



O'KEEFE COMPLEX
ROOF & PLAZA WATERPROOFING,
CONCRETE REPAIRS, & GYM
HUMIDIFICATION

225 Canal Street
Salem, MA 01970

PROJECT MANUAL

10 November 2020

Issued for Contract Documents

WSA Project No. 4011.0056

WINTER STREET ARCHITECTS

27 Congress Street, Suite 201

Salem, MA 01970

978 744-7379 Tel.

978 741-0240 Fax

Salem State University: O'Keefe Complex
ROOF & PLAZA WATERPROOFING,
CONCRETE REPAIRS & GYM HUMIDIFICATION
 225 Canal Street
 Salem, MA 01970

Winter Street Architects, Inc.

Architect No.: 4011.0056

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 Contract Documents Submission [CD] 10 November 2020

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Commonwealth of Massachusetts COVID-19 GUIDELINES AND PROCEDURES FOR ALL CONSTRUCTION SITES AND WORKERS AT ALL PUBLIC WORK

These Guidelines and Procedures MUST be implemented at all times on all construction sites. All construction sites MUST conduct a Safety Stand Down day to disseminate these Guidelines to all employees and workers.

Employee Health Protection – ZERO Tolerance

The following applies to both State employees and contracted staff working on behalf of the State.

- ZERO TOLERANCE FOR SICK WORKERS REPORTING TO WORK. IF YOU ARE SICK, STAY HOME! IF YOU FEEL SICK, GO HOME! IF YOU SEE SOMEONE SICK, SEND THEM HOME!
- If you are exhibiting any of the symptoms below, you are to report this to your supervisor (via phone, text or email) right away, and head home from the job site or stay home if already there.

If you notice a co-worker showing signs or complaining about such symptoms, he or she should be directed to their supervisor (via phone, text or email) and asked to leave the project site immediately.

COVID-19 Typical Symptoms:

- o Fever
- o Cough
- o Shortness of Breath
- o Sore Throat
- Prior to starting a shift, each employee will self-certify to their supervisor that they:
 - o Have no signs of a fever or a measured temperature above 100.3 degrees or greater, a cough or trouble breathing within the past 24 hours.
 - o Have not had "close contact" with an individual diagnosed with COVID-19. "Close contact" means living in the same household as a person who has tested positive for COVID-19, caring for a person who has tested positive for COVID-19, being within 6 feet of a person who has tested positive for COVID-19 for about 15 minutes, or coming in direct contact with secretions (e.g., sharing utensils, being coughed on) from a person who has tested positive for COVID-19, while that person was symptomatic.
 - o Have not been asked to self-isolate or quarantine by their doctor or a local public health official.
- Workers that are working in a confined space or inside a closed building envelope will have to be temperature screened by a Medical Professional or Trained Individual provided that such screening is out of public view to respect privacy and results are kept private.
- Employees exhibiting symptoms or unable to self-certify should be directed to leave the work site and seek medical attention and applicable testing by their health care provider. They are not to return to the work site until cleared by a medical professional.

March 2020

General On-the-Job Guidance to Prevent Exposure & Limit the Transmission of the Virus

- No handshaking
- Wash hands often with soap for at least 20 seconds or use an alcohol-based hand sanitizer with at least 60% ethanol or 70% isopropanol
- Contractor and State Agency Field Offices are locked down to all but authorized personnel
- Each jobsite should develop cleaning and decontamination procedures that are posted and shared. These Procedures must cover all areas including trailers, gates, equipment, vehicles, etc. and shall be posted at all entry points to the sites, and throughout the project site.
- A "No Congregation" policy is in effect, individuals must implement social distancing by maintaining a minimum distance of 6-feet from other individuals
- Avoid face to face meetings – critical situations requiring in-person discussion must follow social distancing
- Conduct all meetings via conference calls, if possible. Do not convene meetings of more than 10 people. Recommend use of cell phones, texting, web meeting sites and conference calls for project discussion
- All individual work crew meetings/tailgate talks should be held outside and follow social distancing
- Please keep all crews a minimum of 6' apart at all times to eliminate the potential of cross contamination
- At each job briefing/tool box talk, employees are asked if they are experiencing any symptoms, and are sent home if they are
- Each jobsite should have laminated COVID-19 safety guidelines and handwashing instructions
- All restroom facilities/porta-potties should be cleaned and handwashing stations must be provided with soap, hand sanitizer and paper towels
- All surfaces should be regularly cleaned, including surfaces, door handles, laptops, etc.
- All common areas and meeting areas are to be regularly cleaned and disinfected at least once a day but preferably twice a day
- Be sure to use your own water bottle, and do not share
- To avoid external contamination, we recommend everyone bring food from home
- Please maintain Social Distancing separation during breaks and lunch.
- Cover coughing or sneezing with a tissue, then throw the tissue in the trash and wash hands, if no tissue is available then cough into your elbow
- Avoid touching eyes, nose, and mouth with your hands
- To avoid sharing germs, please clean up after Yourself. DO NOT make others responsible for moving, unpacking and packing up your personal belongings
- If you or a family member is feeling ill, stay home!

Work Site Risk Prevention Practices

- At the start of each shift, confirm with all employees that they are healthy.
- We will have a 100% glove policy from today going forward. All construction workers will be required to wear cut-resistant gloves or the equivalent.
- Use of eye protection (safety goggles/face shields) is recommended
- In work conditions where required social distancing is impossible to achieve affected employees shall be supplied PPE including as appropriate a standard face mask, gloves, and eye protection.
- All employees shall drive to work site/parking area in a single occupant vehicle. Contractors / State staff shall not ride together in the same vehicle
- When entering a machine or vehicle which you are not sure you were the last person to enter, make sure that you wipe down the interior and door handles with disinfectant prior to entry
- In instances where it is possible, workers should maintain separation of 6' from each other per CDC guidelines.
- Multi person activities will be limited where feasible (two person lifting activities)
- Large gathering places on the site such as shacks and break areas will be eliminated and instead small break areas will be used with seating limited to ensure social distancing.
- Contact the cleaning person for your office trailer or office space and ensure they have proper COVID-19 sanitation processes. Increase their cleaning visits to daily
- Clean all high contact surfaces a minimum of twice a day in order to minimize the spread of germs in areas that people touch frequently. This includes but is not limited to desks, laptops and vehicles

Wash Stations: All site-specific projects with outside construction sites without ready access to an indoor bathroom MUST install Wash Stations.

