect controller inputs to the meter auxiliary outputs at the point shown on the drawings where the utility meter sensor terminations are shown to be connected.

C. System Polling Server:

1. Provide at the system supplier facility a polling server service that will poll every meter for the consumption of utility commodity every sixty (60) minutes.
2. Data shall be stored in an approved supported SQL database such as Microsoft SQL Server. The server polling process shall be self-healing so as to automatically recover back data in conditions where Internet outages occur for an adjustable period of minimum six (6) hours to a maximum of seven days.
3. The data collection application controllers that interface directly with the meter pulsing head sensors shall be capable of storing data for a minimum period of the previous seven (7) days so as to provide the source for the data recovery outlined above.
4. The system shall incorporate a temperature-sensing device, and collect data from the same for outdoor air. This data shall be used to provide for the calculation of degree-day information for use in daily energy analysis formats.

D. User Report Interface:

1. The system shall provide the user with a menu driven interface, which shall contain a menu driven interface for the purpose of report configuration, storage and advanced analysis.

E. The application shall provide the following:

1. Provide a Site Manager interface to browse building sites and the meter sources, grouped by commodity. Information displayed shall provide for the ability to map meter sources back to their related software points at the data input interface for ready field identification and system cross reference.
2. Provide a Rate Manager interface, permitting the user to enter and store a unit cost for each commodity tracked in the system, giving the user the ability to analyze financial impact, as provided for in reports listed in the Energy Reports section of this specification.
3. Provide a Report Manager interface, which provides the user with the ability to select the desired Commodity to be examined and between Daily and Hourly Reports. The report manager interface shall be calendar driven to provide for easy selection of data set date ranges. The report manager interface shall permit the user to dynamically choose any number of building sites to include in a report, as well as save reports that can be easily recalled for the purposes of analysis against events such as billing cycles.
4. Provide a function to allow the user to create and save groups of buildings to allow for ease of use when benchmarking buildings against each other.
5. Daily reports shall contain:
 - a. Summary Report page plotting all buildings polled against each other for Consumption, Consumption per square foot, and Load Consumption Ratio.
 - b. Summary Data page charting all buildings polled against each other for Consumption, Consumption per square foot, and Load Consumption Ratio.
 - c. Building Area page ranking buildings from highest to lowest square footage.
 - d. Energy Mark page ranking all buildings polled from highest to lowest energy savings potential based upon Energy per square foot, Load Ratio, and Energy used.
 - e. Weather Data page providing daily weather history including outside air temperature, heating degree days, and cooling degree days.

f. Page for each building polled containing:

- 1) Total Consumption for period polled.
- 2) Consumption per square foot of building area for period polled.
- 3) Daily Consumption Total.
- 4) Daily Consumption per square foot of building area.
- 5) Daily Peak Demand and time.
- 6) Daily Low Demand and time.
- 7) Night Consumption as total.
- 8) Night Consumption as a percentage of total consumption.
- 9) Daily Night Consumption Total.
- 10) Daily Night Consumption per square foot of building area.
- 11) Day Consumption as total.
- 12) Day Consumption as a percentage of total consumption.
- 13) Daily Day Consumption Total.
- 14) Daily Day Consumption per square foot of building area.
- 15) Load Ratio comparing night and day consumption totals.
- 16) Daily Load Ratio comparing daily night and day consumption.

6. Hourly reports shall contain:

a. Page for each building polled containing:

- 1) Total Consumption for period polled.
- 2) Night Consumption as percentage of total consumption.
- 3) Day Consumption as percentage of total consumption.
- 4) Load ratio comparing night and day consumption totals.
- 5) Consumption for each hour of period polled.

2.10 SURGE SUPPRESSION (SP) RECEPTACLE

A. Provide at each DDC panel and operator workstation locations, a surge suppression receptacle with metal oxide varistor to dissipate the electrical energy of voltage spikes. 20 ampere, duplex, NEMA 5-20R configuration. Back and side wiring, high impact nylon body.

B. Acceptable Make: Hubbell 5352-S.

2.11 GRAPHICS

A. System Graphic:

1. The equipment drawing will be three-dimensional. The values on the screen shall be reported in real time as well as dynamic to be updated as the value changes.
2. All components of the drawing will show their actual field location and position. Sensors will be in the exact location in reference to piping and air stream. Icons or "library" images imported during the construction of the drawing will be

accurate in depiction of the device and any interaction with other components of the drawing, i.e. don't draw piping into the motor of a pump icon.

3. If there are size limitations or clutter from the number of components a link to a sub graphic having the same layout will be used to clarify.

B. Space Graphic:

1. Floor plan drawings will be linked to the supplying air handling unit or in some cases to the exhaust fan. Electronic floor plans to be provided by Architect/Engineer.
2. Floor plans showing areas served by more than one air handling unit will have the areas color-coded by air handling unit. If the air-handling unit serves different floors the color will be consistent for an air-handling unit for all floors.
3. If an area has control other than DDC it will be noted with text and left white in the background.
4. A temperature zone serving more than one space shall have a unique pattern, to distinguish that zone from other temperature zones. The patterns should slight enough as to not obscure the space temperature, room number and borders detail but visible enough to be able to distinguish between different zones. A different "peppering" of symbols (of + ^ * ≈) or patterns (hex, herringbone, verticals, etc.) will be used to define the zones.
5. Temperature zones dedicated to only one space will not have to be detailed.
6. Remote physical points such as differential monitors and the like shall be shown in their installed location.

- C. The second level of graphics shall be all the DDC points to be installed under the contract overlaid on building floor plan and the Air Handling Unit and its associated systems. Electronic floor plans to be provided by Architect/Engineer.

D. Description of Operation:

1. The approved description of operation will appear on a text graphic in 12-point text written in paragraph form.
2. Additional notes may appear on the equipment graphic in an appropriate location.

E. Layout:

1. The subject device of equipment graphic will be centrally located on the drawing.
2. At the top center, the name of the equipment device will be displayed with its room number. Immediately below the PM# will be displayed. On a third line will be the capacity of the device in units common to that device i.e. air handling units in CFM, pumps in GPM.

3. The top right hand corner will contain links to associated graphics. The Description of Operation, submittal graphic, space graphic and graphic index page will be typical. Other links may be required. All graphic pages will have backward link to return to the main System Graphic.
 4. The top left-hand corner will contain global data. Outside Air would be the most common other values may be required when related to the device operation. If the global data functions within the program of this unit, the point referenced in the program will be displayed.
 5. The lower left-hand corner will display the operational modes of the device. Occupied, warm up, winterized and economizer would be common. Other modes will be displayed if the unit uses them.
 6. In the upper right-hand area, just below the links, the setpoints of the device will be displayed. All setpoints in the various control loops of the device, DA temp, static pressure, MA will be placed in columns as the drawing permits.
 7. The date of the last revision of the graphic will be displayed in the lower right corner.
- F. Text:
1. Text will contrast with the background for easy reading.
 2. The text will be free floating without borders or boxes unless specifically required.
- G. The graphics shall include approved schematic of the equipment, sequence of operation and all wiring interface diagrams.
- H. The graphic shall include all new and existing systems, equipment and spaces.

PART 3 - EXECUTION

3.1 GENERAL SYSTEM REQUIREMENTS

- A. The control of each system shall be guaranteed to perform as described in the Sequence of Operation on the drawings. Equipment, remote switches, in finished rooms shall be flush-mounted, if possible. Interlock supply and return fans, humidifiers with fans, condensers or cooling towers with air conditioning equipment and similar situations demanding coordinated operation.
- B. All existing DDC controllers and sensors removed from the project shall be turned over the Owner in good condition.
- C. This contract shall be responsible for decommissioning of the temperature control systems being removed and modifications to existing system graphics and software programming.

3.2 SYSTEM COMPONENTS

- A. Valves: Union or flanged connected. Locate close to apparatus controlled with pipe reducers and increasers located closest to valve. Locate, arrange, and pipe per installation diagram.
- B. Thermostats/Sensors: Room thermostats or sensors shall be mounted symmetrical with adjacent items such as light switches (nominally 44 inch to the center of the device and in accordance with ADA requirements). Verify exact room location to avoid doors, fixed and portable equipment. Install to minimize damage. Do not install adjacent to lighting dimmers or other heat generating equipment.
- C. Dampers and Damper Operators: Tag dampers for proper location. Install per manufacturer's printed instruction as to motor size and quantity, linkage arrangement, drive connection point. Adjust to close tightly. Allow for conduit sleeve or blank space for roof fan dampers. Where ducts are insulated, set damper operators at least 2 in. away from side of duct to allow for insulation.

3.3 SYSTEM TESTING AND COMMISSIONING

- A. At the time of installation, systems shall be tested for control device operation prior to the systems acceptance. A report of each systems performance shall be submitted to the Owner's Representative. The report shall include:
 - 1. Field verification and demonstration checklist of analog input calibration, analog output operation, digital input function, and digital output operation.
 - 2. Trend log of inputs and output, printed every two (2) hours, for one (1) week.
 - 3. Refer to "Instructions and Adjustments".

3.4 EXISTING CONTROL DEVICES

- A. The bid for the control work shall be based on the premise that existing control devices are operational and are not in need of repair and replacement, unless otherwise noted.
- B. This contractor shall notify the Owner's Representative of existing control devices that need to be replaced or repaired that may be noticed in the process of installation of new work.

3.5 SYSTEM DESCRIPTION - GENERAL

- A. All systems shall maintain the scheduled or otherwise noted minimum outside air ventilation rate during building occupied hours.
- B. Provide normally open hot water and normally closed cooling coil valves.
- C. Provide normally open return air damper, normally closed relief air and normally closed outside air dampers and operators.
- D. Mode of operation (occupied/unoccupied) including building warm-up and pull-down cycles, as well as all system functions shall be programmable and controlled by the BMS system.

- E. Shutdown of air handling units and fans due to a fire alarm shall be by the Electrical Contractor. The fire alarm system will send a signal to the BMS system for monitoring purposes only of each air handling unit and exhaust system. The BMS system will provide a staggered restart of the units once the alarm is cleared.
- F. All setpoints shall be adjustable.
- G. Two (2) outside air temperature sensors are to be provided as general inputs to the BMS system. The pair of readings shall be averaged for use by the system. If an individual reading is found to be out of range by comparison, then the other reading shall be used, and an alarm shall be generated.
- H. Where the normal sequence position or status of a device is allowed to be manually overridden by the building Owner/operator, the device shall be returned to its normal "system off" position, if the system is shut down by the BMS system or building fire alarm system. This includes overriding manually set and locked setpoints. Upon system restart, the device shall return to its manually over-ridden status. Returning devices to their normal "systems off" position shall be done to reduce the potential of damage to the systems.

3.6 CONTROL SEQUENCE

- A. Disconnect and reconnect all fan coil unit controls from units to be removed and then reinstall on replacement units. The sequence of operation shall remain as existing.

END OF SECTION 23 09 23

SECTION 23 20 10

PIPING SYSTEMS AND ACCESSORIES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services as required for the complete installation designed in Contract Documents.

1.2 SUBMITTALS

- A. Schedule of pipe materials, fittings and connections.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Pipe and fittings shall be new, marked with manufacturer's name and comply with applicable ASTM and ANSI Standards.
- B. All adhesives, sealants, primers and paint used for piping in the interior of the building shall comply with the maximum Volatile Organic Compound (VOC) limits called for in the current version of U.S. Green Building Council LEED Credits EQ 4.1 and EQ 4.2.

2.2 STEEL PIPING AND FITTINGS

- A. Pipe: ASTM A53, Schedule 40 weight; black or galvanized finish as called for; ends chamfered for welding or roll grooved for grooved mechanical connections.
- B. Fittings: Same material and pressure class as adjoining pipe.
 - 1. Welded Fittings: Factory forged, seamless construction, butt weld type, chamfered ends. Where branch connections are two or more sizes smaller than main size, use of "Weldolets", "Thredolets", or "Sokolets" are acceptable. Socket weld type, 2000 psi wp, where required.
 - 2. Threaded Fittings: Cast or malleable iron, black or galvanized, as required; drainage type where called for.
 - 3. Shop Fabricated Connections and Fittings:
 - a. Shop Fabricated Branch Connections: Fabricated branch connections constructed in strict conformance to the appropriate ASME B 31 Code of Construction may be acceptable as reviewed by the Engineer. All fabricated connections shall be constructed under controlled shop conditions using automated equipment. Calculations for all fabricated connections demonstrating conformance to ASME code and project design criteria shall be prepared and submitted for acceptance prior to fabrication. Certified welding procedures, shop quality control

procedures and certifications of welders and inspectors shall be submitted to the Engineer prior to fabrication.

C. Flanges, Unions and Couplings:

1. Threaded Connections:

- a. Flanges: Cast iron companion type; for sizes 2-1/2 in. and larger.
- b. Unions: Malleable iron, bronze to iron seat, 300 lb. wwp; for sizes 2 in. and smaller.
- c. Couplings: Malleable iron, 150 or 300 lb. wwp, based on system pressure. Steel thread protectors are not acceptable as couplings.

2. Welded Connections:

- a. Flanges: Welding neck type.
- b. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents and working temperatures and pressures.
- c. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Gauge and Instrument Connections: Nipples and plugs for adapting gauges and instruments to piping system shall be IPS brass.

E. Base Elbows:

- 1. Cast iron or steel type, flange connections; Crane 500 or equivalent. Made from welding elbows, with welded pipe support and steel base. Reducing elbows where necessary.

ELBOW SIZE	SUPPORT SIZE	BASE PLATE
2 in. to 3 in.	1-1/4 in.	6 in. x 6 in. x 1/4 in.
4 in. to 6 in.	2-1/2 in.	8 in. x 8 in. x 1/4 in.
8 in. and larger	6 in.	14 in. x 14 in. x 5/16 in.

- 2. Anchor bolt holes in each corner of base for securely bolting to floor or concrete base; minimum 3/4 in. bolts.

2.3 COPPER TUBE AND FITTINGS - SOLDER JOINT

- A. Pipe: ASTM B88; Type K, L or M, hard temper. Soft temper only where specified. Plans show copper tube sizes.
- B. Tees, Elbows, Reducers: Wrought copper, ASME B16.22 or cast bronze; ASME B16.18 solder end connections.

- C. Unions and Flanges: 2 in. and smaller use unions, solder type, cast bronze, ground joint, 150 lb. swp; 2-1/2 in. and over use flanges, cast bronze, companion type, ASME drilled, solder connection, 150 lb. swp.
- D. Solder Materials: No-lead solder, using alloys made from tin, copper, silver and nickel.
- E. Make: Harris "Stay-Safe 50" and "Bright", Engelhard "Silverbright 100", Willard Industries "Solder Safe (silver bearing), Canfield "Watersafe" or approved equal.

2.4 COPPER TUBE AND FITTINGS - PRESS FITTINGS

- A. Tubing Standard: Copper tubing shall conform to ASTM B75 or ASTM B88.
- B. Fitting Standard: Copper fittings shall conform to ASME B16.18, ASME B16.22, or ASME B16.26.
- C. Press Fitting: Copper press fittings shall conform to the material and sizing requirements of ASME B16.18 or ASME B16.22. O-rings for copper press fittings shall be EPDM.
- D. Make: Viega Pro-Press, Nibco, Tyco Grinnell, Elkhart Apolloxpress, Mueller.

2.5 COPPER DRAINAGE TUBE AND FITTINGS - SOLDER JOINT

- A. Pipe: ASTM B306, Type DWV, hard temper.
- B. Fittings: Wrought copper, ANSI B16.29 or cast bronze, ANSI B16.23; solder end connections.
- C. Solder Materials: No lead solder, using alloys made from tin, copper, silver and nickel.
- D. Make: Harris "Stay-Safe 50" and "Bright", Engelhard "Silverbright 100", Canfield "Watersafe" or approved equal.

2.6 REFRIGERATION PIPING

- A. Type ACR hard temper deoxidized, dehydrated, and sealed copper tubing, refrigerant grade.
- B. Refrigerant grade wrought copper fittings. Long radius elbows.
- C. Factory made suction traps, Melco Type PT.
- D. Piping and system shall meet the requirements of Safety Code for Mechanical Refrigeration, ANSI/ASHRAE 15-1994 and ASME/ANSI B31.5.
- E. Brazing Materials: Harris, Inc. Stay Silv 5 or approved equal.
- F. Make: Mueller, Howell Metal, Cerro, Cambridge-Lee, Universal Tube.

2.7 DIELECTRIC PROTECTION

- A. Description: Assembly or fitting having insulating material isolating joined dissimilar metals to prevent galvanic action and stop corrosion.
- B. Dielectric unions shall not be used due to their tendency to leak. Provide a dielectric waterway fitting or a brass nipple for dielectric protection. A brass valve is also an acceptable method of dielectric protection.
- C. Flanges: Factory-fabricated, companion-flange assembly, for 150 or 300 psig minimum pressure to suit system fluid pressures and temperatures with flange insulation kits and bolt sleeves.
- D. Waterway Fittings: 300 psi maximum working pressure at 230°F, male threaded or grooved ends, electroplated ductile iron or steel body with LTHS high temperature polyolefin polymer liner.
- E. Make: EPCO, Capitol Manufacturing, Watts, Surejoint, Victaulic, or approved equal.
- F. The use of brass valves, brass nipples (3 in. and larger) and Shurjoint epoxy coated transition coupling IPS-CTS may be used for dielectric isolation. Dielectric transition fittings shall be Shurjoint Model DE30-GG for sizes 2 in. through 8 in., which shall provide effective insulation between the steel and copper systems to avoid galvanic local cell and stray current problems. The dielectric transition fitting shall be made of ductile iron per ASTM A536 Gr. 65-45-12, electric deposition coated, with a virgin PP (propylene) lining.

2.8 HANGERS, INSERTS, AND SUPPORTS

- A. Hangers, Inserts, Clamps: B-Line, Grinnell, Michigan Hanger, PHD Manufacturing, Anvil, Hilti.
- B. Hangers:
 - 1. Adjustable, wrought malleable iron or steel with electroplated zinc or cadmium finish. Copper plated or PVC coated where in contact with copper piping. Hot-dipped galvanized finish for exterior locations.
 - 2. Adjustable ring type where piping is installed directly on hanger for piping 3 in. and smaller.
 - 3. Adjustable steel clevis type for 4 in. and larger, and where insulation passes through hanger.
 - 4. Hangers sized to permit passage of insulation through the hanger for all piping.
 - 5. Nuts, washers and rods with electroplated zinc or cadmium finish. Hot-dipped galvanized finish for exterior locations.
- C. Hanger Shields:
 - 1. Pre-Insulated Type:

- a. Insulated pipes shall be protected at point of support by a 360° insert of high density, 100 psi waterproof calcium silicate, encased in a 180° sheet metal shield. Insulation insert to be same thickness as adjoining pipe insulation and extend 1 in. beyond sheet metal shield. Insulation shall be provided with a factory installed ASJ.

2. Field-Insulated Type:

- a. #18 USSG, galvanized steel shields, minimum 120° arc. Provide ICA-HAMFAB-BLOCK, 18# density molded fiberglass inserts, between pipe and hanger shield to maintain proper spacing for insulation. Insulation inserts shall extend 1 in. beyond the sheet metal shields. Material shall comply with ASTM E84 25/50, have a thermal conductivity of K=.30 (stable) and have a service temperature of -120°F to +650°F. Install in accordance with manufacturer's printed instructions.

3. Shield Sizing:

PIPE SIZE	SHIELD LENGTH	MINIMUM GAUGE
1/2 in. to 3-1/2 in.	9 in.	20
4 in.	9 in.	20
5 in. and 6 in.	9 in.	20
8 in. to 12 in.	12 in.	18
14 in. to 24 in.	18 in.	16

4. Hanger shield gauges listed are for use with band type hangers only. For point loading (roller support), increase shield thickness by one gauge, and length by 50%.

- D. Hanger Spacing Schedules: (Based upon most stringent requirement of MCNYS and ASME B31.9)

COPPER OR PLASTIC PIPE SIZE	COPPER PIPE HANGER SPACING	PLASTIC PIPE HANGER SPACING	HANGER ROD SIZE
3/4 to 1 in.	6 ft.	3 ft.	3/8 in.
1-1/4 in.	6 ft.	4 ft.	3/8 in.
1-1/2 to 2 in.	8 ft.	4 ft.	3/8 in.
2-1/2 to 4 in.	10 ft.	4 ft.	1/2 in.
5 in. and larger	10 ft.	4 ft.	3/4 in.

STEEL PIPE SIZE	STEEL PIPE HANGER SPACING	HANGER ROD SIZE
3/4 to 1 in.	8 ft.	3/8 in.
1-1/4 in.	10 ft.	3/8 in.
1-1/2 to 2-1/2 in.	12 ft.	3/8 in.
3 to 4 in.	12 ft.	1/2 in.
5 in. and larger	12 ft.	3/4 in.

- E. Inserts: Carbon steel body and square insert nut, galvanized finish, maximum loading 1,300 lbs., for 3/8 in. to 3/4 in. rod sizes. Drill through decking for hanger rods and secure devices with integral support plate strap with sheet metal screws. Devices shall have a safety factor of four.
- F. Beam Attachments:
 - 1. C-Clamp, locknut, electroplated finish, UL listed, FM approved, for pipe sizes 2 in. and smaller.
 - 2. Center load style with clamp attachments that engage both edges of beam, electroplated finish, UL listed, FM approved, for pipe sizes larger than 2 in., refer to "Supports" for additional requirements.
 - 3. Welded beam attachments may be considered only upon the review and acceptance of the structural engineer of record with written confirmation of weld meet configuration, location and service/pipe size submitted to the Mechanical Engineer for review.
- G. Supports:
 - 1. Provide intermediate structural steel members where required for hanger attachment. Secure member to structure. Select size of members based on a minimum factor of safety of four.
 - 2. For Weights Under 1000 lbs.: Insert, "U" shaped channel, beam clamps or other structurally reviewed support. The factor of safety shall be at least four. Follow manufacturer's recommendations.
 - 3. For Weights Above 1000 lbs.: Drill through floor slabs and provide flush plate welded to top of rod or provide additional inserts and hangers to reduce load per hanger below 1000 lbs.
 - 4. Make: Hilti, ITW Ramset, Phillips "Red Head", or approved equal.
- H. Trapeze Hangers:
 - 1. For use on 1-1/2 in. and smaller piping only.
 - 2. Hangers shall be supported with rod sized with a safety factor of four.
 - 3. May be manufactured type "U" shaped channel, or suitable angle iron or channel. Round off all sharp edges.
 - 4. Securely fasten piping to trapeze with "U" bolt or straps, dissimilar metals shall not touch, use isolation gaskets.
 - 5. Make: B-Line, Kindorf, Unistrut, or approved equal.