- Install hand wash stations with hot water, if possible, and soap at fire hydrants or other water sources to be used for frequent handwashing for all onsite employees
- All onsite workers must help to maintain and keep stations clean
- If a worker notices soap or towels are running low or out, immediately notify supervisors
- Garbage barrels will be placed next to the hand wash station for disposal of tissues/towels

Do all you can to maintain your good health by: getting adequate sleep; eating a balanced, healthy diet, avoid alcohol; and consume plenty of fluids.

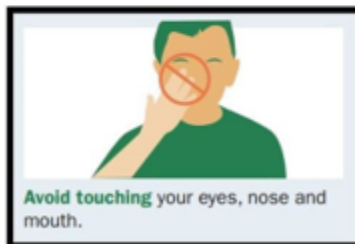
Please Note: This document is not intended to replace any formalized procedures currently in place with the General Contractor.

Where these guidance does not meet or exceed the standards put forth by the General Contractor, everyone shall abide by the most stringent procedure available.

A site-specific COVID-19 Officer (who may also be the Health and Safety Officer) shall be designated for every site.

The approved project Health and Safety Plan (HASP) shall be modified to require that the Contractor's site-specific project COVID-19 Officer submit a written daily report to the Owner's Representative. The COVID-19 Officer shall certify that the contractor and all subcontractors are in full compliance with these guidelines.

Any issue of non-compliance with these guidelines shall be a basis for the suspension of work. The contractor will be required to submit a corrective action plan detailing each issue of non-conformance and a plan to rectify the issue(s). The contractor will not be allowed to resume work until the plan is approved by the Owner. Any additional issues of non-conformance may be subject to action against the contractor's prequalification and certification status.



INSTRUCTION TO BIDDERS PROVIDED BY SSU FOR INCLUSION HERE

WAGE RATES TO BE OBTAINED AND INCLUDED HERE

FORMS USED FOR BIDDING PROVIDED BY SSU FOR INCLUSION

BID FORM PROVIDED BY SSU FOR INCLUSION

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EXHIBIT A: ADDITIONAL INSURANCE PROVISIONS

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GENERAL CONDITIONS OF THE CONTRACT (AIA A201-2017 Incorporated by Reference)

SECTION 00 70 01

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PART 4 – SUPPLEMENTARY CONDITIONS

SECTION 00 70 52

**CONTRACTOR'S SALES TAX EXEMPT PURCHASE CERTIFICATE / MASS DOR IN FORM
ST-5C**



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January 8, 2019

Mr. Paul Durand, AIA, Senior Principle
Winter Street Architects, Inc.
27 Congress Street, Suite 201
Salem, MA 01970

Ref: TRC Project 320123
Asbestos Survey Report
Roof and Kalwall Clerestory Window Replacement Project
O'Keefe Center
Salem State University
225 Canal Street, Salem, Massachusetts

Dear Mr. Durand:

At your request, TRC Environmental (TRC) performed a survey for asbestos-containing materials (ACM) prior to planned renovations at the above-referenced location. The survey was performed on November 30, 2018 by Commonwealth of Massachusetts Department of Labor Standards (DLS) certified Asbestos Inspector, Mr. Robert Thomson (Certification No. AI 031431).

Scope of Asbestos Survey

The purpose of TRC's survey was to identify asbestos-containing materials that may be impacted by planned renovation activities, which reportedly include roof replacement of the existing Rink (flat and pitched), adjoining Classroom building (lower) and Clerestory window components.

Renovation areas were identified by an aerial picture provided by Winter Street Architects of the building sections outlined in red. A visual inspection of the roof and clerestory window areas was performed to identify suspect ACM that may be impacted by the planned renovations. Where feasible, bulk samples of suspect ACM were collected and analyzed to determine asbestos content. Roof sample locations were repaired by TRC's subcontract roofer, Aulson Roofing.

Inspection Method

The asbestos survey was performed using guidelines established by the EPA guidance document "Guidance for Controlling Asbestos-Containing Materials in Buildings" (EPA 5605-85/024), 40 CFR Part 61 National Emission Standards for Hazardous Air Pollutants (NESHAP), Paragraph

61.145, Standard for Demolition and Renovation, EPA AHERA 40 CFR 763 and OSHA 1926.1101 regulations.

A visual inspection was conducted of the roof and clerestory window areas to identify the types, locations, and approximate quantities of ACMs, presumed ACM (as defined in 29 CFR 1926.1101), and otherwise suspect ACM that may be disturbed during the planned roof and window replacement activities. Building materials including roofing materials and building caulk were assessed as potential ACM.

Bulk Sample Collection

Where feasible, bulk samples of suspect building materials were collected in a random manner and submitted for laboratory analysis to determine asbestos content. Note that multiple bulk samples are collected from each homogenous area of suspect ACM observed. In accordance with U.S. EPA guidelines, a minimum of two or three samples are collected from each homogenous area of miscellaneous and thermal system insulation materials and either three, five, or seven samples for each type of surfacing materials, depending on the quantity. If one or more samples within a homogenous area of suspect ACM are positive for asbestos, then all of the suspect ACM must be treated as asbestos-containing material.

Laboratory Analysis

Sample analysis was performed by the EMSL laboratory located in Woburn, Massachusetts, using Polarized Light Microscopy with Dispersion Staining (PLM/DS) in accordance with the United States Environmental Protection Agency (US EPA) "Method for the Determination of Asbestos in Bulk Building Materials", EPA/600/R-93/116. The EMSL laboratory is accredited through the National Institute of Standards and Technology, National Voluntary Laboratory Accreditation Program (#101147-0). The Massachusetts Analytical Laboratory certification number is AA000188. The laboratory bulk sample analysis report is attached.

Results/Discussion

The US EPA defines ACM as any material that contains greater than one percent asbestos. The Massachusetts Department of Environmental Protection (DEP) defines ACM as any material that contains greater than or equal to one percent asbestos.

The following table summarizes the suspect materials observed in the renovation areas, location, laboratory analysis results and condition.

**Summary of Suspect Asbestos-Containing Materials
 Rink and Adjacent Classroom Building Roof
 Salem State University, O'Keefe Center
 Salem, Massachusetts
 November 30, 2018**

| Suspect Material Description | Location | Analysis Result | Quantity | Condition |
|--|---|---|---------------------|------------------|
| Mop coat associated with roof insulation beneath rubber membrane | Lower roof | No Asbestos Detected | NQ | Good |
| Caulk associated with metal vent pipes | Lower roof | No Asbestos Detected | NQ | Good |
| Pitch pocket sealant | Lower roof | No Asbestos Detected | NQ | Good |
| Built up roofing material beneath rubber membrane | Flat and pitched sections of the Rink roof field and edges | Positive 2%-5% Chrysotile Asbestos | 24,000 sq ft | Good |
| Caulk associated with metal gutter cap | Rink Roof | Positive 2% Chrysotile Asbestos | 600 ln ft | Good |
| Exterior brown and gray caulk | Clerestory window on frames and building opening | Positive 2% Chrysotile Asbestos | 800 ln ft | Good |
| Interior caulk | Clerestory window on frames and building opening | NAD | NQ | Good |
| Interior caulk | Columns at Clerestory window junction | NAD | NQ | Good |

Recommendations

TRC recommends the following:

1. Prior to the start of any renovation activities, a Massachusetts DLS certified Project Designer prepare a work plan for removal of all ACM that may be disturbed by renovation activities.
2. The US EPA Regulation 40 CFR Part 61 National Emission Standards for Hazardous Air Pollutants (NESHAP), Paragraph 61.145, Standard for Demolition and Renovation, requires that all regulated ACM be removed from a facility prior to the start of renovation or demolition activities if the materials may be disturbed by these activities. A licensed Asbestos Contractor should remove identified ACM prior to the start of renovation/ demolition activities in accordance with federal, state and local regulations.

3. Additional ACM may be present within the inspection area in inaccessible areas (i.e., mechanical equipment, ductwork, etc.) or roof areas that were not inspected by TRC. These areas should be investigated prior to the start of any planned renovations that may disturb these areas. If additional suspect ACM is encountered, then precautions should be taken to prevent the disturbance of the material and the suspect material should be sampled and analyzed to determine asbestos content.
4. A copy of this survey report should be maintained by Harvard University at the building for review by or submittal to the MassDEP upon request at all times during related asbestos abatement activities and for a minimum of two years following completion of abatement activities.

Limitations

Services performed by TRC were conducted in a manner consistent with "state of the industry" practices, recognizing that even the most comprehensive survey may not detect all asbestos-containing materials in a building. Reasonable measures were taken to detect the presence of all normally suspect materials within the survey area; however, additional materials may be enclosed in solid walls and ceilings or otherwise may be inaccessible and materials that are not normally suspect may contain asbestos. TRC cannot act as an insurer or certify that the site is free of asbestos.

No expressed or implied representation or warranty is included in our report except that the services were performed within the limit of the scope of work authorized by the client and the encountered site conditions.

Should you have any questions regarding the scope of the investigation, our findings and recommendations, or if we can be of additional assistance, please contact us at your convenience.

Sincerely,



Robert Thomson
Field Operations Supervisor



Jennifer L. Archacki.
Senior Project Manager

Attachment

TRC P/D:
320123

11/30/18

Salem State
University,
Salem,
Mass.



ATTACHMENT

ASBESTOS ANALYSIS LABORATORY REPORT



EMSL Analytical, Inc.

5 Constitution Way, Unit A Woburn, MA 01801

Tel/Fax: (781) 933-8411 / (781) 933-8412

<http://www.EMSL.com/bostonlab@emsl.com>

EMSL Order: 131809839

Customer ID: COVI50

Customer PO: 320123

Project ID:

Attention: Jen Archacki
TRC
300 Wildwood Avenue
Woburn, MA 01801

Phone: (781) 420-4246

Fax:

Received Date: 12/03/2018 3:50 PM

Analysis Date: 12/06/2018

Collected Date: 11/30/2018

Project: 320123 / Salem State O'Keefe Center, 255 Canal St., Salem, MA

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

| Sample | Description | Appearance | Non-Asbestos | | Asbestos |
|--------------------------------------|--|------------------------------------|---------------------------|--------------------------|---------------|
| | | | % Fibrous | % Non-Fibrous | % Type |
| 01A <small>131809839-0001</small> | Lower Roof Rink Side Edge - Mop Coat on Roof Insulation | Black/Yellow Fibrous Homogeneous | 10% Cellulose 3% Glass | 87% Non-fibrous (Other) | None Detected |
| 01B <small>131809839-0002</small> | Lower Roof Middle of Field - Mop Coat on Roof Insulation | Black/Yellow Fibrous Homogeneous | 10% Cellulose 3% Glass | 87% Non-fibrous (Other) | None Detected |
| 02A <small>131809839-0003</small> | Lower Roof Metal Vent Pipe - Caulk | Black Non-Fibrous Homogeneous | | 100% Non-fibrous (Other) | None Detected |
| 02B <small>131809839-0004</small> | Lower Roof Metal Vent Pipe - Caulk | Gray/Black Non-Fibrous Homogeneous | | 100% Non-fibrous (Other) | None Detected |
| 03A <small>131809839-0005</small> | Lower Roof - Pitch Pocket Sealant | Black Non-Fibrous Homogeneous | | 100% Non-fibrous (Other) | None Detected |
| 03B <small>131809839-0006</small> | Lower Roof - Pitch Pocket Sealant | Black Non-Fibrous Homogeneous | | 100% Non-fibrous (Other) | None Detected |
| 04A <small>131809839-0007</small> | Rink Roof Flat Side Field - Built Up Roofing | Black Fibrous Homogeneous | 20% Cellulose | 75% Non-fibrous (Other) | 5% Chrysotile |
| 04B <small>131809839-0008</small> | Rink Roof Ptched Side Field - Built Up Roofing | Black Fibrous Homogeneous | 20% Cellulose | 75% Non-fibrous (Other) | 5% Chrysotile |
| 05A <small>131809839-0009</small> | Rink Roof Flat Side Edge - Built Up Roofing | Black Fibrous Homogeneous | 30% Cellulose | 70% Non-fibrous (Other) | None Detected |
| 05B <small>131809839-0010</small> | Rink Roof Ptched Side Edge - Built Up Roofing | Black Fibrous Homogeneous | 20% Cellulose | 75% Non-fibrous (Other) | 5% Chrysotile |
| 06A <small>131809839-0011</small> | Rink roof Metal Gutter Cap - Caulk | Gray/Black Non-Fibrous Homogeneous | 2% Glass | 96% Non-fibrous (Other) | 2% Chrysotile |
| 06B <small>131809839-0012</small> | Rink roof Metal Gutter Cap - Caulk | Gray/Black Non-Fibrous Homogeneous | | 98% Non-fibrous (Other) | 2% Chrysotile |
| 07A <small>131809839-0013</small> | Exterior Kalwall Clerestory Window Wall - Brown Caulk | Black Non-Fibrous Homogeneous | | 97% Non-fibrous (Other) | 3% Chrysotile |
| 07B <small>131809839-0014</small> | Exterior Kalwall Clerestory Window Wall - Brown Caulk | Black Fibrous Homogeneous | | 98% Non-fibrous (Other) | 2% Chrysotile |
| 07C <small>131809839-0015</small> | Exterior Kalwall Clerestory Window Wall - Brown Caulk | Black Non-Fibrous Homogeneous | | 98% Non-fibrous (Other) | 2% Chrysotile |
| 08A <small>131809839-0016</small> | Exterior Kalwall Clerestory Window Wall - Gray Caulk | Brown Non-Fibrous Homogeneous | | 98% Non-fibrous (Other) | 2% Chrysotile |

Initial report from: 12/06/2018 16:16:15



EMSL Analytical, Inc.

5 Constitution Way, Unit A Woburn, MA 01801

Tel/Fax: (781) 933-8411 / (781) 933-8412

<http://www.EMSL.com/bostonlab@emsl.com>

EMSL Order: 131809839
Customer ID: COVI50
Customer PO: 320123
Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

| Sample | Description | Appearance | Non-Asbestos | | Asbestos |
|--------------------------------------|--|-------------------------------------|--------------|--------------------------|---------------|
| | | | % Fibrous | % Non-Fibrous | % Type |
| 08B <small>131809839-0017</small> | Exterior Kalwall Clerestory Window Wall - Gray Caulk | Brown Non-Fibrous Homogeneous | | 98% Non-fibrous (Other) | 2% Chrysotile |
| 08C <small>131809839-0018</small> | Exterior Kalwall Clerestory Window Wall - Gray Caulk | Brown Non-Fibrous Homogeneous | | 98% Non-fibrous (Other) | 2% Chrysotile |
| 09A <small>131809839-0019</small> | Interior Kalwall Clerestory Window Wall - Brown Caulk | Black Non-Fibrous Homogeneous | | 100% Non-fibrous (Other) | None Detected |
| 09B <small>131809839-0020</small> | Interior Kalwall Clerestory Window Wall - Brown Caulk | Black Non-Fibrous Homogeneous | | 100% Non-fibrous (Other) | None Detected |
| 09C <small>131809839-0021</small> | Interior Kalwall Clerestory Window Wall - Brown Caulk | Black Non-Fibrous Homogeneous | | 100% Non-fibrous (Other) | None Detected |
| 10A <small>131809839-0022</small> | At Columns Assoc. w/Interior Kalwall Clerestory Window Wall - White Caulk | White Non-Fibrous Homogeneous | | 100% Non-fibrous (Other) | None Detected |
| 10B <small>131809839-0023</small> | At Columns Assoc. w/Interior Kalwall Clerestory Window Wall - White Caulk | White Non-Fibrous Homogeneous | | 100% Non-fibrous (Other) | None Detected |
| 10C <small>131809839-0024</small> | At Columns Assoc. w/Interior Kalwall Clerestory Window Wall - White Caulk | White Non-Fibrous Homogeneous | | 100% Non-fibrous (Other) | None Detected |

Analyst(s)

Elizabeth Stutts (24)

Steve Grise, Laboratory Manager
or Other Approved Signatory

EMSL maintains liability limited to cost of analysis. The above analyses were performed in general compliance with Appendix E to Subpart E of 40 CFR (previously EPA 600/M4-82-020 "Interim Method"), but augmented with procedures outlined in the 1993 ("final") version of the method. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. All samples received in acceptable condition unless otherwise noted. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. EMSL recommends gravimetric reduction for all non-friable organically bound materials prior to analysis. Estimation of uncertainty is available on request.