2.9 PIPING ACCESSORIES

- A. Escutcheon Plates: Provide escutcheon plates on uninsulated piping in exposed and finished areas. Steel or cast brass polished chrome, split hinge type with setscrew, high plates where required for extended sleeves.
- B. Pipe Guides: Cylindrical steel guide sleeve, proper length for travel, integral bottom base anchor, top half removable. Split steel spider to bolt to pipe, copper plated spider for copper pipe. Insulated style where pipe is required to be insulated. Make: Tri-State Industries, or equal.
- C. Anchors:
 - 1. Pipe support; same material as pipe; as manufactured by Pipe Shields Model C1000 or C2000, Keflex, Metraflex, Flexonics or Advanced Thermal Systems.
 - 2. Pipe Anchors:
 - a. Anchors shall be designed and located as to prevent stress to piping or building structural components from exceeding those permitted by ASME B31.9 and to prevent transfer of loading and stressing to connected equipment.
- D. Pipe Roll Stand: Cast iron roll stand. Make: Advanced Thermal Systems, Carpenter and Patterson, ITT Grinnell, Pipe Shields.

2.10 SLEEVES

- A. Standard Type:
 - 1. Schedule 40 black steel pipe sleeves shall be used for sleeves in horizontal and vertical applications through structural surfaces. Sleeves shall extend a minimum of 1 in. beyond both sides of the structure surface being penetrated. The sleeve shall be sized to account for the total diameter of the service, inclusive of insulation and the appropriate annular space for firestopping installation or requirements of the sealing element manufacturer.
 - 2. Full circle water stop collar for sleeves located in below grade walls, wet wells and waterproofed surfaces. The collar shall be fabricated from steel plate and welded to the sleeve around its entire circumference.
 - 3. Schedule 40, PVC sleeves or sheet metal sleeves for nonstructural surfaces and existing construction. Sheet metal sleeves shall be 18 gauge minimum and braced to prevent collapsing. Sleeves shall extend a minimum of 1/2 in. beyond both sides of the non-structural vertical surface being penetrated. The sleeve shall be sized to account for the total diameter of the service, inclusive of insulation and the appropriate annular space for firestopping.
- B. Pre-Insulated Type:
 - 1. Adjustable or fixed length metal cans, 24 gauge minimum sized for 1 in. spacing between insulation and can. Insulation shall consist of a 360° waterproofed

calcium silicate insert sized to extend 1 in. beyond wall or floor penetration. Calcium silicate insert shall be the same thickness as adjoining pipe insulation. Spacing between shield and can packed at each end with double neoprene rope positively fastened.

2.11 SEALING ELEMENTS

- A. Expanding neoprene link type, watertight seal consisting of interlocking links with zinc plated bolts.
 - 1. Make: Thunderline "Link-Seal" Series 200, 300 or 400, Pyropac, Calipco.
- B. Waterproof Type:
 - 1. Exterior Walls, Below Grade, Above Floor: Synthetic rubber material with zinc plated bolts. Make: "Link-Seal" Series 200, 300 or 400, Pyropac, Calipco.

2.12 FIRESTOP SYSTEM FOR OPENINGS THROUGH FIRE RATED WALL FLOOR ASSEMBLIES

- A. Materials for firestopping seals shall be listed by an approved independent testing laboratory for "Penetration Firestop Systems". The system shall meet the standard fire test for Penetration Firestop Systems designated ASTM E814. Firestop system shall be provided at locations where piping passes through fire rated wall, floor/ceiling, or ceiling/roof assembly. Minimum required fire resistant ratings of the assembly shall be maintained by the Firestop System. Installation shall conform with the manufacturer's recommendations and other requirements necessary to meet the testing laboratory's listing for the specific installation.

2.13 PIPING MATERIALS AND SCHEDULE

- A. See Exhibit "A", "Schedule of Piping Materials" at end of this Section for (HVAC) piping.

PART 3 - EXECUTION

3.1 EQUIPMENT AND SYSTEMS

- A. Provide equipment and systems in accordance with laws, codes, and provisions of each applicable section of these specifications. Accurately establish grade and elevation of piping before setting sleeves. Install piping without springing or forcing (except where specifically called for), making proper allowance for expansion and anchoring. Arrange piping at equipment with necessary offsets, union, flanges, and valves, to allow for easy part removal and maintenance. Offset piping and change elevation as required to coordinate with other work. Avoid contact with other mechanical or electrical systems. Provide adequate means of draining and venting units, risers, circuits and systems. Install drains consisting of a tee fitting with a 3/4 in. ball valve with hose end cap and chain, at low points in hydronic piping system mains, and elsewhere as required for system drainage.

- B. Conceal piping unless otherwise called for. Copper tubing shall be cut with a wheeled tubing cutter or other approved copper tubing cutter tool. The tubing must be cut square to permit proper joining with the fittings. Ream pipes after cutting and clean before installing. Cap or plug equipment and pipe openings during construction. Install piping parallel with lines of building, properly spaced to provide clearance for insulation. Make changes in direction and branch connections with fittings unless submitted and accepted per Part 2. Do not install valves, union and flanges in inaccessible locations. Provide trap seal of adequate depth on drain pans.
- C. Provide reducers at all control valves, where control valve is smaller than pipeline size. Reducers for steam control valves shall be eccentric type. Provide unions at each side of every control valve and reducers directly adjacent to the unions.
- D. Provide reducers at all balance valves, where balance valve is smaller than pipeline size.

3.2 PIPING OVER ELECTRICAL EQUIPMENT

- A. Contractor shall route piping to avoid installation directly over electric equipment, including, but not limited to panels, transformers, disconnects, starters, motor control center, adjustable speed drives and fused switches.
- B. Piping shall not be installed in the dedicated electric and working space as defined by NEC 110. Dedicated electrical space is generally equal to the depth and width of electrical equipment, and extends 6 ft. above the electrical equipment, or to a structural ceiling. Dedicated working space is a minimum of 30 in. wide or the width of equipment (whichever is larger) a minimum of 6 ft.-6 in. tall, with a depth of 3 ft. to 9 ft. depending on the voltage.

3.3 WATER SYSTEMS

- A. Top connection for upfeed, bottom or side connection for downfeed. Grade off level; up in direction of flow and down toward drain.

3.4 CONDENSATE DRAIN PIPING

- A. Condensate drain piping shall be sloped a minimum of 1% in the direction of flow to an approved place of disposal. Condensate shall not be disposed into a street, alley or other areas so as to cause a nuisance.
- B. Condensate drain piping shall not be less than 3/4" internal diameter and shall not decrease in size from the drain pan connection to the location of condensate disposal.
- C. Condensate drains shall be trapped as required by the equipment or appliance manufacturer.
- D. Condensate drain piping shall be configured to permit the clearance of blockages and performance of maintenance without requiring the drain piping to be cut.

3.5 REFRIGERATION PIPING

- A. Fittings brazed with silver brazing alloy. Guarantee refrigerant charge for one year from date of final acceptance. Provide for flexibility at compressor connections. Piping and system shall meet the requirements of Mechanical Refrigeration Safety Code, ANSI B9.1. Clean piping, then pump-down and evacuate system to 0.1 in. VAC break vacuum with dry nitrogen and re-evacuate to 0.1 in. VAC and hold for four (4) hours; then charge system. Charge with refrigerant as recommended by manufacturer.

3.6 HANGERS, INSERTS AND SUPPORTS

- A. Piping shall not be supported by wires, band iron, chains, or from other piping. Support each pipe with individual hangers from concrete inserts, welded supports, or beam clamps of proper configuration and point loading design requirements for each location including the designated safety factor. Trapeze hangers are acceptable for racking of multiple pipes of 1-1/2 in. or less in size. Follow manufacturer's safe loading recommendations. Suspend with rods of sufficient length for swing and of size as called for, using four nuts per rod. Provide additional rustproofed structural steel members, where required for proper support. Provide oversized hangers where insulation/supports must pass between pipe and hanger. Only concentric type hangers are permissible on piping larger than 2-1/2 in., "C" types are permitted for piping 2-1/2 in. and smaller. Provide riser clamps for each riser at each floor.
- B. Provide a pipe hanger within 12 in. of pipe unions and piping connections to equipment, in order to facilitate disconnections of piping without pipe sagging.

3.7 HANGERS ATTACHED TO JOISTS

- A. Individual hangers may be suspended directly from the bottom chord panel point provided that the sum of the concentrated loads within the chord panel does not exceed 100 pounds and the attachments are concentric to the chord. (Eccentrically loaded joists using beam clamps or other attachment methods are not acceptable.)
- B. For nominal concentrated loads between panel chords, which have been accounted for in the specified uniform design load for the joists, this Contractor is to provide struts to transfer the load to a panel point on the opposite chord as reviewed and acceptable by the Structural Engineer of Record.

3.8 PIPE CONNECTIONS

- A. Solder Connections: Nonacid flux and clean off excess flux and solder.
- B. Press Connections: Copper press fittings shall be made in accordance with the manufacturer's installation instructions. The tubing shall be fully inserted into the fitting and the tubing marked at the shoulder of the fitting. The fitting alignment shall be checked against the mark on the tubing to assure the tubing is fully engaged (inserted) in the fitting. The joints shall be pressed using the tool approved by the manufacturer.
- C. Brazed Connections: Make joints with silver brazing alloy in accordance with manufacturer's instructions. Remove working parts of valves before applying heat.

- D. Threaded Connections: Clean out tapering threads, made up with pipe dope; screwed until tight connection. Pipe dope must be specific for each application.
- E. Flanged Joints: Select appropriate gasket material, size, type and thickness for service applications. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- F. Dielectric Protection: Provide dielectric protection devices at ALL piping connections and ALL equipment connections, where dissimilar metals meet. Follow all applicable manufacturer's recommendations at equipment connections. Dielectric protection systems are not required for air or gas systems.

3.9 WELDING

- A. Welding shall be performed in compliance with the welding procedure specifications prepared by the National Certified Pipe Welding Bureau. Welded pipe fabricated by certified welder. Contractor shall submit proof of current certification of each welder. Use full-length pipe where possible; minimum distance between welds, 18 in. on straight runs. Welds must be at least full thickness of pipe inside smooth and remove cutting beads, slag and excess material at joints; chamfer ends. Minimum gap 1/8 in., maximum 1/4 in., for butt welds. One internal pass and one external pass minimum required on slip-on flanges. Do not apply heat to rectify distorted pipe due to concentrated welding; replace distorted pipe. When welding galvanized pipe, apply cold galvanizing on joint after welding.

3.10 HANGER SHIELDS

- A. Provide at hangers for all piping. Pre-insulated type or field-insulated type at Contractor's option.

3.11 SLEEVES

- A. Provide for pipes passing through floors, walls or ceilings.
- B. Standard Type: Provide for piping, except as called for.
- C. Extend 1/8 in. above finished areas. In above grade mechanical and other areas with floor drains; use steel pipe sleeves 2 in. above floor. Use pipe sleeves in bearing walls, structural slabs, beams and other structural surfaces, and where called for. Sleeves shall be as small as practical, consistent with insulation, so as to preserve fire rating. Fill abandoned sleeves with concrete. Provide rubber grommet seals for pipes passing through ducts or air chambers or built-up housings.

3.12 SLEEVE PACKING

- A. Seal void space at sleeves as follows:
 - 1. Interior Locations: Firmly pack with fiberglass and caulk.
 - 2. Exterior Walls and Below Grade Cored Holes: Use sealing element.

3. Fire Rated, Partitions and Floor Slabs: Use fire rated sealing elements, materials and methods. Provide per manufacturer's instructions to maintain firestop.
4. Waterproofed Walls and Floors: Use waterproof sealing element, device, or compound.

3.13 ESCUTCHEON PLATES

- A. Provide polished chrome escutcheon plates for uninsulated exposed piping passing through floors, walls or ceilings in finished areas.

3.14 CLEANING HOT WATER AND CHILLED WATER SYSTEMS

- A. Provide the services of an experienced Water Treatment Subcontractor.
- B. After each closed system has been tested and thoroughly flushed, the entire piping system shall be cleaned by, or as per, the Water Treatment Subcontractor.
- C. Operate pumps and arrange control system so that all control valves are open. Fill, vent and circulate system with this solution, while rising to design temperature.
- D. Remove, clean and/or replace air vents, strainers, and check valves, which do not function properly. After cleaning strainers, circulate for additional time, then clean strainers again; repeat until strainers are found clean. Drain and refill system.
- E. Provide a batch chemical feed tank, valving and accessories as shown in the Contract Documents. Add water treatment as necessary to prevent deterioration of piping systems and equipment due to oxygen, acid, scaling, etc. Submit typewritten letter to inform Owner's Representative upon completion of the work.
- F. Pumps shall not be operated continuously until system is flushed, strainers cleaned and water treatment is complete.
- G. Water Treatment:
 1. After system cleaning, furnish report of water test to determine quality.
 2. Provide complete water treatment facilities to Owner, including water analysis, feed equipment, metering equipment, pumps, and chemical, obtained from Calgon, Vulcan, Bird Archer, Heating Economy Service, Inc., Mogul, Garratt-Callahan Company, Metropolitan, or Allen-Murray.
 3. Recommendations for water treatment reviewed by Owner's Representative before systems are placed into service.
 4. Add water treatment as necessary to prevent deterioration of piping system and equipment due to oxygen, acid, scaling, etc.
 5. Water treatments shall be deemed complete when circulation has been established throughout, and water runs clear and clean from deposits and

discoloration. Submit typewritten letter to inform Owner's Representative upon completion of the Work.

3.15 TESTS

- A. Test piping and accessories before insulation, connection to existing piping or concealment. Repeat as many times as necessary to prove tight system. Notify Owner's Representative at least seven days in advance of each test. Isolate valves and equipment not capable of withstanding test pressures. Make leaks tight; no caulking permitted. Remove and replace defective fittings, pipe or connections. Furnish necessary pumps, gauges, equipment, piping, valving, power and labor for testing. Certify that tests have been successfully completed.
- B. Schedule of Test Requirements:
 - 1. Hot, Chilled, Water: Hydrostatic, 100 psig at high point of system; two (2) hours duration.
 - a. If utilizing a pressed mechanical connection system, test at 15 to 85 psig (or at manufacturer's recommended pressure) prior to testing at a higher pressure,
 - 2. Refrigeration:
 - a. After installation, charge system with dry nitrogen to manufacturer's recommended pressure.
 - b. System shall hold this charge with no pressure drop for 24 hours.
 - 3. Test: No change in pressure under stable temperature conditions.
 - 4. Equipment: Test at working pressures.

3.16 PROTECTION AGAINST PHYSICAL DAMAGE

- A. In concealed locations where piping, other than cast-iron or steel, is installed through holes or notches in studs, joists, rafters or similar members less than 1-1/2 in. from the nearest edge of the member, the pipe shall be protected by shield plates. Protective steel shield plates having a minimum thickness of 0.0575 in. (No. 16 gage) shall cover the area of the pipe where the member is notched or bored, and shall extend not less than 2 in. above sole plates and below top plates.

3.17 PIPE LINE SIZING

- A. Pipe sizes called for are to be maintained. Pipe sizing changes made only as reviewed by Owner's Representative. Where discrepancy in size occurs, the larger size shall be provided.

EXHIBIT "A" - PIPING MATERIALS (HVAC)

(Notes are at end of Exhibit "A")

<u>SERVICE</u>	<u>PIPE MATERIALS</u>	<u>FITTINGS</u>	<u>CONNECTIONS</u>
Hot water heating	Schedule 40, black steel	Malleable iron and butt weld	Screwed 2 in. and smaller; Welded 2-1/2 in. and larger; (SEE NOTE 1)
Hot water heating (optional)	Type L copper	Wrought copper or cast bronze, solder end	No-lead solder for 2 in. and smaller; 95/5 for 2-1/2 in. and larger
Hot water heating (optional)	Type L copper	Wrought copper or cast bronze	Viega Pro-Press, Nibco Press, Elkhart Apolloxpress
Chilled water	Schedule 40, black steel	Butt weld and malleable iron	2-1/2 in. and larger welded or flanged; 2 in. and smaller screwed (SEE NOTE 1)
Chilled water (optional)	Type L copper	Wrought copper or cast bronze solder end	No-lead solder for 2 in. and smaller 95/5 for 2-1/2 in. and larger
Chilled water (optional)	Type L copper	Wrought copper or cast bronze	Viega Pro-Press, Nibco Press, Elkhart Apolloxpress
Refrigerant	Type ACR refrigerant grade hard temper, deoxidized copper	Wrought copper, brazed end	Sil-Flo "5" silver brazing
Vent, overflow, condensate drain	Type DWV or Type M copper	Wrought copper	Threaded or solder

NOTES FOR EXHIBIT "A":

NOTE 1: Screwed piping permitted in Crawl Spaces, Mechanical Rooms and Boiler Rooms.

END OF SECTION 23 20 10

SECTION 23 81 26.11

DUCTLESS SPLIT SYSTEM AIR CONDITIONER

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide all labor, materials, equipment and services as required for the complete installation designed in Contract Documents.

1.2 SUBMITTALS

- A. Submit product data for split system ductless air conditioner, including condensing unit, refrigerant piping diagrams, and control and wiring schematics.

1.3 GENERAL REQUIREMENTS

- A. Provide units to fit intended use and location as indicated:
 - 1. Capacity, size and arrangement, component parts and accessories as scheduled and/or as necessary to obtain required results and allow for proper maintenance.
 - 2. Unit capacities to be ARI 210 rated.
 - 3. Unit to meet or exceed minimum SEER Requirements of New York State Energy Code and Department of Energy (DOE).

PART 2 - PRODUCTS

2.1 AIR HANDLING UNIT (WALL MOUNTED TYPE)

- A. Units shall be completely factory assembled including coil, condensate drain pan, fan, motor, filters and controls in an insulated casing. Units shall be UL listed and C.S.A. certified. Forward curved, dynamically and statically balanced fan with 3 speed direct drive. Fan motor bearing shall be permanently lubricated.
- B. Units shall have sheet metal and steel frame construction and shall be painted with an enamel finish. Casing shall be insulated and knockouts shall be provided for electrical power and control wiring.
- C. Unit shall have a single refrigerant circuit controlled by a flow control check valve (FCCV). Aluminum fin surface shall be mechanically bonded to 3/8 in. OD copper tubing. Coils shall be factory pressure and leak tested.

2.2 CONDENSING UNIT

- A. The condensing unit shall be fully charged from the factory for up to 100 ft. of piping. The unit must be designed to operate at outdoor ambient temperatures as high as 115°F and as low as -20°F, with low-ambient kit. The unit shall be UL listed. Unit casing shall

be constructed of heavy gauge, galvanized steel and painted with a weather-resistant powder paint finish.

- B. Refrigeration system controls include condenser fan and compressor contactor. High and low pressure controls shall be inherent to the compressor. A factory installed liquid line dryer shall be standard. The compressor shall feature internal over temperature and pressure protection, total epoxy dipped hermetic motor windings, thermostatically controlled sump heater, centrifugal oil pump, and internal spring mounts to reduce vibration and noise. The coil shall be continuously wrapped, corrosion resistant all aluminum glued with minimized brazed joints. The coil shall be 3/8 in. O.D. seamless aluminum glued to a continuous aluminum fin. The coil shall be protected on all four sides by louvered panels.

2.3 ACCESSORIES

- A. Wall Mounted Microprocessor Controller:
 - 1. Liquid crystal digital display indicating: Operating mode, setpoint temperature, room temperature, timer setting, fan speed and airflow direction.
 - 2. Self diagnostic fault indication.
 - 3. 24 hour on-off timer.
 - 4. Previous setpoint memory feature.
- B. Low ambient protection kit with wind baffle. Allow unit operation down to **-20°F**.
- C. Auto restart following power failure.
- D. Pre-charged uninsulated refrigerant piping lines.

2.4 DESIGN EQUIPMENT

- A. Fujitsu.

2.5 ACCEPTABLE MAKE

- A. Fujitsu, Sanyo, Mitsubishi, EMI, Carrier.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install equipment in strict accordance with manufacturer's instructions and so as to be compatible with intent of the respective system performance requirements.
- B. Provide 2 in. thick wire mesh reinforced concrete paver of sufficient size for all outdoor condensing units.
- C. Provide condensate piping to exterior.

- D. Provide refrigerant piping and control wiring.
- E. Provide any and all necessary control wiring

END OF SECTION 23 81 26.11

SECTION 23 82 19

FAN COIL UNITS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services as required for the complete installation shown on Contract Drawings.

1.2 SUBMITTALS

- A. Submit product data for room fan coil units and accessories.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Baked enamel finish of color selected from manufacturers standard colors. Each piece of equipment boxed separately and tagged by room number.
- B. Coordinate voltages of valve and damper operators to be provided, with the DDC system controls subcontractor.

2.2 CONSOLE FAN COIL UNITS

- A. Cabinets:
 - 1. 18 gauge steel removable front enclosure so that internal operating parts are accessible for service or replacement.
 - 2. Bar supply grilles.
 - 3. Isolated valve compartment.
 - 4. Access to motor, fan assembly, and filters.
 - 5. Type as required for job conditions.
 - 6. Return air grilles.
 - 7. Insulated drip pan for coil and valve sections.
 - 8. Insulated cabinet with material in compliance with NFPA 90A requirements.
- B. Heating Coils:
 - 1. Copper tubes and headers, nonferrous fins.
- C. Cooling Coils:

1. Copper tubes and headers, nonferrous fins.
- D. Motors:
1. Multispeed, tapwound permanent split capacitor high efficiency type.
 2. Built-in overload protection.
 3. Resilient mountings to dissipate noise and magnetic vibration.
 4. Quick detachable motor cords.
 5. Permanently lubricated bearings.
- E. Shall not exceed sound data as scheduled. Acoustical data is published manufacturer's data obtained by tests in accordance with ARI Standard 350-086.
- F. Options:
1. Fresh air intake damper with two-position spring-return electric operator.
 2. Keylock panel and access doors.
 3. Manual air vent.
 4. Disconnect switch.
 5. 1 in. pleated throwaway filter.
 6. Deluxe 2-way factory installed piping package with manual circuit setter, unions, strainer and supply side ball valve.
 7. Unit-mounted fan speed switch.
- G. Design Equipment: Trane.
- H. Make: Carrier, Daikin Applied, Trane.

PART 3 - EXECUTION

3.1 GENERAL

- A. Left hand or right hand piping connections for supply and return. Obtain complete instructions from unit manufacturer regarding each item and proper installation of same. Adjust motor speed.

3.2 INSTALLATION

- A. In accordance with manufacturer's recommendations. Install piping within valve compartment to allow for pipe insulation. Provide drain piping. Vacuum clean inside of unit prior to operating units.

END OF SECTION 23 82 19

SECTION 26 05 00

ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide all labor, tools, materials, accessories, parts, transportation, taxes, and related items, essential for installation of the work and necessary to make work, complete, and operational. Provide new equipment and material unless otherwise called for. References to codes, specifications and standards called for in the specification sections and on the drawings mean, the latest edition, amendment and revision of such referenced standard in effect on the date of these contract documents. All materials and equipment shall be installed in accordance with the manufacturer's recommendations.

1.2 LICENSING

- A. The Contractor shall hold a license to perform the work as issued by the authority having jurisdiction.
- B. Plumbing contract work shall be performed by, or under, the direct supervision of a licensed master plumber.
- C. Electrical contract work shall be performed by, or under, the direct supervision of a licensed electrician.

1.3 PERMITS

- A. Apply for and obtain all required permits and inspections, pay all fees and charges including all service charges. Provide certificate of approval from the Authorities Having Jurisdiction prior to request for final payment.
- B. Provide electrical inspection certificate of approval from Middle Department Inspection Agency, Commonwealth Inspection Agency, or an Engineer approved Inspection Agency prior to request for final payment.

1.4 CODE COMPLIANCE

- A. Provide work in compliance with the following Codes and Standards based on the current edition in effect at project location:
 - 1. Building, Code of New York State.
 - 2. Existing Building Code of New York State.
 - 3. Fire Code of New York State.
 - 4. Plumbing Code of New York State.
 - 5. Mechanical Code of New York State.

6. Fuel Gas Code of New York State.
7. Property Maintenance Code of New York State.
8. Energy Conservation Code of New York State.
9. Accessible and Usable Buildings and Facilities, ICC A117.1.
10. New York State Department of Labor Rules and Regulations.
11. New York State Department of Health.
12. National Electrical Code (NEC).
13. Occupational Safety and Health Administration (OSHA).
14. Local Codes and Ordinances.
15. Life Safety Code, NFPA 101.

1.5 GLOSSARY

ACI	American Concrete Institute
AGA	American Gas Association
AGCA	Associated General Contractors of America, Inc.
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AFBMA	Anti-Friction Bearing Manufacturer's Association
AMCA	Air Moving and Conditioning Association, Inc.
ANSI	American National Standards Institute
ARI	Air Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.
ASME	American Society of Mechanical Engineers
ASPE	American Society of Plumbing Engineers
ASTM	American Society for Testing Materials
AWSC	American Welding Society Code
AWWA	American Water Works Association
FM	Factory Mutual Insurance Company
IBR	Institute of Boiler & Radiation Manufacturers
IEEE	Institute of Electrical and Electronics Engineers

IRI	Industrial Risk Insurers
NEC	National Electrical Code
NEMA	National Electrical Manufacturer's Association
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
NYS/DEC	New York State Department of Environmental Conservation
SBI	Steel Boiler Institute
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
UFPO	Underground Facilities Protective Organization
UL	Underwriter's Laboratories, Inc.
OSHA	Occupational Safety and Health Administration
XL - GAP	XL Global Asset Protection Services

1.6 DEFINITIONS

Acceptance	Owner acceptance of the project from Contractor upon certification by Owner's Representative.
As Specified	Materials, equipment including the execution specified/shown in the contract documents.
Basis of Design	Equipment, materials, installation, etc. on which the design is based. (Refer to the article, Equipment Arrangements, and the article, Substitutions.)
Code Requirements	Minimum requirements.
Concealed	Work installed in pipe and duct shafts, chases or recesses, inside walls, above ceilings, in slabs or below grade.
Coordination Drawings	Show the relationship and integration of different construction elements and trades that require careful coordination during fabrication or installation, to fit in the space provided or to function as intended.
Delegated-Design Services	Performance and Design criteria for Contractor provided professional services. Where professional design services or certifications by a design professional are specifically required of a Contractor, by the Contract Documents. Provide products and systems with the specific design criteria indicated. If criteria indicated is insufficient to perform services or certification required, submit a written request for additional information to the Engineer. Submit wet signed and sealed certification by the licensed design professional for each product and system specifically assigned to the Contractor to be designed or certified by a design professional. Examples: structural maintenance ladders, stairs and platforms, pipe anchors, seismic compliant system, wind, structural supports for material equipment, sprinkler hydraulic calculations.

Equal, Equivalent, Equal To, Equivalent To, As Directed and As Required	Shall all be interpreted and should be taken to mean "to the satisfaction of the Engineer".
Exposed	Work not identified as concealed.
Extract	Carefully dismantle and store where directed by Owner's Representative and/or reinstall as indicated on drawings or as described in specifications.
Furnish	Purchase and deliver to job site, location as directed by the Owner's Representative.
Inspection	Visual observations by Owner's site Representative.
Install	Store at job site if required, proper placement within building construction including miscellaneous items needed to affect placement as required and protect during construction. Take responsibility to mount, connect, start-up and make fully functional.
Labeled	Refers to classification by a standards agency.
Manufacturers	Refer to the article, Equipment Arrangements, and the article, Substitutions.
Prime Professional	Architect or Engineer having a contract directly with the Owner for professional services.
Product Data	Illustrations, standard schedules, performance charts, instructions, brochures, wiring diagrams, finishes, or other information furnished by the Contractor to illustrate materials or equipment for some portion of the work.
Provide (Furnish and Install)	Contractor shall furnish all labor, materials, equipment and supplies necessary to install and place in operating condition, unless otherwise specifically stated.
Relocate	Disassemble, disconnect, and transport equipment to new locations, then clean, test, and install ready for use.
Remove	Dismantle and take away from premises without added cost to Owner, and dispose of in a legal manner.
Review and Reviewed	Should be taken to mean to be followed by "for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents".
Roughing	Pipe, duct, conduit, equipment layout and installation.
Samples	Physical full scale examples which illustrate materials, finishes, coatings, equipment or workmanship, and establishes standards by which work will be judged.
Satisfactory	As specified in contract documents.
Shop Drawings	Fabrication drawings, diagrams, schedules and other instruments, specifically prepared for the work by the Contractor or a Sub-contractor, manufacturer, supplier or distributor to illustrate some portion of the work.
Site Representative	Owner's Inspector or "Clerk of Works" at the work site.
Submittals Defined	Any item required to be delivered to the Engineer for review as requirement

(Technical) of the Contract Documents.

The purpose of technical submittals is to demonstrate for those portions of the work for which a submittal is required, the manner in which the Contractor proposes to conform to the information given and design concepts expressed and required by the Contract Documents.

1.7 EXISTING CONDITIONS

- A. Contractor shall review all available record documents of existing construction or other existing conditions and hazardous material information. Owner does not guarantee that existing conditions are the same as those indicated in these documents. Contractor shall record existing conditions via measured drawings and preconstruction photographs or video. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage, removal or construction operations.
- B. Owner will occupy portions of the building immediately adjacent to the area(s) of removals. Conduct removals so Owner's operations are not disrupted. Contractor shall locate, identify, disconnect and seal or cap mechanical, plumbing, fire protection and/or electrical systems serving areas of removals, unless noted otherwise in the contract documents. Contractor shall arrange shut-down of systems with the Owner. Piping and ductwork indicated to be removed shall be removed and capped or plugged with compatible materials. If services/systems are required to be removed, relocated or abandoned, provide temporary services/systems the bypass area(s) of removals to maintain continuity of services/systems to other parts of the building, as required.

1.8 SHOP DRAWINGS/PRODUCT DATA/SAMPLES

- A. Provide submittals on all items of equipment and materials to be furnished and installed. Submittals shall be accompanied by a transmittal letter, stating name of project and contractor, name of vendor supplying equipment, number of drawings, titles, specification sections (name and number) and other pertinent data called for in individual sections. Submittals shall have individual cover sheets that shall be dated and contain: Name of project; name of prime professional; name of prime contractor; description or names of equipment, materials and items; and complete identification of locations at which materials or equipment are to be installed. Individual piecemeal or incomplete submittals will not be accepted. Similar items, (all types specified) shall be submitted at under one cover sheet per specification section (e.g. lighting fixtures, valves, plumbing fixtures, etc.). Submittals shall include all required documentation for each product listed in the specification section at the same time as a complete package. Number each submittal by trade. Indicate deviations from contract requirements on Letter of Transmittal. Submittals will be given a general review only. Corrections or comments made on the Submittals during the review do not relieve Contractor from compliance with requirements of the drawings and specifications. The Contractor is responsible for: confirming and correcting all quantities; checking electrical characteristics and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner. If submitting hard copies, submit four (4) copies for review.

- B. The Engineer will review up to two (2) submissions of any single submittal. The Contractor will be invoiced on an hourly rate basis for the time spent reviewing the same shop drawing in excess of twice.
- C. If submittals are to be submitted electronically, all requirements in Item A apply. Submittals shall be emailed in PDF format to specific email address provided by the Construction Manager, General Contractor, Architect or Project Manager. Name of project shall be in subject line of email. Send emails to mealbasubmittalclerk@meengineering.com
- D. Refer to Division 01 for additional requirements.

1.9 PROTECTION OF PERSONS AND PROPERTY

- A. Contractor shall assume responsibility for construction safety at all times and provide, as part of contract, all trench or building shoring, scaffolding, shielding, dust/fume protection, mechanical/electrical protection, special grounding, safety railings, barriers, and other safety feature required to provide safe conditions for all workmen and site visitors.

1.10 EQUIPMENT ARRANGEMENTS

- A. The contract documents are prepared using one manufacturer as the Basis of Design, even though other manufacturers' names are listed. If Contractor elects to use one of the listed manufacturers other than Basis of Design or if the physical size, performance or electrical characteristics for the Basis of Design equipment differs from what is indicated in the contract documents, submit detailed drawings, indicating proposed installation of equipment. Show maintenance clearances, service removal space required, and other pertinent revisions to the design arrangement. Make required changes in the work of other trades, at no increase in any contract. Provide larger motors, feeders, breakers, and equipment, additional control devices, valves, fittings and other miscellaneous equipment required for proper operation, and assume responsibility for proper location of roughing and connections by other trades. Remove and replace doorframes, access doors, walls, ceilings, or floors required to install. If revised arrangement submittal is rejected, revise and resubmit specified Basis of Design item which conforms to Contract Documents.

1.11 SUBSTITUTIONS

- A. Refer to Division 01 for additional requirements.

1.12 CONTINUITY OF SERVICES

- A. The building will be in use during construction operations. Maintain existing systems in operation within all rooms of building at all times. Refer to "General Conditions of the Contract for Construction" for temporary facilities for additional contract requirements. Schedules for various phases of contract work shall be coordinated with all other trades and with Owner's Representative. Provide, as part of contract, temporary mechanical and electrical connections and relocations as required to accomplish the above. Obtain approval in writing as to date, time, and location for shutdown of existing mechanical/electrical facilities or services.

1.13 ROUGHING

- A. The Contract Drawings have been prepared in order to convey design intent and are diagrammatic only. Drawings shall not be interpreted to be fully coordinated for construction.
- B. Due to small scale of Drawings, it is not possible to indicate all offsets, fittings, changes in elevation, interferences, etc. Make necessary changes in contract work, equipment locations, etc., as part of a contract to accommodate work to avoid obstacles and interferences encountered. Before installing, verify exact location and elevations at work site. **DO NOT SCALE** plans. If field conditions, details, changes in equipment or shop drawing information require an important rearrangement, report same to Owner's Representative for review. Obtain written approval for all major changes before installing.
- C. Install work so that items both existing and new are operable and serviceable. Eliminate interference with removal of coils, motors, filters, belt guards and/or operation of doors. Provide easy, safe, and code mandated clearances at controllers, motor starters, valve access, and other equipment requiring maintenance and operation. Provide new materials, including new piping and insulation for relocated work.
- D. Coordinate work with other trades and determine exact route or location of each duct, pipe, conduit, etc., before fabrication and installation. Coordinate with Architectural Drawings. Obtain from Owner's Representative exact location of all equipment in finished areas, such as thermostat, fixture, and switch mounting heights, and equipment mounting heights. Coordinate all work with the architectural reflected ceiling plans and/or existing Architecture. Mechanical and electrical drawings show design arrangement only for diffusers, grilles, registers, air terminals, lighting fixtures, sprinklers, speakers, and other items. Do not rough-in contract work without reflected ceiling location plans.
- E. Before roughing for equipment furnished by Owner or in other Divisions, obtain from Owner and other Divisions, approved roughing drawings giving exact location for each piece of equipment. Do not "rough in" services without final layout drawings approved for construction. Cooperate with other trades to insure proper location and size of connections to insure proper functioning of all systems and equipment. For equipment and connections provided in this contract, prepare roughing drawing as follows:
 - 1. Existing Equipment: Measure the existing equipment and prepare for installation in new location.
 - 2. New Equipment: Obtain equipment roughing drawings and dimensions, then prepare roughing-in-drawings. If such information is not available in time, obtain an acknowledgement in writing, then make space arrangements as required with Owner's Representative.

1.14 REMOVAL WORK

- A. Refer to Division 02 for additional information regarding hazardous materials.

1.15 REFRIGERANT RECOVERY

- A. Existing equipment to be removed, as shown on the plans may contain refrigerant and refrigerant oils. This refrigerant and refrigerant oil must be handled in accordance with Federal, State and Local law requirements.
- B. Removal and recovery of refrigerant shall be in accordance with the current edition of Section 608 of the Clean Air Act of 1990, including all final regulations.
- C. Refrigerant recovery must be performed by a technician, certified by an EPA-approved certification program, using refrigerant recovery and recycling equipment certified by an EPA-approved testing organization.
- D. Owner "reserves the right of first refusal" on ownership of recovered refrigerant. Should Owner choose to maintain ownership of refrigerant, refrigerant shall be reclaimed, cleaned by this Contractor to ARI 700-1993 Standard of Purity, by an EPA certified refrigerant reclaimer. Refrigerant shall be turned over to the Owner in suitable marked containers to be stored on site, at a place of the Owner's choosing.

1.16 EQUIPMENT AND MATERIAL REQUIREMENTS

- A. Provide materials that meet the following minimum requirements:
 - 1. Materials shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less, in accordance with NFPA 255.
 - 2. All equipment and material for which there is a listing service shall bear a UL label.
 - 3. Potable water systems and equipment shall be built according to AWWA Standards.
 - 4. Gas-fired equipment and system shall meet AGA Regulations and shall have AGA label.
 - 5. All electrical equipment and systems, as a whole, shall be tested and listed by an OSHA approved Nationally Recognized Testing Laboratory (NRTL) for the intended use in accordance with the applicable standards and have a physical label indicating such.
 - 6. Fire protection equipment shall be UL listed and FM approved.
- B. Exterior and wet locations shall utilize materials, equipment supports, mounting, etc. suitable for the intended locations. Metals shall be stainless steel, galvanized or with baked enamel finish as a minimum. Finishes and coatings shall be continuous and any surface damaged or cut ends shall be field corrected in accordance with the manufacturer's recommendations. Hardware (screws, bolts, nuts, washers, supports, fasteners, etc.) shall be:
 - 1. Stainless steel where the associated system or equipment material is stainless steel or aluminum.

2. Hot dipped galvanized or stainless steel where the associated system or equipment is steel, galvanized steel or other.

1.17 CUTTING AND PATCHING

- A. Each trade shall include their required cutting and patching work unless shown as part of the General Construction Contract. Refer to General Conditions of the Contract for Construction, for additional requirements. Cut and drill from both sides of walls and/or floors to eliminate splaying. Patch cut or abandoned holes left by removals of equipment or fixtures. Patch adjacent existing work disturbed by installation of new work including insulation, walls and wall covering, ceiling and floor covering, other finished surfaces. Patch openings and damaged areas equal to existing surface finish. Cut openings in prefabricated construction units in accordance with manufacturer's instructions.

1.18 PAINTING

- A. Refer to Division 9 - Finishes, for additional information.

1.19 EXISTING CEILING REMOVAL AND RE-INSTALLATION

- A. In a renovation project, any existing ceiling removal and re-installation work required for the completion of a Contractors or Subcontractors work, shall be removed and re-installed by that Contractor or Subcontractor. This applies in any areas not called for to have a new ceiling installed.
- B. The ceiling removal and re-installation shall include lay-in ceiling tile and grid, to the extent necessary to accomplish the work. Removed ceiling tile and grid shall be safely stored during the course of the work, and it shall be re-installed to the original existing condition.
- C. The ceiling removal and re-installation shall include gypsum board or plaster ceilings and the associated suspension systems. Removed ceiling areas shall be patched with materials to match the existing ceiling, and painted to match. If paint cannot be matched exactly, paint the entire ceiling a similar color.

1.20 CONCEALMENT

- A. **Conceal all contract work** above ceilings and in walls, below slabs, and elsewhere throughout building. If concealment is impossible or impractical, notify Owner's Representative before starting that part of the work and install only after their review. In areas with no ceilings, install only after Owner's Representative reviews and comments on arrangement and appearance.

1.21 CHASES

- A. In Existing Buildings:
 1. Drill holes for floor and/or roof slab openings.
 2. Multiple pipes smaller than 1 in. properly spaced and supported may pass through one 6 in. or smaller diameter opening.

3. Seal voids in fire rated assemblies with a fire-stopping seal system to maintain the fire resistance of the assembly. Provide 18 gauge galvanized sleeves at fire rated assemblies. Extend sleeves 2 in. above floors.
4. In wall openings, drill or cut holes to suit. Provide 18 gauge galvanized sleeves at shafts and fire rated assemblies. Provide fire-stopping seal between sleeves and wall in drywall construction. Provide fire stopping similar to that for floor openings.

1.22 PENETRATION FIRESTOPPING

A. Fire-Stopping for Openings Through Fire and Smoke Rated Wall and Floor Assemblies:

1. Provide materials and products listed or classified by an approved independent testing laboratory for "Penetration Fire-Stop Systems". The system shall meet the requirements of "Fire Tests of Penetrations Fire-Stops" designated ASTM E814.
2. Provide fire-stop system seals at all locations where piping, tubing, conduit, electrical busways/cables/wires, ductwork and similar utilities pass through or penetrate fire rated wall or floor assembly. Provide fire-stop seal between sleeve and wall for drywall construction.
3. The minimum required fire resistance ratings of the wall or floor assembly shall be maintained by the fire-stop system. The installation shall provide an air and watertight seal.
4. The methods used shall incorporate qualities which permit the easy removal or addition of electrical conduits or cables without drilling or use of special tools. The product shall adhere to itself to allow repairs to be made with the same material and permit the vibration, expansion, and/or contraction of any items passing through the penetration without cracking, crumbling and resulting reduction in fire rating.
5. Plastic pipe/conduit materials shall be installed utilizing intumescent collars.
6. Provide a submittal including products intended for use, manufacturer's installation instructions, and the UL details for all applicable types of wall and floor penetrations.
7. Fire-stopping products shall not be used for sealing of penetrations of non-rated walls or floors.
8. Piping insulation is allowed to be reduced in thickness only when a specific UL assembly detail for piping passing thru a rated wall indicates a maximum insulation thickness that is less than the insulation specification section calls for. In this case reduce the insulation thickness just for the rated wall penetration. The reduction of insulation thickness shall be limited to the length of the penetration only.

B. Acceptable Manufacturers:

1. Dow Corning Fire-Stop System Foams and Sealants.
2. Nelson Electric Fire-Stop System Putty, CLK and WRP.
3. S-100 FS500/600, Thomas & Betts.
4. Carborundum Fyre Putty.
5. 3-M Fire Products.
6. Hilti Corporation.

1.23 NON-RATED WALL PENETRATIONS

- A. Each trade shall be responsible for sealing wall penetrations related to their installed work, including but not limited to ductwork, piping, conduits, etc. See individual specification sections for requirements.

1.24 SUPPORTS

- A. Provide required supports, beams, angles, hangers, rods, bases, braces, and other items to properly support contract work. Modify studs, add studs, add framing, or otherwise reinforce studs in metal stud walls and partitions as required to suit contract work. If necessary, in stud walls, provide special supports from floor to structure above.
- B. For precast panels/planks and metal decks, support mechanical/electrical work as determined by manufacturer and the Engineer. Provide heavy gauge steel mounting plates for mounting contract work. Mounting plates shall span two or more studs. Size, gauge, and strength of mounting plates shall be sufficient for equipment size, weight, and desired rigidity.
- C. For finished areas without a finished ceiling system such as classrooms, offices, conference rooms, etc., where decking and structure is exposed, and ductwork/piping/conduit is exposed: All mounting brackets, channel support systems and mounting hardware for ductwork, piping, lighting, etc. shall be concealed and approved by the Architect/Engineer prior to the installation. AirCraft cable style hanging for ductwork is required. It is recommended that room mockups be done and receive Architect/Engineer approval prior to proceeding with installation.
- D. Equipment, piping, conduit, raceway, etc. supports shall be installed to minimize the generation and transmission of vibration.
- E. Materials and equipment shall be solely supported by the building structure and connected framing. Gypboard, ceilings, other finishes, etc. shall not be used for support of materials and equipment.

1.25 ACCESS PANELS

- A. Provide access panels for required access to respective trade's work. Location and size shall be the responsibility of each trade. Access panels provided for equipment shall provide an opening not smaller than 22 in. by 22 in. Panels shall be capable of opening a minimum of 90 degrees. Bear cost of construction changes necessary due to improper information or failure to provide proper information in ample time. Access panels over 324 square inches shall have two cam locks. Provide proper frame and door type for various wall or ceiling finishes. Access panels shall be equal to "Milcor" as manufactured by Inland Steel Products Co., Milwaukee, Wisconsin. Provide General Construction trade with a set of architectural plans with size and locations of access panels.