Samples analyzed by EMSL Analytical, Inc. Woburn, MA NVLAP Lab Code 101147-0, CT PH-0315, MA AA000188, RI AAL-139, VT AL998919, Maine Bulk Asbestos LB-0039

Initial report from: 12/06/2018 16:16:15



EMSL ANALYTICAL, INC.
LABORATORY-PRODUCTS-TRAINING

Asbestos Bulk Building Material Chain of Custody

EMSL Order Number (Lab Use Only):

131809839

EMSL ANALYTICAL, INC.
5 CONSTITUTION WAY, UNIT A
WOBURN, MA 01801
PHONE: (781) 933-8411
FAX: (781) 933-8412

| | | | |
|---|---------------|---|-----------------------|
| Company : TRC | EMSL#: COVI51 | EMSL-Bill to: <input checked="" type="checkbox"/> Same <input type="checkbox"/> Different <small>If Bill to is Different note instructions in Comments**</small> | |
| Street: 300 Wildwood Avenue | | <i>Third Party Billing requires written authorization from third party</i> | |
| City: Woburn | State: MA | Zip: 01801 | Phone #: 781-933-2555 |
| Report To (Name): J Archacki | | Purchase Order: | |
| Email Address: Jarchacki@trcsolutions.com | | Project Name: Salem State O'Keefe Center | |
| Please Provide Results: <input checked="" type="checkbox"/> Email <input type="checkbox"/> Other: | | Project Number: 320123 | |
| | | Project Address: 255 Canal St, Salem, MA | |
| | | U.S. State Samples Taken: MA | |

Turnaround Time (TAT) Options - Please Check

3 Hour*
 6 Hour*
 24 Hour
 48 Hour
 72 Hour
 96 Hour
 1 Week
 2 Week

*Same Day - Rush - 3 Hour - 6 Hour Turnaround Time Not Available Due to Method, Matrix and/or Laboratory Restrictions

| | |
|--|--|
| <p style="text-align: center;">PLM - Bulk (reporting limit)</p> <p><input checked="" type="checkbox"/> PLM EPA 600/R-93/116 (<1%)</p> <p><input type="checkbox"/> PLM EPA NOB (<1%)*</p> <p>Point Count <input type="checkbox"/> 400 (<0.25%) <input type="checkbox"/> 1000 (<0.1%)</p> <p>Point Count w/Gravimetric <input type="checkbox"/> 400 (<0.25%) <input type="checkbox"/> 1000 (<0.1%)*</p> <p><input type="checkbox"/> NIOSH 9002 (<1%)</p> <p><input type="checkbox"/> NY ELAP Method 198.1 (friable in NY)*</p> <p><input type="checkbox"/> NY ELAP Method 198.6 NOB (non-friable-NY)*</p> <p><input type="checkbox"/> OSHA ID-191 Modified</p> <p><input type="checkbox"/> Standard Addition Method*</p> | <p style="text-align: center;">TEM - Bulk</p> <p><input type="checkbox"/> TEM EPA NOB - EPA 600/R-93/116 Section 2.5.5.1*</p> <p><input type="checkbox"/> NYS NOB 198.4 (TEM)*</p> <p><input type="checkbox"/> Chatfield Protocol (semi-quantitative)*</p> <p><input type="checkbox"/> TEM % by Mass - EPA 600/R-93/116 Section 2.5.5.2*</p> <p><input type="checkbox"/> TEM Qualitative via Filtration Prep Technique*</p> <p><input type="checkbox"/> TEM Qualitative via Drop Mount Prep Technique*</p> <p style="text-align: center;">Other:</p> <p><input type="checkbox"/></p> |
|--|--|

Check For Positive Stop - Clearly Identify Homogenous Group Date(s) Sampled: 11-30-18

Samplers Name: Robert Thomsen Samplers Signature: *[Signature]*

| Sample # | HA # | Sample Location | Material Description |
|----------|------|-------------------------------|-----------------------------|
| 01A | | Lower Roof Trunk side edge | mop coat on roof insulation |
| 01B | | Lower Roof middle of field | " " |
| 02A | | Lower Roof metal vent pipe | caulk |
| 02B | | " " | ↓ |
| 03A | | Lower Roof | Pitch Pocket Sealant |
| 03B | | ↓ | ↓ |
| 04A | | Trunk Roof flat side - Field | Built up Roofing |
| 04B | | Trunk Roof Pitched side field | ↓ |
| 05A | | Trunk Roof flat side edge | ↓ |
| 05B | | Trunk Roof Pitched side edge | ↓ |

| | |
|---|--------------------------|
| Client Sample # (s): 01 - 10 | Total # of Samples: |
| Relinquished (Client): <i>[Signature]</i> | Date: 12-3-18 Time: |
| Received (Lab): | Date: Time: |
| Comments/Special Instructions: | |



SECTION 01 00 00 - CONSOLIDATED GENERAL REQUIREMENTS

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PART 1 - GENERAL

1.1. RELATED DOCUMENTS

- A. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. This Section applies to all Work performed under the Contract.
- C. Owner Standards are made part of this Project Manual and incorporated by reference. See Owner for copies.
- D. Comply with the special requirements of Owner and attached or referenced documents.

1.2. SUMMARY OF WORK & PROJECT REQUIREMENTS

- A. Project Identification: As listed on cover page and in header.
- B. The work consists of: Renovations and remediation as shown and specified.
- C. Order of Conditions: Be bound by and comply with applicable Order of Conditions as it affects the work of this Contract. Obtain copies of the Order and have them available at the job site.
- D. Pricing & Contracting Requirements: Refer to Owner and Article 1.9 below.
- E. Comply with the Owner Standards. Specific attention is directed to:
 - 1. Written reports to be provided detailing subcontractors at the site, workers per sub, minority workers per sub, Contractor's workers and minority workers at the site, weather conditions, description of work done, deliveries, Owner/Architect instructions and decisions. Deliver report to Owner PM office the next following working day.
 - 2. Requirements for regular project meetings, at intervals required by Owner or Architect.
 - 3. Construction Scheduling.