1.26 CONCRETE BASES

- A. Provide concrete bases for all floor mounted equipment. Provide 3,000 lb. concrete, chamfer edges, trowel finish, and securely bond to floor by roughening slab and coating with cement grout. Bases 4 in. high (unless otherwise indicated); shape and size to accommodate equipment. Provide anchor bolts in equipment bases for all equipment provided for the project, whether mounted on new concrete bases or existing concrete bases.

1.27 HVAC EQUIPMENT CONNECTIONS

- A. Contractor is responsible for draining, filling, venting, chemically treating and restarting any systems which are affected by work shown on the Contract Documents unless specifically noted otherwise.
- B. Provide final steam, condensate, hot water, glycol, chilled and condenser water, drain, vent and gas connections to all equipment as required by the equipment. Provide final connections, including domestic water piping, wiring, controls, and devices from equipment to outlets left by other trades. Provide equipment waste, drip, overflow and drain connections extended to floor drains.
- C. Provide for Owner furnished and Contractor furnished equipment all valves, piping, piping accessories, traps, pressure reducing valves, gauges, relief valves, vents, drains, insulation, sheet metal work, controls, dampers, as required.

1.28 PLUMBING EQUIPMENT CONNECTIONS

- A. Contractor is responsible for draining, filling, venting, chemically treating and restarting any systems which are affected by work shown on the Contract Documents unless specifically noted otherwise.

- B. Provide roughing and final water, waste, vent, gas connections to all equipment. Provide loose key stops, sanitary "P" traps, tailpiece, adapters, gas or air cocks, and all necessary piping and fittings from roughing point to equipment. Provide installation of sinks, faucets, traps, tailpiece furnished by others. Provide cold water line with gate valve and backflow prevention device at locations called for. Provide continuation of piping and connection to equipment that is furnished by others. Provide relief valve discharge piping from equipment relief valves.
- C. Provide valved water outlet adjacent to equipment requiring same. Provide equipment type floor drains, or drain hubs, adjacent to equipment.
- D. Install controls and devices furnished by others.
- E. Refer to Contract Documents for roughing schedules, and equipment and lists indicating scope of connections required.
- F. Provide for Owner furnished and Contractor furnished equipment all valves, piping, piping accessories, traps, pressure reducing valves, gauges, relief valves, vents, drains, as required.

1.29 ELECTRICAL EQUIPMENT CONNECTIONS

- A. Provide complete power connections to all electrical equipment. Provide control connections to equipment. Heavy duty NEC rated disconnect ahead of each piece of equipment. Ground all equipment in accordance with NEC.
- B. Provide for Owner furnished and Contractor furnished equipment all power wiring, electric equipment, control wiring, switches, lights, receptacles, and connections as required.

1.30 STORAGE AND PROTECTION OF MATERIALS AND EQUIPMENT

- A. Store Materials on dry base, at least 6 in. aboveground or floor. Store so as not to interfere with other work or obstruct access to buildings or facilities. Provide waterproof/windproof covering. Remove and provide special storage for items subject to moisture damage. Protect against theft or damage from any cause. Replace items stolen or damaged, at no cost to Owner.
- B. Refer to Division 01 for additional information.

1.31 FREEZING AND WATER DAMAGE

- A. Take all necessary precautions with equipment, systems and building to prevent damage due to freezing and/or water damage. Repair or replace, at no change in contract, any such damage to equipment, systems, and building. Perform first seasons winterizing in presence of Owner's operating staff.

1.32 LUBRICATION CHART

- A. Provide lubrication chart, 8-1/2 in. x 11 in. minimum size, typed in capital letters, mounted under clear laminated plastic; secure to wall in area of equipment. List all

motors and equipment in contract. Obtain and list necessary information by name/location of equipment, manufacturer recommended types of lubrication and schedule. Lubricate motors as soon as installed and perform lubrication maintenance until final acceptance. Divisions 22 and 26 shall add contract items to the chart provided by Division 23 or provide separate charts.

1.33 OWNER INSTRUCTIONS

- A. Before final acceptance of the work, furnish necessary skilled labor to operate all systems by seasons. Instruct designated person on proper operation, and care of systems/equipment. Repeat instructions, if necessary. Obtain written acknowledgement from person instructed prior to final payment. Contractor is fully responsible for system until final acceptance, even though operated by Owner's personnel, unless otherwise agreed in writing. List under clear plastic, operating, maintenance, and starting precautions procedures to be followed by Owner for operating systems and equipment.

1.34 OPERATION AND MAINTENANCE MANUALS

- A. Submit by email (preferred) or digital media, thru the normal project submittal process. Include a copy of each final approved Shop Drawing, wiring diagrams, piping diagrams, spare parts lists, final testing and balancing report, as-built drawings and manufacturer's instructions. Include typewritten instructions, describing equipment, starting/operating procedures, emergency operating instructions, summer-winter changeover, freeze protection, precautions and recommended maintenance procedures. Include name, address, and telephone number of installing contractor and of supplier manufacturer Representative and service agency for all major equipment items. Provide a table of contents page and dividers based upon specification section numbers. Submit in a compiled and bookmarked PDF format as outlined below. Each item listed in the table of contents shall include a hyperlink to the associated section of the O&M Manual, in addition to the bookmarking.
- B. Provide content for Operation and Maintenance Manuals as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Engineer will comment on whether content of operation and maintenance submittals is acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- C. Submit Operation and Maintenance Manuals in the following format:
 - 1. Submit by uploading to web-based project software site, or by email to Architect, as a formal project submittal in conformance with the project specific submittal procedures. Enable reviewer comments on draft submittals.
 - 2. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.

3. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in the table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- D. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing Owner training. Engineer will comment on whether general scope and content of manual are acceptable.
- E. Final Manual Submittal: Submit O&M manual in final form prior to requesting inspection for Substantial Completion and at least 2 weeks before commencing Owner training. Engineer will return copy with review comments.
 1. Correct or revise O&M manual to comply with Engineer's comments. Submit copies of each corrected manual within 2 weeks of receipt of Engineer's comments.
- F. Refer to Division 01 for additional requirements.

1.35 RECORD DRAWINGS

- A. The Contractor shall obtain at his expense one (1) set of construction Contract Drawings, (including non-reproduction black and white prints or electronic files) for the purpose of recording as-built conditions.
- B. The Contractor shall perform all survey work required for the location and construction of the work and to record information necessary for completion of the record drawings. Record drawings shall show the actual location of the constructed facilities in the same manner as was shown on the bid drawings. All elevations and dimensions shown on the drawings shall be verified or corrected so as to provide a complete and accurate record of the facilities as constructed.
- C. It shall be the responsibility of the Contractor to mark **EACH** sheet of the contract documents in red and to record thereon in a legible manner, any and all approved field changes and conditions as they occur. A complete file of approved field sketches, diagrams, and other changes shall also be maintained. At completion of the work, the complete set of red marked contract documents, plus all approved field sketches and diagrams shall be submitted to the engineer and used in preparation of the record drawings.
- D. A complete set of red marked contract drawings shall be submitted, at one time, as the "Record" set. If there are no changes to a specific drawing, the contractor shall indicate "NO CHANGES" on that drawing. ALL drawings shall be included in the "Record" set.
- E. The complete set of red marked Contract Documents or electronic files shall be certified by the Contractor as reflecting record conditions and submitted to the engineer for review.

F. The Contractor shall have the marked up set scanned, if they are not already electronic files, and then submit them to the Engineer as the "Record Set".

G. Refer to Division 01 for additional requirements.

1.36 FINAL INSPECTION

A. Upon completion of all Engineering Site Observation list items, the Contractor shall provide a copy of the Engineering Site Observation Report back to the Engineer with each items noted as completed or the current status of the item.

1.37 COMMISSIONING

A. Refer to General Commissioning Requirements in Division 01 for additional requirements.

1.38 TEMPORARY HEATING AND COOLING

A. Refer to the General Conditions of the Contract for Construction and Supplemental General Conditions.

1.39 MAINTENANCE OF HVAC SYSTEMS DURING TEMPORARY USE PERIODS

A. Provide each air handling system with a set of prefilters in addition to the permanent filters. Furnish four sets of prefilters for each system for use when system is operated for temporary heating or cooling. During such use, change prefilters as often as directed by Owner's Representative. Provide MERV-8 filters in all open ended ducts, return grilles and registers to keep dust out of ductwork. Change as often as necessary. Remove all such temporary filters upon completion. Use supply fans only. Do not operate return fans.

B. Blank-off outside air intake opening during temporary heating period. Install first set of permanent filters and prefilters.

C. Adjust dampers on supply system.

D. Set all heating coil control valves for manual operation.

E. Do not install any grilles or diffusers at room terminal ends of ducts until permission is given.

F. Assume responsibility for systems and equipment at all times, even though used for temporary heat or ventilating. Repair or replace all dented, scratched or damaged parts of systems prior to final acceptance.

G. Remove concrete, rust, paint spots, other blemishes, then clean.

H. Just prior to final acceptance, remove used final filter and install new set. Deliver all unused sets of prefilters to the Owner and obtain written receipt. Properly lubricate system bearings before and during temporary use. Maintain thermostats, freeze stats, overload devices, and all other safety controls in operating condition.

1.40 TEMPORARY FACILITIES

- A. Refer to the Division 01 Sections, General Conditions and Supplemental General Conditions.

1.41 TEMPORARY LIGHT AND POWER

- A. Refer to the Division 01 Sections, General Conditions and Supplemental General Conditions.

1.42 CLEANING

- A. It is the Contractor's responsibility to keep clean all equipment and fixtures provided under this contract for the duration of the project. Each trade shall keep the premises free from an accumulation of waste material or rubbish caused by his operations. The facilities require an environment of extreme cleanliness, and it is the Contractor's responsibility to adhere to the strict regulations regarding procedures on the existing premises. After all tests are made and installations completed satisfactorily:
 - 1. Thoroughly clean entire installation, both exposed surfaces and interiors.
 - 2. Remove all debris caused by work.
 - 3. Remove tools, surplus, materials, when work is finally accepted.

1.43 TRANSFER OF ELECTRONIC FILES

- A. M/E Engineering, P.C. will provide electronic files for the Contractor's use in the preparation of sheet metal shop drawings, coordination drawings, or record drawings related to the project, and the following terms and conditions:
 - 1. The Contractor shall submit a formal request for electronic drawing files on the M/E Engineering, P.C. website, by utilizing the following website link:
<http://www.meengineering.com/contact-pages/contractor-request>
 - 2. M/E Engineering, P.C. makes no representation as to the compatibility of these files with the Contractor's hardware or the Contractor's software beyond the specific release of the referenced specifications.
 - 3. M/E Engineering can only provide CAD files of M/E/P/FP drawing levels for which we are the Engineer of Record. CAD files of Architectural backgrounds, reflected ceiling plans, structural plans, etc. must be obtained separately from the Architect of Record.
 - 4. Data contained on these electronic files is part of M/E Engineering, P.C.'s instruments of service shall not be used by the Contractor or anyone else receiving data through or from the Contractor for any purpose other than as convenience in the preparation of shop drawings for the referenced project. Any other use or reuse by the Contractor or by others will be at the Contractor's sole risk and without liability or legal exposure to M/E Engineering, P.C. The Contractor agrees to make no claim and hereby waive, to the fullest extent

permitted by law, any claim or cause of action of any nature against M/E Engineering, P.C., its officers, directors, employees, agents or sub-consultants which may arise out of or in connection with the Contractor's use of the electronic files.

5. Furthermore, the Contractor shall, to the fullest extent permitted by law, indemnify and hold harmless, M/E Engineering, P.C. from all claims, damages, losses and expenses, including attorney's fees arising out of or resulting from the Contractor's use of these electronic files.
6. These electronic files are not contract documents. Significant difference may arise between these electronic files and corresponding hard copy contract documents due to addenda, change orders or other revisions. M/E Engineering, P.C. makes no representation regarding the accuracy or completeness of the electronic files the Contractor receives. In the event that a conflict arises between the signed contract documents prepared by M/E Engineering, P.C. and electronic files, the signed contract documents shall govern. The Contractor is responsible for determining if any conflicts exist. By the Contractor's use of these electronic files the Contractor is not relieved of the Contractor's duty to comply with the contract documents, including and without limitation, the need to check, confirm and coordinate all dimensions and details, take field measurements, field verify conditions and coordinate the Contractor's work with that of other contractors for the project.

END OF SECTION 26 05 00

SECTION 26 05 01

BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The drawings are diagrammatic, unless detailed dimensioned drawings are included, and show only approximate locations of equipment, fixtures, panelboards, conduits, and wiring devices. Exact locations are subject to the approval of the Owner's Representative. The general run of electrical feeders, branch circuits, and conduits, indicated on the drawings, is not intended to be the exact routing. Exact routings of conduit shall suit the job conditions.
- B. Circuit designations, in the form of "Home Runs" on branches, indicate the designation of the branch circuit, the size and the quantity of branch circuit conductors, and the panel board or interconnection box from which the branch circuit is served.
- C. Make measurements at the site and in the building during construction for all systems installed as the work progresses in such a manner that the equipment, piping, vents, ducts, conduit, and boxes will fit in the space available. Maintain headroom and if in unfinished areas, be as neatly installed, as obscure and "out-of-the-way" as physically possible. Where more than one trade is involved in an area, space or chase, all shall cooperate and install their own work to utilize the space equally between them in proportion to their individual requirements. In general, ductwork shall be given preference except where grading of piping becomes a problem, followed by piping then electrical wiring. If, after installation of any equipment, piping, ducts, conduit, and boxes, it is determined that ample maintenance and passage space has not been provided, rearrange work and /or furnish other equipment as required for ample maintenance space.
- D. Any changes in the size or location of the material or equipment supplied, which may be necessary in order to meet field conditions or in order to avoid conflicts between trades, shall be brought to the immediate attention of the Owner's Representative and approval received before such alterations are made.

1.2 QUALITY ASSURANCE

- A. Electric equipment shall be installed in a neat and workmanlike manner. All methods of construction, details of workmanship, that are not specifically described or indicated in the contract documents, shall be subject to the control and approval of the Owner's Representative.
- B. Equipment and materials shall be of the quality and manufacture indicated in their respective sections of the specifications. The equipment specified is based upon the acceptable manufacturers listed. Equipment types, device ratings, dimensions, etc., correspond to the nomenclature dictated by those manufacturers. Where "or equal" is stated, equipment shall be equal in every way to that of the equipment specified and subject to approval. All equipment shall be tested at the factory. Unless specified elsewhere, standard factory inspection and operational tests will be acceptable.

1.3 SUBMITTALS

- A. Submit product data for the following equipment, materials and products, including all fittings and accessories:
 - 1. Conduit
 - 2. Surface Raceway
 - 3. Wireway and Wire Trough
 - 4. Channel Support Systems
 - 5. Conductors
 - 6. Cables
 - 7. Poke-Through Service Fittings
 - 8. Floor Boxes
 - 9. Wiring Devices Including Dimmers
 - 10. Flashing, Sealing, Firestopping Materials
 - 11. Testing reports prior to energizing equipment and materials.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Conduit, Raceway and Tubing:
 - 1. Rigid Metal Conduit (RMC) shall be hot-dipped galvanized or electro-galvanized steel, UL listed "rigid metal conduit."
 - a. Acceptable Manufacturers:
 - 1) Nucor Tubular Products
 - 2) Allied Tube and Conduit
 - 3) Wheatland Tube
 - 4) Approved equal
 - 2. Electrical Metallic Tubing (EMT) shall be electro-galvanized steel with corrosion resistant zinc coating; UL listed.
 - a. Acceptable Manufacturers:
 - 1) Nucor Tubular Products
 - 2) Allied Tube and Conduit
 - 3) Wheatland Tube
 - 4) Approved equal
 - 3. Flexible Metal Conduit (FMC) shall be constructed of one continuous length of electro-galvanized, spirally wound steel strip with interlocking convolutions and interior surfaces free from burrs and sharp edges; UL listed.
 - a. Acceptable Manufacturers:
 - 1) AFC (American Flexible Conduit) Cable Systems

- 2) Anaconda Sealtite by ANAMET Electrical, Inc.
 - 3) Southwire
4. Liquidtight Flexible Metal Conduit (LFMC) shall be constructed of one continuous length of electro-galvanized, spirally wound steel strip with interlocking convolutions, interior surfaces free from burrs and sharp edges, and an outer liquidtight, nonmetallic, sunlight-resistant jacket; UL listed.
 - a. Acceptable Manufacturers:
 - 1) AFC (American Flexible Conduit) Cable Systems
 - 2) Anaconda Sealtite by ANAMET Electrical, Inc.
 - 3) Southwire
5. Surface Metal Raceway shall be .040 in. steel UL listed "Surface Metal Raceway". Use manufacturer's standard fittings designed to be used with the specific raceway.
 - a. One-Piece Raceway:
 - 1) Buff or ivory finish.
 - 2) Acceptable Manufacturers:
 - a) Wiremold "700" Series (Design Make)
 - b) Mono Systems
 - c) Approved equal

B. Conduit Fittings:

1. Fittings for rigid metal conduit shall be fully threaded and shall be of the same material as the respective raceway system. Fittings for electrical metallic tubing shall be single screw indenter fittings for conduits up to 2 in. and double screw indenter fittings for conduits 2 in. and larger. Connectors shall also have insulated throat or plastic insulating bushing up to and including 1 in. size. For sizes 1-1/4 in. and larger, provide plastic insulating bushing. Die-cast, pressure cast fittings shall not be used. Fittings for rigid non-metallic conduit shall be solvent cemented in accordance with the manufacturer's instructions.
 - a. Acceptable Manufacturers:
 - 1) O.Z. Gedney
 - 2) Steel City
 - 3) Thomas & Betts
 - 4) Crouse-Hinds
 - 5) Carlon

2. Expansion Fittings shall be watertight, combination expansion and deflection type designed to compensate for movement in any direction. Fittings shall have flexible copper braid bonding jumpers, neoprene sleeve and stainless steel bands, use aluminum body fittings for rigid aluminum conduit.

- a. Acceptable Manufacturers:

- 1) Crouse-Hinds, Type "XD"
- 2) O.Z./Gedney, Type "DX"
- 3) Approved equal

- C. Wireway, Wire Trough, and Auxiliary Gutters:

1. Wireway and Wire Trough shall be hinged cover type wireway with provisions for full lay-in along the entire length of run. Wireway shall be steel, enclosed with gray enamel finish. Provide NEMA 1 units for interior/dry/clean locations and NEMA 12 for interior dry maintenance/shop/utility locations. Size to meet NEC fill requirements or larger as noted on Contract Documents. Provide knockouts along runs. Recess in wall where required for flush mounted equipment. Hinge shall be on the bottom of front face for horizontal mounting. Provide all covers, couplings, offsets, elbows, expansion joints, adapters, hold down straps, end caps, tees, pullboxes, hangers, reducers, supports, and other fittings to match and mate with wireways as required for complete system.

- a. Acceptable Manufacturers:

- 1) Square D "Square Duct"
- 2) General Electric
- 3) Hoffman
- 4) Meco

- D. Strut-Type Channel Raceways and Fittings:

1. Strut-Type Channel Raceways and Fittings shall be provided for racking of conduit, trapeze suspensions, equipment support, cable racks and panel racks. Channel shall be steel with electroplated zinc finish for interior dry locations. Provide necessary accessories such as bolts, screws, anchors, connection plates, and straps as required to perform the necessary functions. Wet location and exterior channel support systems shall be steel with hot dipped galvanized finish and stainless steel hardware as a minimum. Cut ends shall be touched up with suitable matching finish.

- a. Acceptable Manufacturers:

- 1) Unistrut
- 2) Globe
- 3) Kindorf
- 4) B-Line

E. Low Voltage (600V or less) Conductors and Cables:

1. Conductors shall be insulated for 600 volts, unless otherwise noted, and shall be standard AWG and kcmil sizes. Conductors shall be 98% copper, thermal plastic or cross-linked polymer insulated, heat and moisture resistant. Conductor sizes No. 18 AWG and smaller shall be a solid single strand; No. 16 AWG and larger shall be multiple stranded. Minimum conductor size shall be #12 AWG except smaller sizes may be used for communications and special systems. Conductor sizes shall be as called for. Conductors shall be labeled with UL seal and be marked with the manufacturer's name, wire size and insulation type. Insulation for all 600 volt conductors shall be Type THHN/THWN-2 or Type XHHW-2, unless otherwise noted. All exterior and underground conductors shall be XHHW-2. Luminaire fixture wire shall conform to the latest Underwriters Laboratories requirements. Flexible cords and cables for general portable use shall be Type SO or SOOW or as noted. Cables for special use shall be of the type specified for the application.

a. Color Coding:

- 1) All circuits shall be color coded according to the following schedule.

	Three Phase 120/208V 240V	Three Phase 277/480V	Single Phase 120/240V
Ground	Green	Green	Green
Neutral	White	Gray	White
A or L1	Black	Brown	Black
B or L2	Red	Orange	Red
C or L3	Blue	Yellow	---

b. Acceptable Manufacturers:

- 1) General Cable (Brand of Prysmian Group)
- 2) Southwire
- 3) The Okonite Company
- 4) Service Wire Co.
- 5) Encore Wire

2. Terminal Lugs and Connectors:

- a. The lug shall be capable of continuous operation at the current rating of the cable it is used on. The lug shall be UL listed per UL 486A, using industry standard crimping tools and dies. Terminal lugs shall be solderless, pressure type with UL label for "CU/AL" conductor terminations. The lug shall be a closed-end compression (crimp) type, constructed of seamless, alloy suitable for copper and/or aluminum conductors to match the conductor. The lug shall be made with a chamfered inside end, for ease of conductor insertion. Both one and two

hole lugs shall be NEMA sized for standard stud sizes and spacing. The lug shall be designed for use at the system voltage.

1) Acceptable Manufacturers:

- a) 3M Scotchlok 30,000 and 31,000 Series
- b) Burndy
- c) O.Z./Gedney
- d) Thomas and Betts

- b. The conductor connection shall be capable of continuous operation at the current rating of the cables it is used on. The connection shall be UL listed per UL 486A, using industry standard crimping tools and dies. The connector shall be an inline compression (crimp) type, constructed of seamless, tin-plated copper. The connector shall be constructed with chamfered inside-ends and with center cable stops. The connector shall be designed for use at the system voltage.

1) Acceptable Manufacturers:

- a) 3M Scotchlok 10,000 and 11,000 Series
- b) Burndy
- c) O.Z./Gedney
- d) Thomas and Betts

- c. "Split-bolt" Connectors shall be solderless type.

1) Acceptable Manufacturers:

- a) Burndy
- b) Kearney
- c) O.Z./Gedney
- d) Thomas and Betts
- e) Anderson

- d. "TWIST ON" Connectors shall be spiral steel spring type and insulated with vinyl cap and skirt.

1) Acceptable Manufacturers:

- a) 3-M Company "Scotch-Lok"
- b) Ideal "Wing-Nuts"
- c) Approved equal

F. Outlet Boxes, Device Boxes, Rings, and Covers:

1. Outlet Boxes having pryout openings, knockouts, threaded entries, or hubs in either the sides of the back, or both, for entrance of conduit or cable fittings, or cables, with provisions for mounting outlet box cover. Outlet boxes shall be galvanized steel, not less than 2-1/2 in. deep, unless restricted by the

surroundings, 4 in. square or octagonal. Boxes and associated fittings, plates and devices shall be mechanically fastened (screwed), friction fitting is not acceptable. Outlet boxes exposed to moisture, surface mounted, exterior, wet or damp locations shall be cadmium cast alloy complete with external threaded hubs and gasketed screw fastened covers. Minimum box size shall be as indicated in the NEC for the conductors and devices installed. Boxes shall be approved for the environmental condition where they will be installed.

2. Conduit bodies providing access to interior of conduit or tubing system through one or more removable covers at junction or terminal point and listed in accordance with outlet box requirements.

3. Extension ring intended to extend sides of outlet box or device box to increase box, volume, or both.

- a. Acceptable Manufacturers:

- 1) Steel City
- 2) Raco
- 3) Appleton
- 4) Crouse Hinds

4. Telephone/Data Communications Outlet Boxes:

- a. 4 in. x 4 in. outlet box with single gang plaster ring with blank cover plate and conduit routed to accessible ceiling space. Cover plate shall match the receptacle cover type.

5. Pull and junction boxes shall be constructed of not less than 14 gauge galvanized steel with trim for flush or surface mounting in accordance with the location to be installed. Provide screw-on type covers. Boxes installed in damp or wet locations shall be of raintight construction with gasketed cover and threaded conduit hubs. In no case shall boxes be sized smaller than as indicated NEC for conduit and conductor sizes installed. Boxes shall be approved for the environmental condition of the location where they will be installed.

- a. Acceptable Manufacturers:

- 1) Hoffman
- 2) Keystone
- 3) Approved equal

6. Flush Poke-Through Service Fitting (Power/Communication):

- a. Provide flush poke-through suitable for installation in a cored floor opening. Shall be complete with junction box, conduit and flush devices as indicated on plans. The complete assembly shall be suitable for two hour fire rated floors, be UL CEYY listed and have UL scrub water protected metallic color as selected by the Architect cover and trim ring. Cover shall be suitable for carpet, tile, wood and concrete. Unit

protrusion above floor plane shall not exceed 0.2". Extend or reduce unit raceway length as needed to accommodate floor thickness and project conditions. Provide indicated devices in units.

b. Acceptable Manufacturers:

- 1) Hubbell S1 Series (Design Make)
- 2) Steel City
- 3) Wiremold
- 4) Approved equal

G. Terminal and Equipment Cabinets:

1. Terminal and equipment cabinets shall be code gauge galvanized steel with removable endwalls. Fronts shall be of code gauge steel, flush or surface type (as indicated) with concealed trim clamps, concealed hinges, flush lock, and grey baked enamel finish. Boxes and front shall be UL listed and shall be minimum 35 in. H x 24 in. W x 6 in. D. Provide removable insulated plywood terminal board mounted on inside back wall of cabinet.

a. Acceptable Manufacturer:

- 1) Square D "Mono-Flat"
- 2) Approved equal

H. Wiring Devices:

1. Wiring Devices (toggle switches, key switches, receptacles, dimmers, occupancy sensors, etc.) shall be specification grade as a minimum. Switch handle and receptacle face shall be as directed by the Architect. Provide device cover plates of satin finish type 302 stainless steel in finished areas and rounded raised (Steel City 450/460 series) only for surface mounted locations in unfinished areas. Provide neoprene gasketed cast aluminum/zinc box with hinged (for receptacle) rain tight cast aluminum/zinc lockable while in use cover with stainless steel hardware for devices designated "WP".

a. Acceptable Manufacturers:

- 1) Pass and Seymour
- 2) Hubbell
- 3) Leviton

2. Toggle/Snap Switches:

- a. Units shall be quiet operation, quick make/quick break, rated for 20A/120-277V/1hp at 120/277V, side/back wired, , with nylon/polycarbonate toggle, self grounding mounting screw clip plate (not staple), ground terminal and silver alloy contacts. Units shall meet latest Federal Specification WS-896, NEMA WD-1 and UL Test 20. Single pole units shall be Hubbell HBL1221, P&S 20AC1 or Leviton

1221-2. Provide two pole, three way, four way, illuminated handle, keyed, etc. type of the same quality and model.

- b. Momentary Contact: Units shall be as indicated above (20A, 277V, nylon handle, side/back wired), three position, two circuit/three wire with spring return to center position, provide where indicated and as needed for proper system operation. Hubbell HBL 1557, P&S 1250, Leviton 1256 or approved equal. Provide keyed operation or pilot light where indicated. When used for lighting controls for vacancy sensor control, provide jumper across the circuit terminals.

3. Receptacles:

- a. Provide receptacles where indicated on the drawings and where called for. Provide type receptacle as indicated and if not indicated then utilize general receptacle.
- b. General Receptacle: Units shall be NEMA 5-20R, duplex, 20A, 125V, side/back wired, #14 to 10AWG screw terminals with nylon face, indented brass contacts for three point connection, self grounding stainless steel mounting screw clip plate and green ground terminal. Shall meet requirements of Federal Specification W-C-596, NEMA WD-6 and UL 498.
 - 1) Units shall have 0.03" thick brass contacts, 0.04 inch galvanized steel mounting strap and be: Hubbell BR20, P&S BR20 or Leviton BR20.
- c. Ground Fault Interrupting Receptacles: Units shall be as specified above for General Receptacle and have 5mA interrupting ground fault level, test/reset front buttons, full through feed capability, power off on reverse wired sensing, 10kA short circuit current rating, be tamper/weather resistant and in compliance with UL 943. Unit shall self-test function to periodically test the components automatically and indicate a failure condition utilizing an LED. Shall be Hubbell GFR5362, P&S 2096TR or Leviton S7599TR.
- d. Tamper Resistant Receptacles: Units shall be as specified above for General Receptacle and have protective shutters to prevent entry into the line or grounded front openings unless all plug prongs are present.
- e. USB Power Receptacle: Units shall be as specified above for General Receptacle but have 0.040" zinc plated mounting strap, two 20A 125V outlets and two USB charging (5A minimum total, 5VDC, USB 2.0/3.0 two Type A) outlets. Overall depth shall not exceed 1.7 in. Shall be Hubbell USB20 or approved equal.

4. Television Outlets:

- a. 4 in. x 4 in. outlet box with single gang plaster ring with blank cover plate and conduit routed to accessible ceiling space. Cover plate shall match the receptacle cover type.

I. Waterproofing Seals:

1. Provide expanding link type seal, for installation between duct/conduit, and sleeve or core-drilled hole in concrete.
2. Make: Link Seal, manufactured by Thunderline Corp., or approved equal.

J. Flashing, Sealing, Fire-stopping:

1. Fire-Stopping for Openings Through Fire and Smoke Rated Wall and Floor Assemblies:
 - a. Provide materials and products listed or classified by an approved independent testing laboratory for "Through-Penetration Fire-Stop Systems". The system shall meet the requirements of "Fire Tests of Through-Penetration Fire-Stops" designated ASTM E814.
 - b. Provide fire-stop system seals at all locations where piping, tubing, conduit, electrical busways/cables/wires, ductwork and similar utilities pass through or penetrate fire rated wall or floor assembly. Provide fire-stop seal between sleeve and wall for drywall construction.
 - c. The minimum required fire resistance ratings of the wall or floor assembly shall be maintained by the fire-stop system. The installation shall provide an air and watertight seal.
 - d. The methods used shall incorporate qualities, which permit the easy removal or addition of electrical conduits or cables without drilling or use of special tools. The product shall adhere to itself to allow repairs to be made with the same material and permit the vibration, expansion and/or contraction of any items passing through the penetration without cracking, crumbling and resulting reduction in fire rating.
2. Acceptable Manufacturers:
 - a. Dow Corning Fire-Stop System Foams and Sealants
 - b. Nelson Electric Fire-Stop System Putty, CLK and WRP
 - c. S-100 FS500/600, Thomas & Betts
 - d. Carborundum Fyre Putty

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA NEIS (National Electrical Installation Standard) latest edition.

- B. Unless otherwise noted, wiring for all systems indicated in the contract documents shall consist of insulated conductors installed in raceways. Raceways shall be continuous from outlet box to outlet box and from outlet box to cabinet, junction or pull box. Secure and bond raceways to all boxes and cabinets so that each system of raceways is electrically continuous throughout. Unless otherwise indicated on the drawings, install all wiring in the following raceway system:
1. Wiring Above 600 Volts in Indoor Dry Locations or Outdoors, Above Grade Locations: RMC.
 2. Wiring 600 Volts or Less in Dry Locations: EMT.
 3. Wiring 600 Volts or Less in Dry Locations and Subject to Physical Damage: RMC.
 4. Flexible metal conduit shall be used for final connection to all motors, final connection to rotating or vibrating equipment, final connections to dry type transformers and final connections to recessed lighting fixtures. Liquidtight flexible conduit shall be used in all wet or damp locations. Maximum length of flexible conduit shall be 36 in., except that from outlet boxes to lighting fixture maximum length shall be 6 ft. Provide green insulated equipment grounding conductor in all flexible metal conduit.
 5. Surface metal raceway shall be used for surface runs in finished area where concealed conduit cannot be run or where specifically indicated on drawings.
- C. Raceways:
1. Sized as indicated on the drawings. Where sizes are not indicated, raceways shall be sized as required by the National Electrical Code in accordance with the quantity, size, and type of the insulation conductors to be installed. Raceways shall be minimum 3/4 in. trade size for branch circuit wiring and minimum 1 in. trade size for all telephone, data, intercommunications, instrumentation, fire alarm, television and computer systems and for all branch circuit "Home Runs" to panelboards. Installed to provide adequate grounding between all outlets and the established electrical system ground.
 2. Arranged in a neat manner for access and allow for access to work installed by other trades.
 3. Install raceways square to the enclosure and terminate at enclosures without hubs with locknuts on both sides of enclosure wall. Install locknuts handtight, plus one-quarter turn more.
 4. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4 inch trade size and insulated throat metal ground bushings on 1-1/2 inch trade size and larger conduits terminated with locknuts. Install throat metal grounding bushings on service conduit.

5. Complete raceway installation before starting conductor installation.
6. Provide stub-ups through floors with coupling threaded inside for plugs, set flush with finished floor. Plug coupling until conduit is extended above floor to final destination or a minimum of 2 feet above finished floor. Wherever a cluster of four (4) or more raceways rise out of floor exposed, provide neatly formed 6 in. high concrete envelop, with chamfered edges, around raceways.
7. Installed with a minimum of bends and offsets. All bends shall be made without kinking or destroying the cross section contour of the raceway. Factory made bends are acceptable and should be considered for raceways larger than 2 in.
8. Make bends in raceway using large-radius performed ells except for parallel bends. Field bending must be in accordance with NFPA 70 minimum radii requirements. Provide only equipment specifically designed for material and size involved.
9. Conceal conduit within finished walls, ceilings, and floors unless otherwise noted, or where permitted by the Owner's Representative. All exposed raceways shall be painted to match existing adjacent surface as directed by the Architect. Install conduit parallel or perpendicular to building lines.
10. Support conduit within 12 inches of enclosure to which attached.
11. Seal raceway opening that penetrate rooms or walls with acoustical requirements on both sides of rooms or walls with acoustically rated putty or firestopping.
12. Differing Temperatures: For raceways routed between areas with differing temperatures (interior to exterior, walk in coolers/freezers, environmental chambers, etc.) install raceway as follows:
 - a. Provide a thermal break, 4 in. minimum of stainless steel conduit within space wall/separation.
 - b. Seal raceway penetration through the wall/separation.
 - c. Provide a box on each side of the space wall/separation.
 - d. Provide raceway interior sealant (duct seal or suitable foam) to provide a complete air barrier after conductors are installed.
 - e. Mounting of raceway and boxes on equipment shall be coordinated and approved by the equipment manufacturer.
 - f. Installed with exterior surfaces not less than 6 in. from any surface with normal operating temperature of 200°F or higher.
13. Expansion-Joint Fittings:
 - a. Install in runs of aboveground PVC that are located where environmental temperature change may exceed 30 deg. F and that have straight-run

- length that exceeds 25 feet. Install in runs of aboveground RMC and EMT conduit that are located where environmental temperature change may exceed 100 deg. F and that have straight-run length that exceeds 100 feet.
- b. Install expansion fittings at locations where conduits cross building or structure expansion joints.
 - c. Install with position, mounting, and piston setting selected in accordance with manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.
 - d. Installed such that no undue stress is placed on any electrical raceway due to the proper functioning of expansion joints.
- 14. Raceway installed in wet/damp locations or on exterior walls shall have a spacer manufactured for this purpose provided to maintain a space/void between the mounting surface and the raceway.
 - 15. Do not install conduits within 2 inches of the bottom side of a metal deck roof.
 - 16. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
 - 17. Cut conduit perpendicular to the length. For conduits 2 inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length. Ream inside of conduit to remove burrs. Bush where necessary.
 - 18. Install pull wires in empty raceways. Provide polypropylene or monofilament plastic line with not less than 200 lb tensile strength. Leave at least 12 inch of slack at both ends of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
 - 19. Plugged at the ends of each roughed-in raceway with an approved cap or disc to prevent the entrance of foreign materials during construction.
 - 20. Installed with UL approved rain-tight and concrete-tight couplings and connectors.
 - 21. Raceways shall not be attached to or supported by wooden plug anchors or supported from mechanical work such as ductwork, piping, etc.
 - 22. If it is necessary to burn holes through webs of beams or girders, call such points to the attention of the Owner's Representative and receive written approval both as to location and size of hole before proceeding with work. All holes shall be burned no larger than absolutely necessary.

23. Become familiar with the general construction of the building and place sleeves, inserts, etc., as required. All penetrations through existing floors shall be core drilled and sleeved.
24. All raceways shall be supported adequately by malleable iron pipe clamps or other approved methods. In exterior or wet locations, supports shall allow not less than 1/4 in. air space between raceway and wall. Firmly fasten raceway within 3 ft. of each outlet box, junction box, cabinet or fitting. The following table lists maximum spacing between conditions, strength of supporting members, etc.
25. Furnish and install such supports at no additional cost to owner.

Conduit Trade Size	Type of Run	Horizontal Spacing in Feet	Vertical Spacing in Feet
3/4 in.	Concealed	7	10
1 in., 1-1/4 in.	Concealed	8	10
1-1/2 in. and larger	Concealed	10	10
3/4 in.	Exposed	5	7
1 in., 1-1/4 in.	Exposed	7	8
1-1/2 in. and larger	Exposed	10	10

26. Where raceways puncture roof, install pitch pockets as required in order that the roof warranty is maintained. Coordinate with representative of roofing material manufacturer.

D. Outlet Boxes:

1. Consider location of outlets shown on drawings as approximate only. Study architectural, process piping, mechanical, plumbing, structural, roughing-in, etc., drawings and note surrounding areas in which each outlet is to be located. Locate outlet so that when fixtures, motors, cabinets, equipment, etc., are placed in position, outlet will serve its desired purpose. Where conflicts are noted between drawings, contact Owner's Representative for decision prior to installation. Comply with the NEC relative to position of outlet boxes in finished ceilings and walls.
2. Prior to installation, relocate any outlet location a distance of 5 ft. in any direction from location indicated on drawings if so directed by the Owner's Representative. Prior to completion of wall construction, adjust vertical height of any outlet from height indicated if so directed by Owner's Representative. The above modifications shall be made at no additional cost to the Owner.
3. Provide boxes in wiring and raceway systems wherever required for pulling of wires, making connections, and mounting of devices or fixtures. Outlet boxes shall be sized to accommodate the wiring, splices and device(s) to be installed in accordance with the NEC.

4. Saw-cut opening for boxes recessed in masonry walls in center of cell of masonry block, and install box flush with surface of wall. Box shall have extra-deep type raised tile covers or shall be 3-1/2 in. deep boxes with square corners and dimensions to accommodate conductors installed. Prepare block surfaces to provide a flat surface for a raintight connection between box and coverplate or supported equipment and box, whether installed indoors or outdoors.
5. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
6. Locate boxes so that cover or plate will not span different building finishes. Install a device cover plate over each and every outlet indicated on drawings. Do not install plates until painting, cleaning and finishing of surfaces surrounding the outlet are complete. Install single one-piece multi-gang covers over multi-gang devices.
7. Where outlets at different mounting heights are indicated on drawings adjacent to each other (due to lack of physical space to show symbol on drawings), install outlets on a common vertical line.
8. Where switch outlets are shown adjacent to strike side of door, locate edge of outlet box approximately 3 in. from door frame.
9. Support boxes in recessed ceilings independent of ceiling tiles and ceiling grid.
10. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for purpose.
11. Fasten junction and pull boxes to, or support from, building structure. Do not support boxes by conduits.
12. Floor outlet boxes shall be installed flush with finished floor, adjust level and tile as required. Where finished floor is terrazzo, provide boxes specifically designed for installation in terrazzo. Where floors are to receive carpet or flooring material, coordinate with appropriate trade and provide insert. Rectangular covers shall be parallel and perpendicular with the building or, if used, floor tile/floor joints/pattern. Coordinate cover type with the flooring and device type.
13. Outlet boxes installed in plaster, gypsum board or wood paneled hollow cavity walls shall be installed flush with raised plaster covers or raised tile covers. Boxes shall be mechanically fastened and supported by two (2) adjacent structural members (studs) with cross brackets (Garvin Industries Model BMB or approved equal).
14. Surface ceiling mounted outlet boxes shall be minimum 4 in. square, 1-1/2 in. deep, galvanized sheet metal.
15. Surface wall mounted outlet boxes shall be cast type boxes.

16. Do not install aluminum boxes, enclosures, or fittings in contact with concrete or earth.
17. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to ensure a continuous ground path.
18. Seal openings and knockouts in back and sides of boxes and enclosures with acoustically rated putty for boxes and enclosures in areas of walls with acoustical requirements. Provide gaskets for wallplates and covers.
19. Seal openings and knockouts in back and sides of boxes and enclosures in areas of walls with lead shielding requirements.

E. Wiring Methods:

1. Conductors shall not be installed until raceway system, including all outlets, cabinets, bushings and fittings, is completed. Verify that all work of other trades which may cause conductor damage is completed. Use only U.L. approved cable lubricants when necessary. Do not use mechanical means to pull conductors No. 8 or smaller.
2. In general, conductors shall be the same size from the last protective device to the load.
3. Wiring systems shall be properly grounded and continuously polarized throughout, following the color-coding specified. Connect branch circuit wiring at panelboards, as required, in order to provide a "balanced" three-phase load on feeders.
4. Provide insulated green ground conductor in each branch circuit.
5. All feeder connections shall be made to bus and other equipment using solderless, pressure type terminal lugs.
6. Branch circuits connected to a 20A circuit breaker shall be sized as indicated except for lengths exceeding 75 ft. For circuits longer than 75 ft. to 100 ft. utilize No. 10 AWG conductors (line, neutral and ground) and for circuits from 100 ft. to 150 ft. utilize No. 8 AWG (line, neutral and ground) unless otherwise indicated. Conduit size shall be modified in accordance with the NEC.
7. For splices and taps, No. 10 AWG and smaller, use solderless "twist on" connectors having spiral steel spring and insulated with a vinyl cap and skirt.
8. For splices and taps, No. 8 and larger, use insulated solderless set screw AL/CU or hydraulically compressed sleeve fittings suitable for the intended use.
9. Use cast connections for ground conductors.
10. Provide minimum 6 in. of spare/slack of each conductor in each junction or pull box and termination.

11. Make all splices and connections in accessible boxes and cabinets only.
12. Cover uninsulated splices, joints, and free ends of conductor with rubber and friction tape or PVC electrical tape. Plastic insulating caps may serve as insulation. Heat shrink sleeves shall be acceptable for crimp type splices.
13. On termination at branch circuit outlets, leave a minimum of 8 in. free conductor for installation of devices and fixtures.
14. Feeder conductors shall be continuous from point of origin to load termination without splice. If this is not practical, contact the Owner's Representative and receive written approval for splicing prior to installation of feeder(s). Where feeder conductors pass through junction and pull boxes, bind and lace conductors of each feeder together. For parallel sets of conductors, match lengths of conductors as near equal as possible.
15. Branch circuit conductors installed in panelboards, and control conductors installed in control cabinets and panels shall be neatly bound together using "Ty-Raps" or equal.
16. Provide conduit seals and explosion proof devices as indicated on the plans and as dictated by the NEC for all hazardous locations indicated on the drawings.
17. Lighting fixtures, detectors, etc., in mechanical equipment, boiler and pump rooms shall be installed with exposed wiring after equipment, ductwork, piping, etc., are in place. In general, lighting shall be as located on the drawings; where conflicts exist, locate lights for best distribution.
18. Fire proof tape all medium voltage cables in handholes, man holes, building entrance and junction/pull boxes.
19. Provide cable/conductor vertical support in accordance with the NEC.