4. Work hours, which are typically 7:00 to 3:00 unless otherwise arranged and approved in writing.
 5. Comply with requirements for permits, details, fire watch and shut downs. Note that addition fees for accelerated construction and off hours work and scheduling of work during on holidays or other times will not be permitted regardless of the fact that authorities having jurisdiction may prohibit work at certain hours or on certain days.
 6. Management of fire detectors and coordination with Fire Marshalls in locality having jurisdiction.
 7. Parking arrangements.
 8. The requirement for progress photos.
 9. Punch list staffing and requirements
 10. Compliance with Factory Mutual Standards.
 11. The Owner's right to occupy and place equipment in completed areas of the building prior to Substantial Completion which does not interfere with the completion of the Work.
 12. Construction Management software: Where required by Owner or Architect, it is a contract requirement that software compatible with Architect/Owner systems be used during all construction phases. This included management and scheduling software.
 13. Owner Tax Exempt Status: Comply with the requirements of state statutes for payment of state taxes in connection with construction projects performed for tax exempt entities. Verify Owner status.
- F. Sustainable Design Intent: The following requirements are made a part of the Contract Requirements for this Project:
1. Compliance with Institution/Local/State/Agency sustainability requirements and regulations and applicable building code standards.
 2. Take notice of Management and Section 01 57 10, Construction Waste Management. See other sections and specific requirements throughout the contract.
 3. At interior locations, provide low-emitting (low VOC) adhesives, sealants, paints, coatings, carpet systems, systems furniture, and seating
 4. At interior locations, provide composite woods, agrifiber products, and laminate adhesives with no added urea-formaldehydes.
 5. Provide green housekeeping methods at final closeout.
 6. Comply with Owner recycling goal for demolition and construction waste removed from the site.
- G. Project Requirements for Temporary Utilities and Facilities:
1. Utility Costs: The Contractor shall meter and pay for cost of utility services consumed, including electricity, water, gas and temporary heat.
 2. Temporary Offices: Provide field offices.
 3. Toilet Facilities: Provide toilet facilities for construction personnel.
- H. Permits and Fees: Apply for, obtain, and pay for permits, fees, and utility company backcharges required to perform the work. Submit copies to Architect and Owner immediately upon receipt.
- I. Dimensions: Verify dimensions indicated on drawings with field dimensions before fabrication or ordering of materials. Do not scale drawings.
- J. Existing Conditions: Notify Architect of existing conditions differing from those indicated on the drawings. Do not proceed with work that requires deviation from the design with Architect's written approval.
- K. Contractor's Conduct on Premises: The Contractor and his employees shall behave in a respectful, courteous and safe manner. Abusive, harassing, and lewd behavior is prohibited. Music playing is prohibited. Alcohol, tobacco and drug use is prohibited.

- L. Hazardous Waste: Refer to Owner. Hazardous waste is outside the scope of responsibility of the Architect and his consultants.
- M. Contractor's Management Staff Requirements: Provide staff necessary to manage project and acceptable to Owner.
 - 1. Experience, Qualifications: Minimum 10 years experience with projects similar to this Contract.
 - 2. Reassignment or Replacement: If requested by the Owner or Architect at any time during the Contract, replace Contractor's management staff with personnel acceptable to the Owner and Architect. Do not reassign or replace management staff, unless preapproved by the Owner.
 - 3. On Site: Contractor's Management Staff shall be on site whenever work is in progress.
 - 4. Work Restrictions: Contractor's Management Staff shall manage, supervise, coordinate, plan, and direct the work. Contractor's Management Staff shall not work with tools and provide production work.
 - 5. Installation/MEP Coordinator: Provide the services of an experienced installation coordinator to direct, manage and supervise the Coordination Drawing process and the installation of all building systems including interface with structure and architecture.
- N. Restrictions on Noise: Comply with requirements of authorities having jurisdiction.
 - 1. Use equipment with well maintained mufflers.
 - 2. Use the least noisy techniques practical.
 - 3. Schedule noisy activities when ambient background noise level is highest.
 - 4. Turn off all unneeded and idling equipment and engines.
 - 5. Locate noise sources as far as practical from noise sensitive locations.
 - 6. Orient noise sources away from noise sensitive locations

1.3. SPECIFICATION INFORMATION

- A. These specifications are a specialized form of technical writing edited from master specifications and contain deviations from traditional writing formats. Capitalization, underlining and bold print are only used to assist readers in finding information and no other meaning is implied.
- B. Except where specifically indicated otherwise, the subject of all imperative statements is the Contractor.
- C. Sections are generally numbered in conformance with Construction Specifications Institute Masterformat System. Numbering sequence is not consecutive. Refer to the table of contents for names and numbers of sections included in this Project.
- D. Pages are numbered separately for each section. Each section is noted with "End of Section" to indicate the last page of a section.
- E. Specification sections are only a portion of the Contract Documents. All Contract Documents including Conditions of the Contract, Division 1 General Requirements apply to each section. Each section applies to all specification section and work of the Contract.