F. Receptacles:

1. Ground opening shall be up for vertical installation and on the left for horizontal installation.

G. Toggle Switches:

1. Switches shall be installed in accessible locations near room/space entryway(s).
2. Provide lighted handle switches in mechanical rooms, elevator pits, electric rooms, etc.
3. Switches shall have neutral pulled through the box even if not used.

H. Junction and Pull Boxes:

1. Install junction and pull boxes in readily accessible locations. Access to boxes shall not be blocked by equipment, piping, ducts and the like. Provide all

necessary junction or pull boxes required due to field conditions and size as require by the National Electrical Code.

I. Equipment Mounting Heights

1. Unless otherwise noted, mount devices and equipment at heights measured from finished floor to device/equipment centerline as follows:

a.	Toggle switches (up position "on")	46 in.
b.	Wall lighting controls (dimmer, digital switch, etc.	46 in.
c.	Receptacle outlets (long dimension vertical, ground" pole farthest from floor)	18 in.
d.	Receptacle outlets above counters	8 in. above counters
e.	Receptacle outlets, above hot water or steam baseboard heaters. Do not install receptacle outlets above electric baseboard heaters	30 in.
f.	Receptacle outlets, hazardous areas; also for refrigerators	48 in.
g.	Receptacle outlets, weatherproof, above-grade	24 in.
h.	Telephone outlets	18 in.
i.	Telephone outlets, wall mounted	46 in.
j.	T.V. outlet	18 in.
k.	Fire alarm manual stations	46 in.
l.	Fire alarm combination audio/visual and standalone visual device (entire strobe lens at heights indicated)	80 in. to bottom of the notification device
m.	Standalone fire alarm audio device	90 in. (min) to 96 in. (max)
n.	Distribution panelboards, to top of backbox	72 in.
o.	Terminal cabinets, control cabinets, to top of backbox	72 in.

- p. Disconnect switches, motor starters, enclosed circuit breakers. 48 in.
 - 2. Where structural or other interferences prevent compliance with mounting heights listed above, consult Owner's Representative for approval to change location before installation.
- J. Hangers and Supports:
 - 1. Provide steel angles, channels and other materials necessary for the proper support and erection of motor starters, distribution panelboards, large disconnect switches, large circuit breakers, pendant mounted lighting fixtures, etc.
 - 2. Panelboards, disconnect switches, circuit breakers, cabinets, large pull boxes, adjustable speed drives, cable support boxes and starters shall be secured to the building structure and not supported from conduits. Small panelboards, etc., as approved by Owner's Representative, may be supported on walls. Racks for support of conduits and heavy electrical equipment shall be secured to building construction by substantial structural supports.
- K. Identification:
 - 1. Provide engraved lamicoid identification nameplates on all items of equipment including individual circuit breaker enclosures and disconnect switches, listing the equipment connected to the particular device provided under Specification Section 262000, including, but not limited to: starters, disconnect switches, adjustable speed drives, circuit breakers, etc. Include voltage, phase, equipment served, voltage source to panel or equipment.
 - 2. Provide complete type written directory for each panelboard listing room number, function, etc., for each circuit breaker. Directory shall be placed in a plastic clear sleeve in the interior of the panelboard door. Provide type written updated panelboard directories for existing panelboards affected by this work.
 - 3. Identify junction and pullboxes for particular service and circuit such as power, emergency power, lighting, fire alarm, telephone, interphone, public address, nurse call, etc. using stencil lettering on cover.
 - 4. Using adhesive backed printed tape label (white background, black lettering) all receptacle and switch coverplates, power poles, etc. listing panel designation and circuit number. Tape shall be attached to outside of receptacle or switch coverplates.
- L. Spare Parts:
 - 1. Deliver to Owner and obtain receipt for spare parts including key switches, fuses, etc.

3.2 TESTS

- A. Branch circuits shall be tested during installation for continuity and identification and shall pass operational tests to determine that all circuits perform the function for which they are designed. For all feeder and exterior branch circuit wiring rated 600 volts or less, provide 1,000 volt "Megger" insulation test prior to energizing feeders. Use a 1,000-volt motor driven megger for all tests. Test voltage shall be applied until readings reach a constant value, and until three (3) equal readings, each one (1) minute apart, are obtained. Minimum megger reading shall be 45 megohms for feeder conductors. Document test results and submit for approval prior to energizing conductors.

END OF SECTION 26 05 01

SECTION 26 05 26

GROUNDING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Provide grounding system equal to or exceeding the requirements of NEC and as indicated in the contract documents. Raceway system which includes metal conduit, wireways, pullboxes, junction boxes, busway, wire ways, cable trays, enclosures, motor frames, etc., shall be made to form a continuous, conducting permanent ground circuit of the lowest practical impedance to enhance the safe conduction of ground fault currents and to prevent objectionable differences in voltage between metal nonload current carrying parts of the electrical system.
- B. Provide solid grounding of building structures and electrical and communications systems and equipment. It includes basic requirements for grounding for protection of life, equipment, circuits and systems. Types of grounding systems include the following:
 - 1. Electrical Equipment Grounding.

1.2 QUALITY ASSURANCE

- A. All methods of construction, details of workmanship, that are not specifically described or indicated in the contract documents, shall be subject to the control and approval of the Owner's Representative. Equipment and materials shall be of the quality and manufacture indicated in their respective sections of the specifications. The equipment specified is based upon the acceptable manufacturers listed. Equipment types, device ratings, dimensions. etc., correspond to the nomenclature dictated by those manufacturers. Where "or equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval. All equipment shall be tested at the factory. Unless specified elsewhere, standard factory inspection and operational tests will be acceptable.
- B. Electrical Components, Devices and Accessories: Listed and labeled as defined in the NEC by Nationally Recognized Testing Laboratory (NRTL) and marked for intended use.
- C. Comply with UL 467 for grounding and bonding materials and equipment.

1.3 REQUIREMENTS

- A. Grounding conductors, bonding conductors, jumpers, grounded conductors, etc. shall be sized in accordance with the NEC.
- B. Equipment and materials shall be installed in accordance with the manufacturer's recommendations.
 - 1. Ground connectors.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Conductors:

1. Exposed grounding components such as bars, straps, cables, flexible jumpers, braids, shunts, etc., shall be bare copper unless otherwise indicated.
2. Grounding conductors in raceway with 600V circuiting shall be insulated to match the circuit conductors with green color.
3. Grounding conductors used with system voltage greater than 1000V shall be bare unless otherwise indicated.
4. Grounding conductor size shall be as indicated or as required by the NEC whichever is larger, stranded, soft drawn or soft annealed copper, unless otherwise indicated. Sizing shall take into account circuit voltage drop.
5. Acceptable Manufacturers:
 - a. Same make as for 600 volt conductors.

B. Connectors, Clamps and Terminals:

1. Mechanical connectors and clamps shall be made of copper alloy or silicon bronze. Solderless compression terminals shall be copper, long-barrel, NEMA two bolt. Bolts and washers (Belleville) shall be of comparable material or stainless steel.
 - a. Acceptable Manufacturers:
 - 1) Burndy
 - 2) Hubbell Anderson Corp.
 - 3) Thomas & Betts
 - 4) Approved equal
2. Pipe Clamp:
 - a. Pipe clamp for bonding to pipe type electrode (water pipe, etc.) shall be a suitably sized copper alloy clamp.
 - b. Acceptable Manufacturers:
 - 1) Burndy GAR-BU
 - 2) O-Z Gedney Type CG
 - 3) Burndy "Durium"
 - 4) AFL Global "Everdur"
 - 5) Approved equal

3. Flexible Strap:

- a. Flexible grounding straps shall be of braided high conductivity copper with two hole connector. Strap shall have equal to or greater than ampacity of the system it is bonding to. Strap shall provide flexibility in all directions when installed properly.
- b. Acceptable Manufacturers:
 - 1) Burndy
 - 2) OZ Gedney
 - 3) Approved equal

PART 3 - EXECUTION

3.1 INSTALLATION

A. Grounding Conductors:

1. Provide grounding conductor(s) with all power circuits. Conductor shall be sized as indicated or as required by the NEC as a minimum and shall be terminated on the equipment, device, enclosure, etc. grounding terminal. Conductor size shall be for the entire length unless approved by the Engineer where oversized for voltage drop.
2. Conductors above grade to ground electrodes (water piping, structural column, etc.) and to equipment (service entrance, ground bars, ground halos, etc.) shall be installed in metallic conduit with ends bonded to the conduit.
3. Grounding conductors shall be installed to have a minimum radius of 3 in.
4. Grounding conductors in a raceway system shall be terminated/bonded to each box, cabinet, enclosure, etc. through which it passes or terminates.
5. Grounding conductors routed with underground circuits shall be bonded to each ground electrode and metallic cable support system within the raceway system including pull and access locations.
6. Stranded conductors penetrating vapor barriers, foundations, slab on grade and water stop membranes shall have the interstitial spaces between strands filled with solder 4 in. beyond the membrane each side. The conductor shall be sealed to the membrane with a manufacturer approved method.

B. Raceway Systems:

1. All metal supports, cable trays, messenger cables, frames, sleeves, brackets, braces, etc. for the raceway system, panels, switches, boxes, starters controls, etc., which are not rigidly secured to and in contact with the raceway system, or which are subject to vibration and loosening, shall be bonded to the raceway system.

2. Termination of rigid conduit at all boxes, cabinets, and enclosures shall be made up tightly with a double locknut arrangement and a bushing, bushings being of the insulated type. Utilize grounding bushings as specified elsewhere in these specifications.
3. Conduit which runs to or from boxes, cabinets, or enclosures having concentric or eccentric knockouts which partially perforate the metal around the conduit and hence impair the continuity of system ground circuits shall be provided with bonding jumpers connected between a grounding type bushing/locknut on the conduit and a ground bus or stud inside the box, cabinet, or enclosure and attached thereto.
4. Conduit expansion joints and telescoping sections of metal raceways shall be provided with bonding jumpers sized in accordance with the NEC.

C. Connectors Clamps and Terminals:

1. Connectors utilized above grade in dry accessible locations shall be mechanical or exothermic type.
2. Connectors in damp locations, below grade or if not indicated shall be exothermic type.
3. Clean the area near the connecting surfaces prior to any connection to ensure effective contact. Cleaning shall be to the bare metal. Wire brush area if needed to remove rust scale paint, dirt, etc. to expose bare metal.
4. Exothermic connections shall be installed in accordance with the manufacturer's recommendations and tested with heavy blow of a five pound sledge.

D. Flexible Strap:

1. Flexible straps shall be used when bonding vibrating/moveable equipment, with expansion fittings and where recommended by the manufacturer.
2. Sufficient slack shall be provided to compensate for the anticipated vibration, movement and expansion.

E. Secondary Electrical Systems:

1. The neutral (grounded) conductor of each low voltage, single and/or polyphase system or distribution system, except special isolated double insulated systems, shall be solidly connected to ground at the transformer neutral bushing, or at the main secondary switchgear to the system ground, and shall be sized for current carrying capacity, not to be less than as required by the NEC. Ground connection shall be to the building grounding system, building steel, building water service, building concrete reinforcement and as indicated.
2. Provide equipment grounding conductor, green colored insulation, with phase conductors, to primary side of all transformers rated 600 volts or less circuited to

the enclosure and secondary neutral bushing, to all electrical utilization and distribution equipment; insulation shall be same type as phase conductors. Transformer enclosures shall be bonded to the primary and secondary circuit grounding conductor.

3. Equipment grounding conductors shall extend from the point of termination back to the ground bus of the source panelboard, switchboard, transformer, or switchgear.

END OF SECTION 26 05 26

SECTION 26 50 00

LIGHTING

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 DESCRIPTION

- A. Provide interior and exterior lighting systems, including luminaires, hangers, supports, fittings, wiring, connections and controls, as indicated in the Contract Documents for complete and operational systems. The lighting layouts on the drawings are diagrammatic only. Refer to architectural "Reflected Ceiling Plans" for exact location of interior luminaires. Luminaires, in general, have been specified for the particular type of ceiling in which they are to be installed. Verify the ceiling construction details and provide luminaires suitable for the respective ceiling types and room finish schedule.

1.3 REFERENCES

- A. The following standards, criteria, codes, etc. shall be followed in the manufacture and installation of the lighting systems.
 - 1. NFPA
 - 2. NEC
 - 3. IESNA
 - 4. NEMA
 - 5. ANSI
 - 6. UL

1.4 QUALITY ASSURANCE

- A. Luminaires shall be as specified in the "Luminaire Schedule". Luminaire types, appearance, characteristics, photometrics, finishes, etc., correspond to the specified manufacturer and associated series or catalog number listed in the "Luminaire Schedule". Products of other listed acceptable manufacturers shall be equivalent in every way to that of the luminaire specified. The Engineer reserves the right to disapprove any luminaire type submitted which they feel is not equal in quality, appearance or performance to the luminaire specified.
- B. Manufacturer's luminaire series or catalog numbers listed in the "Luminaire Schedule" indicate quality, type, and style, but may not cover required special design details. Provide luminaires having such special details as noted in the "Luminaire Schedule", as indicated by the specified luminaire model number and as required for proper installation.
- C. All luminaires shall be new and bear a Nationally Recognized Testing Laboratories (NRTL) label for the service intended.

- D. Luminaires shall be products of manufacturers regularly engaged in the manufacture of the type of luminaires specified and shall be the manufacturer's latest standard design that complies with specification requirements.
- E. Verify the availability of all luminaires proposed to be used in the execution of the work prior to submitting same for approval. The discontinuance of production of any luminaire after such approval has been granted shall not relieve the Contractor from furnishing an approved luminaire of comparable quality and design at no additional cost.
- F. Photometric and operational data shall be provided only by qualified and certified organizations. Certification documentation shall be submitted with the luminaire information.
- G. Should there be any difference between drawings and schedules, secure from Architect/Engineer such information as necessary prior to providing proposal. When finishes are not definitely specified, they shall be as selected by the Architect and not be limited to standard finishes.
- H. Locations indicated for luminaires are approximate. Field coordinate exact locations as near as possible to the location indicated. Coordinate with the Engineer for any major location changes.

1.5 SUBMITTALS

- A. Product Data: For each luminaire type, include in a single submittal, in order of luminaire designation, the catalog "cut" sheet with complete manufacturer and model number. Product data should include the following:
 - 1. Manufacturer and Catalog Number.
 - 2. Features, accessories, materials and finishes.
 - 3. Physical description and dimensions of luminaires.
 - 4. Life, power input, output (lumens, distribution, CCT, and CRI) and energy-efficiency data.
 - 5. Photometric data and adjustment factors based on laboratory tests (space to mounting height ratio, coefficient of utilization complete values, IES distribution, candlepower distribution by angle and luminaire efficiency). Format shall be in accordance with IES TM-27.
 - 6. Power, signal, and control wiring diagrams between luminaires and controllers.
 - 7. Lens/Louver Type.
 - 8. Driver with each type luminaire as applicable (type, sound rating, overload protection, voltage, input/fixture wattage, ballast factor, power factor, etc.).
 - 9. Integral battery inverters.

10. Emergency lighting units, including batteries and chargers.
 11. Certification of IES LM-79, IES LM-80 and TM-21 testing for LED luminaires. Luminaires shall be tested in accordance with IES LM and TM standards.
 12. Warranty.
- B. Coordination Drawings: Provide coordination drawings in accordance with Section 260500. Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Luminaires.
 2. Suspended ceiling components.
 3. Partitions and millwork that penetrate the ceiling or extend to within 12 inches of the plane of the luminaires.
 4. Structure members to which equipment and or luminaires will be attached.
 5. Initial access modules for acoustical tile, including size and locations.
 6. Items penetrating finished ceiling, including other luminaires, air outlets and inlets, speakers, sprinklers, access panels, ceiling mounted projectors, etc.
 7. Coordination of ceiling types and ceiling grids/structure to account for luminaire mounting and space requirements and luminaire lengths.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Luminaires and equipment shall be delivered with NRTL and manufacturer's labels intact and legible. Broken, cracked and damaged materials and equipment shall be removed from the site immediately and be replaced with new materials and equipment. Luminaires and accessories shall be stored in protected dry locations in their original unbroken package or container. Luminaires shall be protected from dust and dampness both before and after installation. Luminaires shall be protected from paint and cleaning solvents during all phases of construction.

PART 2 - PRODUCTS

2.1 LUMINAIRE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. NRTL Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division hazard by a NRTL.
- C. UL Compliance: Comply with UL 1598 and UL 8750.

- D. Recessed Luminaires: Comply with NEMA LE 4.

2.2 LIGHT-EMITTING DIODE (LED) LUMINAIRES

- A. Luminaires shall be identical in construction features, options and appearance to the luminaires specified in the Luminaire Schedule. LED luminaires include white and RGBW systems as indicated on the luminaire schedule.
- B. Luminaires shall be provided with all cables, controllers, power supplies, drivers, connectors, terminators and accessories required for a complete installation. LED system shall utilize pulse width modulation, non-linear scaling techniques and reverse polarity protection.
- C. Provide dimming down to 10% as a minimum, or to percentage indicated or called for on the drawings. Unless otherwise indicated, the dimming control shall be a 0-10VDC signal
- D. RGBW LED systems where indicated shall be capable of at least 8-bit control of red, green, blue and white module. RGBW LED system shall be capable of setting each module with a unique and individual address. Each address shall be controlled independently by DMX or alternate method protocol. All RGB LED fixtures shall undergo a minimum of eight-hour burn-in testing during manufacturing.
- E. LED luminaires shall be high brightness and binned for forward voltage, luminous flux and wavelength.
- F. LED luminaires shall be tested in accordance with IESNA LM-79 (luminous output, power input, luminaire efficacy (lumens/watt), color temperature and color rendering index), IESNA LM-80 (L70, output luminous maintenance, 10,000 hour minimum test, calculation method is not acceptable) and IESNA TM-21/28. Luminaire output shall be a minimum of 100 lumens/watt. Rated life shall be a minimum of 50,000 hours at 70% output. Testing shall be performed by a US Department of Energy (DOE) accredited laboratory.
- G. Drivers shall be solid state Class 1 power supply/driver with universal input (120-277V). The system shall have a minimum 90% power factor, 3.5 maximum crest factor, minimum efficiency of 90%, a maximum of 20% THD and overload protection. Adequate heat sink capability shall be provided to ensure the rated life. Unit shall meet FCC rules and regulations.
- H. Where indicated luminaires shall have color tuning capability and control. System to have separate dimming (5-100%) and color (3000K to 5000K, or as indicated on drawings) adjustability. Control shall be Dali or DMX512 for controllability as indicated. The system shall utilize the most recent settings when energized.
- I. The luminaire (to include LED sources and drivers) shall have a full five (5) year minimum warranty for replacement and labor.

1. Acceptable LED Manufacturers:

- a. Philips
- b. Osram
- c. Cree
- d. Nichea
- e. Lumiled

J. LED Emergency Drivers:

- 1. LED emergency drivers shall have the following minimum requirements:
 - a. Operate indicated fixtures at full illumination for 90 minutes minimum.
 - b. Universal voltage input (120 to 277V).
 - c. Upon loss of normal power, fixtures shall automatically switch to battery power.
 - d. Upon restoration of normal power, fixture shall return to normal mode and charge battery.
 - e. Battery shall be maintenance free, nickel cadmium type with a minimum life expectancy of seven (7) years.
 - f. Driver shall be suitable for the environment installed.
 - g. Driver shall be Class 2 and enclosed entirely in the fixture (except for down lights and exterior locations).
 - h. Units shall be listed for UL924 -Emergency Lighting and Power Equipment.
 - i. Minimum five (5) year non-prorated full warranty.
 - j. Factory installed.
 - k. Shall include an emergency system test switch integral to fixture.
 - l. Unit shall be self-testing and provide indication of unit failure.
 - m. Design Make: Iota, ILB-CP series or approved equal.

2.3 LUMINAIRE CONSTRUCTION

A. Metal Parts:

- 1. Free of burrs and sharp corners and edges.
- 2. Sheet metal components shall be steel unless otherwise indicated.

3. Form and support to prevent warping and sagging.
- B. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during maintenance and when secured in operating position.
- C. Lenses:
 1. Shall be listed materials tested in accordance with ASTM D-635, "Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position" and burns less than 2/5 inches per minute.
 2. The products shall have a smoke density of less than 75 when tested in accordance with ASTM D-2843, standard test method for "Density of Smoke from the Burning or Decomposition of Plastics".
 3. The flame spread rating shall not exceed 0-25 and smoke developed rating shall not exceed 450 in accordance with ASTM E-84, standard test method for "Surface Burning Characteristics of Building Materials".
 4. Self-ignition shall not occur below 600°F, in accordance with ASTM D-1929, standard test method for "Ignition Properties of Plastics".
 5. Materials shall remain in place 15 minutes at 175°F and fall from frame at 200° below ignition temperature in accordance with ASTM D-648, "Deflection Temperature of Plastics Under Flexural Load".

2.4 LUMINAIRE SCHEDULE

- A. Luminaire schedule is found on the contract drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of Work.
- B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 GENERAL INSTALLATION

- A. Comply with NECA NEIS (National Electrical Installation Standard) latest edition.
- B. All luminaires shall be installed as per manufacturer furnished installation instructions.
- C. Provide for every luminaire as shown on the plans, or as scheduled on the drawings.

- D. Location of all ceiling and wall mounted luminaires shall be as indicated on the Architectural and Electrical drawings. The contractor shall verify ceiling type, construction, and material prior to ordering.
- E. Provide luminaires with an IC rating for luminaires installed in direct contact with insulation.
- F. Provide plaster frames for plaster ceilings and flanged frames for drywall ceilings.
- G. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.
- H. Luminaires shall be suitable and as recommended by the manufacturer for the actual intended mounting method and materials.
- I. Supports:
 - 1. Sized and rated for luminaire weight.
 - 2. Able to maintain luminaire position after cleaning and maintenance.
 - 3. Provide support for luminaire without causing deflection of ceiling or wall.
 - 4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.
- J. Flush-Mounted Luminaires:
 - 1. Secured to outlet box.
 - 2. Attached to ceiling structural members at four points equally spaced around circumference of luminaire.
 - 3. Trim ring flush with finished surface.
- K. Wall-Mounted Luminaires:
 - 1. Attached to structural members in walls, to a minimum 20 gauge backing plate attached to wall structural members, or using through bolts and backing plates on either side of wall.
 - 2. Do not attach luminaires directly to gypsum board.
- L. Suspended Luminaires:
 - 1. Pendant and Rods:
 - a. Pendant mount luminaires from 1/4 in. threaded rods of required length.
 - b. Brace pendants and rods longer than 48 inches to limit swinging.

2. Aircraft Cable:

- a. Cables shall be 1/16 in. aircraft cable with end safety fittings. Cable shall be provided with 2 in. diameter mini-canopy and threaded coupler for attachment to a 1/4 in.-20 threaded stud extending 3/4 in. below ceiling.
- b. Cable assembly shall include a spring-loaded adjustment device mounted in the fixture.
- c. The Contractor shall be responsible for providing required supports for cable attachment.
- d. For cord feed to the luminaire provide continuous cord clip of matching color to attach the cord to the cable.
- e. Support per manufacturer's recommendations.

3. Support stem mounted, single unit luminaires with approved outlet box and accessories that hold tem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.

4. Use tubing or stem for wiring at one point of continuous rows of luminaires and tubing, rod, or wire support for suspension for each unit of length of luminaire chassis, including one at each end.

M. Ceiling-Grid-Mounted Luminaires:

1. Secure to any required outlet box.
2. Use approved devices and support components to connect luminaire to building structure in a minimum of four locations, spaced near corners of luminaire. Utilize #10 steel wire; similar to that used to support the ceiling grid.
3. Provide UL listed seismic hold-down clips and fasten to luminaires and to ceiling grid members at or near each luminaire corner.
4. Install luminaires of sizes less than ceiling grid as indicated on reflected ceiling plans or center in acoustical panel and support luminaire independently with at least two metal channels spanning and secured to ceiling tees.
5. Contractor to verify luminaire mounting and supports are compatible with the ceiling grid type and mounting/support requirements.
6. Contractor to coordinate recessed linear luminaire run lengths with the ceiling grid layout and required mains supports. All continuous run lengths to be verified and coordinated prior to determining the final housing lengths.

N. Cove Lighting:

1. Installed so as to produce a continuous and unbroken band of light with no shadows or light gaps.

O. In-Grade Luminaires:

1. Provide a minimum of 6 in. peat gravel at the bottom of luminaire to allow for drainage. When installed in a concrete walkway, secure luminaire to rebar to prevent luminaire from "floating" when concrete is poured.
2. Seal conduit entry into luminaire to prevent moisture penetration into luminaire from conduit system.
3. Secure faceplate of in-grade luminaires in accordance with manufacturer directions to compress gasket evenly to form a waterproof seal. The use of power tools to secure faceplate is not permitted.

P. Provide all necessary accessories for "end-to-end" mounting where continuous rows of luminaires are indicated. All luminaire assemblies shall be grounded.

Q. Luminaires installed in continuous rows may be fed by a single outlet if luminaires are UL approved and suitable for through wiring in luminaire raceway.

R. New luminaires may be provided to replace existing luminaires indicated to remain or be reused, subject to shop drawing approval.

3.3 REMOTE DRIVERS

- A. Remote drivers shall be mounted in an approved NEMA 1 enclosure and shall be located in areas easily accessible to maintenance personnel.
- B. Wiring from luminaire to remote driver shall not exceed the driver manufacturer's recommendations for distance.
- C. Remote driver shall be clearly labeled indicating fixture served, voltage, panelboard and circuit number served from.

3.4 GROUNDING

- A. Ground all non-current carrying parts of all lighting luminaires.
- B. All grounding shall be accomplished with NRTL tested grounding connectors suitable for this purpose.

3.5 FINAL CLEANING

- A. Immediately prior to acceptance, damp clean diffusers, luminaire trim, reflectors, louvers, lens, and similar objects of all luminaires. Remove all dirt, corrosion, foreign material, finger marks, and blemishes. Replace all burned out LEDs and failed components.

3.6 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
 - 2. Test of Emergency Lighting: Under supervision of Engineer, interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.
- B. Luminaire will be considered defective if it does not pass operation tests and inspections.
- C. Prepare test and inspection reports.
- D. Replace luminaires damaged during shipment, construction, or installation.

3.7 STARTUP SERVICE

- A. Comply with requirements for startup specified in Section 260936 "Lighting Controls."

3.8 ADJUSTING

- A. Provide adjusting the direction of aim of luminaires to suit occupied conditions. Adjustment may be required during hours of darkness.
- B. Final distribution shall be acceptable to the Owner and may take several attempts.

END OF SECTION 26 50 00

SECTION 26 55 00

LIGHTING CONTROL

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Provide a complete lighting control system as indicated on the Contract Documents and as specified herein.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.3 QUALITY ASSURANCE

- A. Equipment and materials shall be of the quality and manufacture indicated in their respective sections of the specifications. The equipment specified is based upon the acceptable manufacturers listed. Equipment types, device ratings, dimensions, etc. correspond to the nomenclature dictated by those manufacturers.
- B. Installation shall be accordance with NFPA 70 (National Electrical Code), energy conservation codes, state codes, local codes, and requirements of authority having jurisdiction.
- C. Equipment shall be designed, manufactured, assembled, and tested in accordance with the latest revisions of applicable published ANSI, NEMA and IEEE Standards.
- D. All equipment shall NRTL tested.
- E. All components and assemblies are to be factory pretested.
- F. The controls provider must:
 - 1. Provide equipment from manufacturers for which they maintain a contract, distributorship, are an agent, or other formal arrangement for which documentation can be produced showing authority to sell and service the equipment in this territory.
 - 2. Demonstrate that they have successfully installed similar systems, utilizing their standard products, for a minimum period of five (5) years.
 - 3. Employ service technicians who are trained in accordance with the systems manufacturer's recommendations.
 - 4. Own and demonstrate proficiency in the use of the required test equipment, tools, etc. for the proper installation, set-up, testing and maintenance of the system. If requested, must provide a listing of tools and/or equipment and where

appropriate, certifications in the proper training and use of the tools and/or equipment.

1.4 SUBMITTALS

- A. Submit the following equipment, materials, and products including all components and accessories:
 - 1. General Equipment
 - 2. Vacancy/occupancy Sensors
 - 3. Wiring diagrams
 - 4. Commissioning Plan
- B. Submit the shop drawings and the product data specified below at the same time as a single submittal package.
- C. Product Data: Provide equipment data sheets, specifications, wiring diagrams and installation instructions for all required system components.
- D. Shop drawings shall include the following at a minimum:
 - 1. Composite custom wiring and/or schematic diagram of each control circuit as proposed to be installed (standard diagrams will not be accepted). Wiring diagrams shall include all system components, including but not limited to: room controllers, digital switches, vacancy/occupancy sensors, photocells, isolated relays, digital I/O interfaces to conference room A/V systems, network interfaces, lighting control panels and associated components.
 - 2. Scaled drawing for each area showing exact location of each room controller(s), digital switch(es), vacancy/occupancy sensor, daylight sensor, lighting control panel and other associated system components.
 - 3. All system devices shall be located per the system manufacturers recommendations. All devices shall be suitable for the building configuration and intended operation.

1.5 SYSTEM DESCRIPTION

- A. The lighting control system and/or components, as specified and indicated on the drawings to provide the intended and required control of the lighting systems.

PART 2 - PRODUCTS

2.1 GENERAL EQUIPMENT

A. Switches:

1. Toggle/Snap:

- a. Unit shall be quiet operation, quick make/quick break, rated for 20A/120-277V/1hp at 120/277V, side/back wired, with nylon/polycarbonate toggle, self grounding mounting screw clip plate (not staple), ground terminal and silver alloy contacts. Units shall meet latest Federal Specification WS-896, NEMA WD-1 and UL Test 20.
- b. Acceptable Manufacturers (for single pole units, provide two pole, three way, four way, illuminated handle, keyed, etc. type of the same quality and model).

1) Hubbell HBL1221

2) P&S 20AC1

3) Leviton 1221-2

2. Low Voltage:

- a. Unit shall be button type switch that is configurable from one button to eight buttons using point-to-point low voltage wiring for control of single or multiple loads. Each button shall provide a momentary contact and all share a common return. The switch shall be totally passive and contain no active electronics or power supply. Operation is dependent upon a Class 2 connection to a compatible relay panel or other device that can react to a momentary contact signal.
- b. Each button shall have an LED indicator light that can serve as a status indicator or as a locator light. The LED indicators shall be powered by a 24VDC source originating from the lighting control panel or other device. The button quantities shall be as indicated on the plan views.

c. Acceptable Manufacturer:

1) Wattstopper LVSW series (Design Make)

2) Acuity Brands

3) Hubbell

4) Approved Equal.

- 3. All device colors shall match the surrounding devices and shall be selected by the Architect.

B. Lighting Dimmers:

1. Provide lighting dimmer where indicated suitable for the type of luminaire for even continuous control. Unit shall be rated for the indicated connected load plus 25% minimum (even when ganged). Review luminaire schedule and plans for type and loading. Provide for three-way control as indicated.
2. Low voltage dimming shall be as recommended by the luminaire manufacturer for magnetic or solid state.
3. LED dimmers shall be as recommended by the luminaire manufacturer and be listed for use with the associated driver.
4. Device color shall match the other project devices.
5. Acceptable Manufacturers:
 - a. Lutron (Design Make)
 - b. Crestron
 - c. Acuity Brands
 - d. Leviton
 - e. Approved equal

2.2 VACANCY/OCCUPANCY SENSORS

A. Vacancy/occupancy Sensors:

1. Vacancy/occupancy sensors shall comply with the following as a minimum:
 - a. Zero crossing switching operation (switch on/off only where sine wave is at zero volts) suitable for linear, non-linear and electronic/magnetic fluorescent ballasts for the loads indicated. Where the load to be controlled exceeds the sensor load rating provide a separate relay of adequate rating.
 - b. Failure of the unit shall be to the on/closed position or manual operation.
 - c. Motion sensitivity adjustment (dip switch or dial) and time delay adjustment (5 to 30 minutes minimum, dip switch or dial).
 - d. Line voltage input and switching. Field selectable for 120 or 277 VAC, 60 Hz.
 - e. UL listed and have a five (5) year manufacturer full replacement warranty.

- f. Test mode feature to override the set time delay to allow adjusting of the sensitivity.
 - g. Sensor locations shall be adjusted during construction and at occupancy as recommended by the manufacturer for optimal sensing and operation.
 - h. Operation shall be field selectable with vacancy sensor being manual "on" with close switch/contact upon motion sensing and open after the set amount of time delay without motion or occupancy sensor being automatic on upon motion sensing.
 - i. Adjustable controls/settings shall only be accessible when the front cover is removed or from the back of the unit.
 - j. Unit color shall match the project devices except for the ceiling-mounted units which shall match the ceiling color. All color selections shall be by the Architect.
 - k. Ultrasonic sensing shall not be affected by air movement and shall operate at 32 kHz minimum (shall not interfere with hearing aids or other equipment).
 - l. Provide components as needed for the indicated control.
 - m. A factory-authorized representative shall coordinate and instruct the startup services of the sensors providing placement recommendations, connection guidance and startup supervision and adjustment.
2. Wall Mounted - Dual Technology:
- a. Unit shall fit into a standard single gang electrical box, have an On/Off button, and utilize PIR and ultrasonic technology motion sensing. Both types of sensing are needed for contact closure but only one (1) is needed to keep it closed.
 - b. Minimum Switching Capacity: 120 V - 800 W, 277 V - 1200 W.
 - c. The sensing shall be 180 degrees and the sensitivity area to be a minimum of:
 - 1) Major Motion (Walking/Arm Wave): 35 ft. x 30 ft.
 - 2) Minor Motion (Small Motion at Desk): 20 ft. x 15 ft.
 - d. Ambient light level sensing (adjustable 20-300 fc) to prevent "On" operation when the ambient light level is greater than the setpoint level.
 - e. High impact resistant sensor lens.

- f. Acceptable Manufacturers:
 - 1) Wattstopper DW-100 (Design Make)
 - 2) Hubbell
 - 3) Eaton
 - 4) Acuity Brands
- 3. Wall Mounted - Dual Technology - Dual Switching:
 - a. Unit shall fit into a standard single gang electrical box, have two (2) On/Off buttons, and utilize PIR and ultrasonic technology motion sensing. Both types of sensing are needed for contact closure but only one (1) is needed to keep it closed. To have two (2) contacts each fully rated, electrically separate and be commonly controlled.
 - b. Minimum Switching Capacity: 120 V - 800 W, 277 V - 1200 W.
 - c. The sensing shall be 180 degrees and the sensitivity area to be a minimum of:
 - 1) Major Motion (Walking/Arm Wave): 35 ft. x 30 ft.
 - 2) Minor Motion (Small Motion at Desk): 20 ft. x 15 ft.
 - d. Ambient light level sensing (adjustable 20-300fc) to prevent "On" operation when the ambient light level is greater than the setpoint level.
 - e. High impact resistant sensor lens.
 - f. Acceptable Manufacturers:
 - 1) Wattstopper DW-200 (Design Make)
 - 2) Hubbell
 - 3) Eaton
 - 4) Acuity Brands
- 4. Ceiling Mounted - Dual Technology:
 - a. Unit shall mount to standard octagonal box, have auxiliary contact (Form C, 0.5A at 24 VDC), and utilize PIR and ultrasonic technology motion sensing. Both types of sensing are needed for contact closure but only one (1) is needed to keep it closed.

- b. Shall have self-contained rated contacts or control a separate switch pack. If a self-contained unit, then the ratings and function shall meet or exceed the switch pack specifications.
- c. Sensing shall be 360 degrees with a minimum operating area of:
 - 1) Major Motion (Walking/Arm Wave): 50 ft. x 30 ft.
 - 2) Minor Motion (Small Motion at Desk): 40 ft. x 20 ft.
- d. Units shall be suitable for overlap of motion detection areas without reduction in spacing and false operation.
- e. Sensing shall be suitable for a ceiling/mounting height of up to 12 ft. minimum.
- f. Ambient light level sensing (adjustable 20-300 fc) to prevent "On" operation when the ambient light level is greater than the setpoint level.
- g. The maximum depth shall be 1.5 in. below the ceiling/box.
- h. Acceptable Manufacturers:
 - 1) Wattstopper DT-300 (Design Make)
 - 2) Hubbell
 - 3) Eaton
 - 4) Acuity Brands

B. Switch Pack:

- 1. Provide a minimum of one (1) switch pack for each ceiling-mounted vacancy/occupancy sensor. Provide additional units for multiple circuits (quantity to match the quantity of circuits).
- 2. Unit shall be plenum rated with line voltage side into a metallic box.
- 3. Low voltage power shall be suitable for a minimum of three (3) sensors. Multiple sensors shall be able to control a single switch pack.
- 4. Minimum switching capacity shall be 20A (all types of loads) at 120/277 VAC.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Provide all required system components, interconnection wiring and branch circuit power connections as required by the lighting control system manufacturer to meet the intended

sequence of operation and system performance requirements. All system wiring shall be in accordance with the system manufacturer's requirements at a minimum.

- B. When using wire for connections other than the digital lighting control network (Category 5e with RJ-45 connectors), provide detailed point to point wiring diagrams for every termination. Provide wire specifications and wire colors to simplify contractor termination requirements. All Category 5e cabling and connectors shall be terminated and tested to meet the system manufacturer's requirements. Category 5e cabling shall have a thermoplastic jacket to easily identify from other building network cabling, building management system, or other low voltage systems cabling.
- C. All line voltage wiring shall be installed in conduit. Terminations shall be done above accessible ceilings or within utility rooms and within a 4"x4" back box and have a suitable cover provided. Digital network devices (room controllers, isolated relays, plug load controllers, etc.) shall be mounted to a junction box and connected as recommended by the system manufacturer.
- D. All low voltage control cabling shall be plenum rated. Cabling shall be installed in minimum 3/4" conduit in vertical runs in walls/partitions and inside mechanical/utility rooms. Provide suitable back box as required by the system manufacturer for the device being installed. Above accessible ceilings and within utility rooms all control cabling shall be installed within separate J-hook supports located at 3' on center with the cabling neatly bundled. All cabling inside utility rooms without ceilings shall be installed in conduit.

3.2 SYSTEM PROGRAMMING

- A. Upon completion of the installation, the system shall be programmed by the manufacturer's factory authorized representative who shall verify a complete fully functional system.
- B. The system manufacturer shall include separate individual site visits scheduled to complete the system programming and perform the following functions:
 - 1. Initial system startup/programming (time shall be suitable to setup all system devices). A minimum of two days shall be accounted for the system initial setup.
 - 2. Coordination with the owner to develop preferred lighting control scenes, scene illumination levels, button operation and coordinate day lighting requirements prior to final system programming. Once verified with the owner all system components shall be fully programmed and setup.
 - 3. Verification of the system operation (time shall be suitable to test and verify day lighting functions are operating properly). The manufacturer shall provide light meters for verification; time shall be as required for proper testing of the system.
 - 4. The lighting control system manufacturer shall coordinate all room names and scheduling with the owner prior to final setup.

5. The presence of the system manufacturer's service technicians to assist the installing electrician in all of the above is a requirement of this project and proof of time expended shall be provided to the Owner's Representative.

3.3 SYSTEM COMMISSIONING

- A. The electrical contractor shall provide both the Owner and the electrical engineer with a minimum of ten working days written notice of the system startup and configuration date.
- B. Refer to the lighting control details that are part of the Construction Drawings for sequence of operation and commissioning requirements of the project lighting control scenarios.
- C. All lighting control systems and components shall be commissioned to verify sensor location, time delay/sensitivity is properly set, auto-on/manual-on, override times, controls, day-lighting control, communications between control panels, and timeclock controls are operating as intended.
- D. Calibrate all sensor time delays, sensitivity settings and properly aim to guarantee proper detection of occupants and energy savings.
 1. Adjust time delay so that controlled area remains lighted for 15 minutes after occupant leaves area.
- E. Exterior photocells shall be aimed per the manufacturer's installation instructions. Locate and aim to be facing to the north and avoid being blocked by the building architectural features.
- F. Provide written or computer-generated documentation on the commissioning of the system including room by room description including:
 1. Sensor parameters, time delays, sensitivities, and daylighting set points.
 2. Sequence of operation, (e.g. manual ON, Auto OFF. etc.)
 3. Load Parameters (e.g. blink warning, etc.)

3.4 SYSTEM TRAINING

- A. The Contractor shall provide instruction to the Owner's Representative with regard to use and operation of the system. Obtain signed receipt from Owner's Representative that instruction has been given.
- B. The lighting control system's manufacturer shall supply at least one (1) service technician after all systems have been tested and in full operation as described above to assist the installing electrician to demonstrate and instruct the Owner's Representative on the operation, programming and any uniqueness of the control system. Minimum time required for Owner instruction of the system is one (1) eight (8) hour session. Provide additional instruction and training to the owner to as required to verify the owner is comfortable with the system operation. Time of demonstration and instruction to be at

Owner's convenience during normal working hours and shall be scheduled a minimum of ten working days prior.

3.5 WARRANTY

- A. Provide a five year complete manufacturer's warranty on all products to be free of manufacturers' defects.

END OF SECTION 26 55 00

SECTION 28 31 02

ANALOG ADDRESSABLE FIRE ALARM SYSTEM

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services to perform operations required for the complete installation of a fully operational analog addressable fire alarm system and related Work as described in the Contract Documents.
- B. Provide system as approved by local Fire Marshal and the Authority Having Jurisdiction (AHJ). System materials and installation shall be in accordance with the manufacturer's recommendations.

1.2 QUALITY ASSURANCE

- A. All methods of construction, details of workmanship that are not specifically described or indicated in the contract documents, shall be subject to the control and approval of the Owner's Representative. Equipment and materials shall be of the quality and manufacture indicated in their respective sections of the specifications. The equipment specified is based upon the acceptable manufacturers listed. Equipment types, device ratings, dimensions, etc. correspond to the nomenclature dictated by those manufacturers. All equipment shall be tested at the factory. Unless specified elsewhere, standard factory inspection and operational tests will be acceptable.
- B. Installation shall be in accordance with NFPA-70 (National Electrical Code), NFPA-72 (National Fire Alarm Code), AHJ, state codes, local codes, requirements of authority having jurisdiction and the contract documents. Installer shall be certified in the State of New York for fire alarm installation.
- C. Equipment shall be designed, manufactured, assembled, and tested in accordance with the latest revisions of applicable published UL, NFPA, ANSI, NEMA and IEEE Standards. All system equipment shall be compatible and of the same manufacturer.
- D. Each item of the fire alarm system shall be listed as a product of a single fire alarm system manufacturer and be listed by a NRTL.
- E. System installation shall be under the supervision of an accredited factory representative. Final connections to the FACP, annunciator panel and any other panels shall be by the factory representative.
- F. The system provider must:
 - 1. Provide equipment from a single manufacturer for which they maintain a contract, distributorship, are an agent, or other formal arrangement for which documentation can be produced showing authority to sell and service the equipment in this territory.

2. Demonstrate that they have successfully installed these systems, utilizing their standard products, for a period of five (5) years minimum.
3. Maintain a service organization to provide both normal and emergency service. Emergency service must be available 24 hours per day, 365 days per year and staff must be adequate to respond within 2 hours of an emergency call.
4. Have a service location not more than 50 miles from the project location.
5. Maintain adequate spare parts inventory to provide both normal and emergency service.
6. Employ service technicians who are trained in accordance with the systems manufacturer's recommendations.
7. Own and demonstrate proficiency in the use of the required test equipment, tools, etc. for the proper installation, set-up, testing and maintenance of the system. If requested, provide a listing of tools and/or equipment and where appropriate, certifications in the proper training and use of the tools and/or equipment.
8. Provide all system programming to deliver a customized system to the Owner ready for use.
9. All system programming is to be completed to the satisfaction of the Owner. If after preliminary use of the system, and/or training, the increased understanding of the system's features and capabilities necessitates reprogramming to any extent, it is to be performed at no additional cost.
10. Provide a minimum of two system inspections/tests each year during the warranty period as described in NFPA 72. Needed and requested system programming changes shall be provided at these times.
11. Warranty period shall be as described elsewhere with two years being minimum. Provide a service contract for the Owner review for two years beyond the warranty period. Warranty shall include all parts, materials, labor, transportation, etc.
12. Any system being extended or connected to an existing system shall be tested for full functionality prior to beginning work. System shall be signed off by Owner/Engineer as fully functional prior to any new work.