1.4. DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" 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," "approved," "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. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
 - G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, disposing of packaging, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
 - H. "Provide": Furnish and install, complete, in place, and ready for the intended use.
 - I. "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.
 - 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. "As shown, if not": As shown or indicated in the Contract Documents and if not so shown, then provide the item(s) following "if not,".
 - L. "Section includes": unless otherwise noted, shall mean, "Section includes, without limitation, providing".
 - M. "As indicated" or "As shown" or "As scheduled" shall mean as indicated on the drawings or finish schedule or finish legend.
- 1.5. INDUSTRY STANDARDS
- A. Referenced standards are part of the Contract Documents and have the same force and effect as if bound with these specifications.
 - B. Except where specifically indicated otherwise, comply with the current standard in effect as of the date of the Owner/Contractor Agreement. Obtain copies of industry standards directly from publisher.
 - C. The titles of industry standard organizations are commonly abbreviated; full titles may be found in Encyclopedia of Associations or consult Architect.
- 1.6. CODES AND REGULATIONS
- A. Comply with all applicable codes, ordinances, regulations and requirements of authorities having jurisdiction:
 - B. Submit copies of all permits, licenses, certifications, inspection reports, releases, notices, judgments, and communications from authorities having jurisdiction to the Architect.
- 1.7. PROGRESS SCHEDULE
- A. Provide comprehensive bar chart schedule showing all major and critical minor portions of the work, sequence of work and duration of each activity. Update and reissue regularly, but not less than monthly. Comply with the following:
 - B. Contract Progress Schedules and Reports: Provide Critical Path Method [CPM] progress schedules and reports.
 - 1. Software Program: Subject to approval by Owner and Architect.
 - 2. First Submittal: Within 30 days after executed Owner Contractor Agreement.
 - 3. Updated Submittals: Required at least once per month.
 - 4. Subcontractors: Shall provide information requested by the General Contractor.
 - 5. Contract Progress Schedule and Schedule of Values: Make the Contract Progress Schedule work items with the Schedule of Value work items the same.
 - C. Contract Progress Schedule Content: Include at least the following information.
 - 1. All major and critical minor Contract activities.
 - 2. Sequence and duration of each activity.
 - 3. Project milestones.
 - 4. Early start and early finish for each activity.

5. Late start and late finish for each activity.
 6. Total float time for each activity.
 7. Submittals related to each activity including dates of first submittal and last date for approval.
 8. Fabrication and delivery time for each item requiring off site fabrication.
 9. Start and completion dates for each mock up and sample including in place samples.
 10. The critical path of work.
- D. Contract Progress Schedule Reports: Submit reports including at least the following information:
1. The critical path of work and all work items on the critical path.
 2. Bar chart plot.
 3. Plot showing the content specified above.
 4. Monthly activity plots for each month.
 5. Two week "look ahead" plots.
 6. "Executive Summary" indicating if on schedule or, if not on schedule, problem areas.
- E. Contract Progress Schedule Updates: Update at least once per month, and as follows:
1. Unless otherwise agreed, submit with Application for Payment.
 2. Incorporate actual start and complete dates.
 3. Update whenever the Contract Time is revised by Change Order.
- F. Recovery Plan: Prepare and submit a "Recovery Plan" whenever the work is 10 calendar days or more behind schedule. Show how the project will be managed **back to "on schedule" condition.**

1.8. SCHEDULE OF VALUES

- A. Comply with Architect and Owner requirements and provide a Standard Schedule of Values in formats and minimum line items unless waived by the Owner. Prepare Schedule of Values to coordinate with application for payment breakdown. Submit at least 10 days before first payment application. Update and reissue regularly, but not less than monthly.

1.9. PAYMENT REQUESTS

- A. Provide three copies of each request on completely filled out copies of AIA G702 and continuation sheet G703. Substantiate requests with complete documentation; include change orders to date. Provide partial [interim] lien waivers for work in progress and full lien waivers for completed work. Waiver of liens shall sum to the total of the applicable line items on the G702 AIA form.
- B. Record Drawing Certification: Certify as a part of each application for payment that the project record documents are current at the time of application is submitted. The Contractor shall require such drawings to be current as a condition of approving any payment to the Trade Contractors and Subcontractors.
- C. Before first payment application, provide the following:
1. List of subcontractors, suppliers and fabricators.
 2. Schedule of values.
 3. Progress schedule.
 4. Submittal schedule keyed to project schedule.
 5. List of Contractor's key project personnel.
 6. Copies of permits and other communications from authorities.
 7. Contractor's certificate of insurance.
 8. Performance and payment bonds if required.
 9. Unit price schedule.
 10. Construction Waste Management Plan, other specified sustainable construction management plans.
- D. For typical payment application, provide the following:
1. Updated Schedule of values,
 2. Progress schedule.

3. Submittal schedule keyed to project schedule.
 4. Release of liens.
 5. Other documents required by Owner or municipalities.
 6. Certificate of title and insurance for goods stored off-site.
 7. Construction Waste Management Plan reports.
 8. Materials cost data as required to document recycled content, certified wood, location of manufacturing, and other sustainable requirements
- E. Before final payment application, provide and complete the following:
1. Complete close out requirements.
 2. Complete punch list items.
 3. Settle all claims.
 4. Transmit record documents to Architect.
 5. Prove that all taxes, fees and similar obligations have been paid.
 6. Remove temporary facilities and surplus materials.
 7. Change lock cylinders or cores.
 8. Clean the work,
 9. Submit consent of surety, if any, for final payment.