1.3 SEQUENCING AND SCHEDULING

- A. Existing Fire Alarm Equipment: Maintain existing equipment fully operational until new equipment has been tested and accepted. When new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service, and label existing fire-alarm equipment "NOT IN SERVICE" until removed from building.
- B. Equipment Removal: After full testing and acceptance of new fire-alarm system, remove existing disconnected fire alarm equipment and wiring.

1.4 SUBMITTALS

- A. Provide a complete system submittal prior to ordering of equipment and installation including but not limited to:
 - 1. Complete equipment list.
 - 2. Catalog descriptive literature for all equipment. This shall include a description of the unit, ratings, functions, capability, materials and compatibility with other components.
 - 3. Riser Wiring Diagram showing all equipment, devices, device addresses, connections, control connections, remote notification connection(s), wire quantities and sizes.
 - 4. Floor plan indicating equipment and device locations, addresses, power circuit information with power panel location, notification circuiting, initiation circuiting, control circuiting and any system applicable building characteristics (ceiling heights, structural members impeding detection, etc.). Contact the Engineer for an electronic copy of the project floor plans. Engineer logo shall be included in final drawing.
 - 5. Typical Terminal Wiring Diagram for each type of device.
 - 6. Terminal wiring Diagram for all Fire Alarm equipment.
 - 7. Calculations including:
 - a. Battery sizing calculations indicating total number of power devices, load associated with each type device, backup period and recommended battery capacity (AH).
 - b. Voltage drop calculations with actual equipment loads used to derive battery back-up ampere-hour rating and individual circuit voltage drop (indicate the wire size to be used and the associated voltage drop with the allowed voltage drop) for each circuit.
 - 8. Complete console enclosure and equipment configuration.
 - 9. Typical Terminal Wiring Diagram for each type of device.
 - 10. Terminal wiring Diagram for all Fire Alarm equipment.
- B. Submittal package, calculations and system wiring shall be performed/collected/signed by a NICET Level III technician.
- C. If required by the Authority Having Jurisdiction (AHJ) provide a submission of all requested information for review and comment by the AHJ. All AHJ comments shall be incorporated and resubmitted until approved.

- D. Test reports at the completion of the project. Testing shall be of all system devices, equipment, circuits, features and functions.

1.5 OPERATIONS AND MAINTENANCE MATERIAL SUBMITTALS

- A. Provide to the Owner the system Operation Manuals as specified, that shall include as a minimum:
 - 1. Bill of Material.
 - 2. Catalog descriptive literature for all equipment. This shall include a description of the unit, ratings, functions, capability, materials and compatibility with other components.
 - 3. Riser Wiring Diagram showing all equipment, devices, device addresses, connections, control connections, remote notification connection(s), wire quantities and sizes.
 - 4. Floor plan indicating equipment and device locations, addresses, power circuit information with power panel location, notification circuiting, initiation circuiting and control circuiting. Contact the Engineer for a copy of the project floor plans.
 - 5. Instruction report starting when instruction was given and who was in attendance, signed by Owner's Representative.
 - 6. A written test report from an authorized representative of the equipment manufacturer that each device and overall system operation has been 100% tested and approved.
 - 7. Certificate of Completion as described in NFPA-72.
 - 8. Provide complete O&M Manual for Engineer review. Upon approval provide complete submission including all materials listed here to the Owner.

PART 2 - PRODUCTS

2.1 EXISTING FIRE ALARM SYSTEM TO BE MODIFIED

- A. Existing System Manufacturer: Simplex 4100U
- B. Source Limitations for Fire Alarm System and Components: Components must be compatible with, and operate as extension of, the existing system. Provide system manufacturer's certification that components provided have been tested as, and will operate, as a system.
- C. Prior to the start of any work on the existing fire alarm system, thorough testing shall be done on the system to verify proper working condition. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections, as per NFPA 72 requirements. Provide test report to Owner's representative and Engineer as a submittal.

2.2 FIRE ALARM SYSTEM

- A. The fire alarm system shall be comprised of the components specified as a minimum and also include components not indicated but required for a complete and operable system as described herein.
- B. The system and all its components shall be UL listed and in accordance with NFPA 72, local and state codes.
- C. Each initiating device shall have an individual address for system communication. The system addresses shall not exceed seven digits. Each address, initiation circuit, notification circuit and control point shall have an individual identification description.

2.3 INITIATION DEVICES

- A. General:
 - 1. Provide analog addressable smoke and thermal sensors as shown. All detectors, control modules, monitor modules and all other initiation devices shall communicate with twisted pair cable and have an individual address. Peripheral devices shall be of the same manufacturer as the FACP.
 - 2. Spot type detectors shall utilize the same interchangeable bases.
 - 3. If a device is removed or taken out of service a trouble signal shall be initiated.
- B. Photo-Obscuration Type Smoke Detector:
 - 1. The photo-obscuration detector shall operate on the photo electronic principle and provide an analog signal to the system indicating the amount of smoke. Detector shall be an analog addressable type.
 - 2. The detector shall incorporate a built in type identification so the system can identify the type of detector. The sensor shall be continually monitored to measure any change in their sensitivity because of the environment (dirt, smoke, temperature, humidity, etc.). Unit shall not be affected by exterior light or EMF.
 - 3. The detector shall be designed and arranged to prevent interference from exterior electromagnetic fields and light.
 - 4. The detector shall provide advance indication of the analog value of the products of combustion to the FACP indicating that maintenance is required in order to insure normal operation. The detector sensitivity shall be adjustable per device (within UL limits) and be set at the FACP for continuous or variable based on time of day. There shall be a minimum of six (6) selectable sensitivity levels. The individual detector sensitivity setting shall be adjusted to meet the building/space characteristics and operation. The detector shall monitor the obscuration continuously and raise the obscuration level to compensate for a dirty sensor to maintain the set sensitivity.

5. Detectors shall be designed for twistlock mounting to a separate base assembly. Provide manufacturer's recommended back box suitable for surface mounting where required.
6. The detector base shall have terminals for making all connections; no soldering shall be required. It shall be possible to secure the detector to the base with a concealed socket headscrew to prevent unauthorized tampering.
7. Smoke detectors shall be UL 268 listed and FM approved.
8. All smoke detectors shall be field checked and set to meet the prevailing conditions of the premise and any Owner requests. All such work shall be performed by an authorized representative of the manufacturer trained in such procedures.
9. Photo-obscuration type smoke detection shall be used for smoke detection unless indicated otherwise indicated.

C. Heat Detector:

1. The heat detector shall be a thermal sensor and shall constantly monitor the space temperature and constantly report this to the system. The unit shall be analog addressable.
2. The sensor shall use dual solid state thermistors and shall monitor the ambient temperature from 32 degrees F, to 155 degrees F and provide a fast response to rapid increase in temperature. The sensor shall send data to the FACP representing the analog value of the ambient temperature. The FACP shall be suitable to monitor for set temperature (selectable by detector for 135 or 155 degrees F) and rate of rise (selectable by detector for 15 or 20 degrees F per minute). Individual detector thermal settings shall be adjusted for the building/space characteristics and operation but shall initially be set to 135 degrees F set temperature and 15 degrees F per minute rate of rise.
3. Detectors shall be designed for twistlock mounting to a separate base assembly. Provide back box suitable for surface mounting where required.
4. The detector base shall have terminals for making all connections; no soldering shall be required. It shall be possible to secure the detector in the base with a concealed socket headscrew to prevent unauthorized tampering.
5. Smoke detectors shall be UL 268 listed and FM approved.
6. All thermal sensors shall be field checked and set to meet the prevailing conditions of the premise. All such work shall be performed by an authorized representative of the manufacturer trained in such procedures.

D. Addressable Initiation Module (AIM):

1. The addressable initiation module shall be used to connect supervised conventional initiating device or zone of supervised conventional initiating devices (water flow switches, tamper switches, manual pull stations, (4) wire smoke detectors, conventional (4) wire duct detectors, fire pump alarms, dry chemical fire extinguisher control panels, etc.) to one of the system's addressable circuits.
2. The module shall provide address setting means using rotary decimal switches and also store an internal identifying code which the control panel shall use to identify the type of device.
3. The module shall contain an integral LED that flashes each time the unit is polled.

E. Manual Pull Stations:

1. Noncoded pull-down type, double action (push then pull down) manual addressable units with front keyed test/reset. Units shall be semi-flush where installed in construction with hollow or block walls. Where construction does not allow semi-flush mounting then unit shall be surface mounted utilizing the manufacturers back box. Each unit shall have a distinct address. Units shall be key reset.
2. Units installed outdoors or in potentially wet locations shall be rated for such conditions.
3. Bright red finish with white lettering "FIRE ALARM".

2.4 NOTIFICATION APPLIANCES

A. Horns:

1. 24 volts DC.
2. Basic grille type with powder coated red finish paint.
3. Horn shall be rated 94 dBA (anechoic chamber) at 10 feet. Output shall be selectable steady tone or coded. Provide dampening devices to reduce unit output by 5dBA for a minimum of 40% of the system horn units and install as needed to meet the Owner's needs.
4. Units shall be semi-flush where installed in construction with hollow or block walls. Where construction does not allow semi-flush mounting then unit shall be surface mounted utilizing the manufacturers back box.
5. Units installed outdoors or in potentially wet locations shall be rated for such conditions.
6. Provide directional projector where noted on the Drawings.

7. Provide backbox and grille for fully recessed installations; 4 in. deep box maximum.

B. Strobe Unit:

1. 24 volts DC with built-in Xenon Flasher; two watts maximum. Pulse duration shall be 0.2 seconds with maximum duty cycle of 40%. Illumination intensity shall be field selectable for 15/30/75/110 candela or 135/177/185 candela as applicable for the location. Output setting shall be 15 candela in corridors, 75 candela in general areas, 177 candela in sleeping areas or as indicated. Flash rate minimum 1 Hz, maximum 2 Hz. Units within building shall flash in synchronization.
2. Protruding pyramid shaped lexan lens with reflector and the word "FIRE" imprinted on the lens.
3. Rated life shall be a minimum of 500 hours of continuous operation.
4. Units installed outdoors or in potentially wet locations shall be rated for such conditions.
5. Units shall be semi-flush where installed in construction with hollow or block walls. Where construction does not allow semi-flush mounting then unit shall be surface mounted utilizing the manufacturers back box. Wall or ceiling mounted as noted on the Drawings.
6. Provide surface backbox for surface installation; 4 in. deep maximum.

C. Combination Horn-Strobe Units:

1. Unit shall be a combination of the horn and strobe units specified above in a single manufactured unit.

2.5 ADDRESSABLE CONTROL MODULE

- A. The addressable control module shall have an individual system address, be supervised and control an output dry contact from indication from the FACP. This can be used to control or have an input to elevator controls, notification appliances, door holder circuits, fans systems, etc. as indicated. Output contacts shall be suitably rated for the intended amperage and be two pole double throw. Modules shall be connected to the addressable loop(s).
- B. The unit shall control an output relay (dry contact form C). The module shall mount in a 4 in. square, 2-1/8 in. deep electrical box.
- C. The module shall contain an integral LED that shall flash each time the module is polled.
- D. The module shall provide address setting means using rotary decimal switches and also store an internal identifying code which the control panel shall use to identify the type of device. Each unit shall have a separate address and be connected to the system addressable signaling circuit.

3.1 PREPARATION

- A. Preinstallation Testing: Perform verification of functionality of installed components of existing system prior to starting work. Document equipment or components not functioning properly and notify the Owner.
- B. Interruption of Existing Fire-Alarm Service: Do not interrupt fire-alarm service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide fire watch in accordance with requirements indicated:
 - 1. Owner has agreed to the interruption, the duration and the use of a fire watch.
 - 2. Notify the Construction Manager or Owner's Representative no fewer than seven days in advance of proposed interruption of fire-alarm service. Do not proceed with interruption of fire-alarm service without Construction Manager or Owner's Representative written permission. The fire watch shall be a project area observation by approved individuals at frequencies acceptable to the Owner and the local fire marshal. The individuals shall be approved for such observation. Means shall be provided for quick alarm notification to the local fire department.
- C. Protection of In-Place Conditions: Protect devices during construction unless devices are placed in service to protect facility during construction.
- D. For existing systems under renovation, provide heat detection throughout the space utilizing the manufacturer recommended spacing. At the end of construction remove the heat detectors and provide the indicated system.

3.2 INSTALLATION OF EQUIPMENT

- A. Comply with NECA 305, NFPA 72, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install electrical wiring to comply with requirements in NFPA 70.
 - 1. Devices placed in service before other trades have completed cleanup must be replaced.
 - 2. Devices installed, but not yet placed, in service must be protected from construction dust, debris, dirt, moisture, and damage in accordance with manufacturer's written storage instructions.
- B. Building spaces shall have suitable environmental conditions to meet the system/equipment manufacturer requirements prior to installation and operation.
- C. Connecting to Existing Equipment: Verify that existing fire-alarm system is operational before making changes or connections.
 - 1. Connect new equipment to existing control panel/circuiting for the indicated new equipment.

2. Expand, modify, and supplement existing equipment as necessary (power supplies, batteries, initiation circuits, etc.) to extend existing functions to new points. New components must be capable of merging with existing configuration without degrading performance of either system.
- D. All surface mounted devices shall be mounted on a special box furnished by fire alarm equipment manufacturer. Total assembly shall be secure, smooth contour and have no protrusions.
- E. Where detectors are installed on wood or masonry surfaces, attach brackets directly to the surface with tamperproof fasteners. Where detectors are installed on suspended ceilings, provide additional supports in the ceiling, such as channel support system, angle iron or additional runner bars. Fasten the additional supports rigidly to the ceiling runner bar system. Attach bracket to the supports with tamperproof fasteners. Install metal spacers between the bracket and supports so that the ceiling tiles will not be a part of the support system.
- F. Where ceiling mounted type devices are called for, verify ceiling type and mounting height in the field. Provide pendant-mounted devices as required for specified mounting height.
- G. Install manual pull station in normal path of egress within 60 inches of exit doorway.
- H. Smoke- and Heat-Detector Spacing:
 1. Provide detectors as indicated on the plans and complying with the below.
 2. Smooth ceiling spacing of smoke detectors must not exceed 30 ft.
 3. HVAC: Locate detectors not closer than 36 inches from air-supply diffuser or return-air opening.
 4. Lighting Fixtures: Locate detectors not closer than 12 inches from lighting fixtures and not directly above pendant mounted or indirect lighting.

3.3 SYSTEM CIRCUITING

- A. All wiring shall conform to the NEC and to NFPA-72, National Fire Alarm Code.
- B. Install all wiring in accordance with manufacturer's recommendations, taking into account loading, intended location, circuit length, spare capacity and voltage drop.
- C. All wiring shall be copper and installed in a dedicated/segregated EMT conduit system.
- D. Ground equipment in accordance with Grounding and Bonding specification.
- E. Exposed raceway systems, system junction boxes, and surface mounted device boxes must be painted red.

- F. Provide minimum #18 AWG twisted shielded pair for addressable signal line circuits. Notification appliance circuits shall be #14 AWG minimum. Conductor size shall meet or exceed the manufacturer recommendation and be within the voltage drop calculations.
- G. Addressable signal line circuits shall be NFPA 72 - 2016 Class A (redundant, single open operation).
- H. Notification appliance circuits shall be NFPA 72 - 2016 Class A (redundant, single open operation).

3.4 ELECTRICAL AND CONTROL CONNECTIONS

- A. All installations shall be accomplished in a professional manner by qualified personnel regularly engaged in and experienced in this type of Work. Fire alarm installation shall be directed by a person who possesses a state license for installation of fire alarm systems. All equipment and components shall be installed in accordance with the manufacturer's recommendations.
- B. All smoke detectors shall be field checked and set to meet the prevailing conditions of the premise. All such Work shall be performed by an authorized representative of the manufacturer trained in such procedures. Spot type smoke detectors shall be mounted a minimum of 3' away from air diffusers and grilles.

3.5 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals.

3.6 FIELD QUALITY CONTROL

- A. Field tests must be witnessed by the authority having jurisdiction.
- B. Tests and Inspections:
 - 1. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.
 - 2. Visual Inspection: Conduct visual inspection of all equipment and components prior to testing.
 - 3. System Testing:
 - a. All system equipment, panels, components and functions shall be fully tested to meet NFPA 72, manufacturer's recommendations and ensure proper operation.
 - b. Each initiation device shall be tested with manufacturer recommended initiating method to verify FACP annunciation.
 - c. Each notification appliance shall be tested for alarm operation and proper audible/visual output.

- d. All ancillary initiation and control equipment shall be tested for proper operation.
- e. Provide test report once all equipment has proper operation as a submittal and once approved send copies to the Owner (O&M) and local fire marshal.

3.7 PROGRAMMING

- A. Include in bid the cost to cover all system programming, including items particular to this project (such as custom zone descriptions, time delay settings, sensitivity settings, etc.) such that entire system is 100% complete and operating to the Owner's satisfaction. Coordinate all system programming with the Owner. Provide up to three programming modifications.
- B. Provide programming of the system a minimum of once during the warranty period to provide changes requested by the Owner.

3.8 EXISTING BUILDINGS UNDER CONSTRUCTION

- A. Comply with all requirements of New York State Code and local authorities having jurisdiction for fire safety during the entire time the fire alarm system is impaired/not fully operational including but not limited to instituting a fire watch, providing temporary protection. Coordinate this with the local code enforcement official and Fire Marshal.
- B. Existing smoke detectors in the project area shall be replaced with heat detectors (combination set temperature and rate of rise) and be mounted to the deck structure when suspended ceilings are removed.

END OF SECTION 28 31 02

APPENDIX A

FIRE ALARM SYSTEM OPERATION/SEQUENCE MATRIX

WARNING, THIS IS NOT SET UP FOR SMOKE EVAC SYSTEMS OR HIGH RISES																										
SYSTEM OUTPUTS																										
SYSTEM INPUTS		ACTIVATE COMMON ALARM SIGNAL INDICATOR	ACTIVATE AUDIBLE ALARM SIGNAL	ACTIVATE COMMON SUPERVISORY SIGNAL	ACTIVATE AUDIBLE SUPERVISORY SIGNAL	ACTUATE COMMON TROUBLE SIGNAL	ACTIVATE AUDIBLE TROUBLE SIGNAL	INDICATE CONDITION OR DEVICE DESCRIPTION	ACTIVATE NOTIFICATION APPLIANCES	SHOW STATUS CHANGE FAC/FACP/PRINTERS	ALARM SIGNAL TO CENTRAL STATION	SUPERVISORY SIGNAL TO CENTRAL STATION	TROUBLE SIGNAL TO CENTRAL STATION	RELEASE MAGNETICALLY HELD DOORS	RECALL ELEVATORS TO RECALL FLOOR	ACTUATE WARNING TO ELEVATOR CONTROLS	ACTUATE WARNING TO ELEVATOR CABS	ACTIVATE ELEVATOR SHUNT TRIP	CLOSE ALL RELATED SMOKE DAMPERS	UNLOCK ALL EXITS AND CONTROL DOORS	SHUT DOWN RESPECTIVE AIR HANDLING UNITS	ACTIVATE PRESSURIZATION OF FLOOR (HIGH RISE)	ACTIVATE STAIR/SHAFT PRESSURIZE (HIGH RISE)	ACTIVATE SMOKE EXHAUST SYSTEM	OPEN ASSOCIATED SMOKE HATCH	LOCAL NOTIFICATION
	FIRE ALARM SYSTEM AC POWER FAILURE					X	X	X		X			X													
	FIRE ALARM SYSTEM LOW BATTERY					X	X	X		X			X													
	OPEN CIRCUIT					X	X	X		X			X													
	GROUND FAULT					X	X	X		X			X													
	CIRCUIT SHORT					X	X	X		X			X													
	MANUAL PULL STATION ACTUATION	X	X					X	X	X	X			X							X		X			
	AREA SMOKE DETECTORS	X	X					X	X	X	X			X							X		X			
	HVAC DUCT SMOKE DETECTOR	X	X					X	X	X	X								X	X	X		X			
	AREA HEAT DETECTORS	X	X					X	X	X	X			X						X			X			
	FIRE SUPPRESSION SYSTEM ALARM	X	X					X	X	X	X			X						X			X			
	SPRINKLER TAMPER SWITCH			X	X			X		X		X														
	SPRINKLER WATER FLOW IN BUILDING	X	X					X	X	X	X			X						X			X			
	SPRINKLER WATER FLOW IN ELEVATOR EQUIPMENT ROOM OR SHAFT	X	X					X	X	X	X				X	X	X	X		X			X			
	ELEVATOR SHAFT SMOKE DETECTOR	X	X					X	X	X	X				X					X			X			
	ELEVATOR EQUIPMENT ROOM AREA SMOKE DETECTOR	X	X					X	X	X	X			X	X		X			X			X			
	ELEVATOR SHAFT AND EQUIPMENT ROOM HEAT DETECTORS	X	X					X	X	X	X			X	X		X	X		X			X			
	ELEVATOR PIT SPRINKLER FLOW	X	X					X	X	X	X			X	X	X	X	X		X			X			
	ELEVATOR PIT HEAT DETECTOR	X	X					X	X	X	X			X	X	X	X	X		X			X			
	ELEVATOR LOBBY SMOKE DETECTOR	X	X					X	X	X	X			X	X					X			X			
	ELEVATOR LOBBY RECALL FLOOR SMOKE DETECTOR	X	X					X	X	X	X			X	X					X			X			
	FIRE PUMP POWER FAILURE/PHASE REVERSAL			X	X			X			X	X														
	FIRE PUMP LOW FUEL			X	X			X			X	X														
	FIRE PUMP RUNNING	X	X					X		X	X															
	JOCKEY PUMP RUNNING			X	X			X				X														
	FIRE PUMP NOT IN AUTOMATIC MODE			X	X			X			X	X														
	AREA OF REFUGE TWO WAY COMMUNICATION STATUS			X	X			X			X	X														
	SMOKE HATCH SMOKE DETECTOR	X	X					X	X	X	X			X	X					X					X	
	AHU OFF, ANY REASON																		X							
	SMOKE CONTROL AREA DETECTION / WATERFLOW							X	X													X	X	X		
	CO DETECTION			X	X			X				X														X