1.10. PROCEDURES AND CONTROLS

- A. Project Meetings: Arrange for and attend project meetings with the Architect and such other persons as the Architect requests to have present. The Contractor shall be represented by a principal, project manager, general superintendent or other authorized main office representative, as well as by the Contractor's field superintendent. An authorized representative of any subcontractor or sub-subcontractor shall attend such meetings if the representative's presence is requested by the Architect. Such representatives shall be empowered to make binding commitments on all matters to be discussed at such meetings, including costs, payments, change orders, time schedules and manpower. Any notices required under the Contract may be served on such representatives. Written reports of meeting minutes shall be prepared and distributed to attendees, the Architect, Contractor(s), and Owner in advance of the next meeting. Minutes shall be prepared by Architect or Contractor, as mutually agreed, except where Owner or agencies mandate minutes to be prepared by Architect.
1. Pre-Construction Conference: Attendance by Architect, Contractor, major subcontractors. Agenda shall include: Quality of workmanship, coordination, interpretations, job schedule, submittals, approvals, requisition procedures, testing, protection of construction, indoor air quality, and construction waste management.
- B. Emergency Addresses: Furnish the Owner and Architect, in writing, the names addresses and telephone numbers of individuals to be contacted in the event of an out-of-hours emergency at the building site. Post a similar list readily visible from the outside of the field office or a location acceptable to the Architect.
- C. Layout: Layout work and be responsible for all lines, elevations, and measurements of the work executed under the contract. Where required to complete the work properly, the Contractor shall engage and pay for a professional land surveyor.
- D. Field Measurements: Verify measurements at the building prior to ordering materials or commencing work. No extra charge or compensation will be allowed because of differences between actual dimensions and measurements indicated on the Drawings. Differences which may be found shall be submitted to the Architect for decision before proceeding with the work.
- E. Field Measurements for Fixed Equipment: Dimensions for fixed equipment to be supplied under this Contract or separate contracts shall be determined by field measurements taken jointly by the Contractor and the equipment supplier involved. A record of the field measurements shall be kept until time of substantial completion of the project, or until the equipment has been fully installed and accepted by the Owner, whichever is later. Responsibility for fixed equipment fabricated accurately to field measurements for proper

fit and operation shall be that of the Contractor. Contractor shall pay all costs involved in correcting any mis-fitting fixed equipment as fabricated.

- F. Project Limit Line: The boundaries of the site do not limit the responsibility of the Contractor to perform the work in its entirety. Make utility connections as indicated.
- G. Matching: Where matching is indicated, the Architect shall be the sole and final judge of what is an acceptable match. Mockups and sample submissions are required.
- H. Observation: Notify the Architect and authorities having jurisdiction at least thirty-six hours in advance of concealing any work.
- I. Utilities: Prior to interrupting utilities, services or facilities, notify the utility owner and the Owner and obtain their written approval a minimum 48 hours in advance.
- J. Furnishings, Fixtures, and Equipment: Cooperate and permit the Owner to install his furnished items. Installation of such furnishings or equipment does not signify Owner's acceptance of any portion of the work.
- K. Clean-Up: Frequently clean-up all waste, remove from site regularly, and legally dispose of off-site.
- L. Installer's Acceptance of Conditions: All installers shall inspect substrates and conditions under which work is to be executed and shall report in writing to the Contractor all conditions detrimental to the proper execution and completion of the work. Do not proceed with work until unsatisfactory conditions are corrected. Beginning work means installer accepts previous work and conditions.
- M. Coordination: The Contractor shall be fully responsible for coordinating all trades, coordinating construction sequences and schedules, and coordinating the actual installed location and interface of all work.
 - 1. Prior to beginning mechanical, electrical and fire protection work, the Contractor shall prepare coordination drawings on mylars or other acceptable media showing the exact alignment, physical location and configuration of the mechanical, electrical and fire protection installations and demonstrating to the Contractor's satisfaction that the installations will clear all obstructions, permit proper clearances for the Work of other trades, and present an orderly appearance where exposed. The Contractor shall be solely liable and responsible for any costs and delays resulting from the Contractor's failure to prepare any such coordination drawings or from the negligent preparation of such coordination drawings. At the completion of the work turn over all coordination drawings to the Architect and Owner. Provide drawings as follows:
 - a. Scale: ¼ inch = 1'-0" or larger scale.
 - b. Color: Color code each trade in a clearly different color.
 - c. Conflicts: Indicate all conflicts by means of a clear symbol and note.
 - 2. Exact locations and groupings of mechanical, electrical and fire protection fixtures, switches, heads, devices and outlets shall be obtained from the Architect before the Work is roughed in, if not already indicated. Work installed without such information from the Architect shall be relocated at the Contractor's expense if the Architect so requests.
- N. Request For Interpretation (RFIs):
 - 1. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and prepare and submit an RFI in the form specified.
 - a. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
 - b. Submit RFI electronically unless otherwise agreed.
 - 2. Content of the RFI: Include a detailed, legible description of item needing interpretation.
 - 3. Architect's Action: Architect will review each RFI, determine action required, and return it. Allow 5 working days for Architect's response for each RFI and 7 where Architect's consultants are involved. RFIs received after 1:00 p.m. will be considered as received the following working day.
 - 4. The following RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for coordination information already indicated in the Contract Documents.

- d. Requests for adjustments in the Contract Time or the Contract Sum.
 - e. Requests for interpretation of Architect's actions on submittals.
 - f. Incomplete RFIs or RFIs with numerous errors.
- O. Existing Articles of Unusual Value: If during demolition, excavation, or disposal work articles of unusual value or of historical or archaeological significance are encountered, the ownership of such articles is retained by the Owner, and information regarding their discovery shall be immediately furnished to the Architect. If the nature of the article is such that work cannot proceed without danger of damage, work in the area shall be immediately discontinued until the Architect has determined the proper procedure to be followed. Delays in time thereby shall be a condition for which the time of the Contract may be extended. Costs incurred after discovery in the salvaging of such articles shall be borne by the Owner.
- P. Quality Control & Testing Services: Coordinate with the Owner and Architect in the event testing is required. Provide services necessary to enable inspectors, testing laboratory representatives and the like to perform their work.
- Q. Progress Photos: Comply with the following:
- 1. Photographer: Any competent person approved by the Owner and Architect.
 - 2. Digital Photographs: Minimum 5 million pixel, clearly legible, "jpeg" file images.
 - 3. Digital Submission: Submit compact disc with digital photograph files each month.
 - 4. Prints: Not required.
 - 5. Lighting: Provide supplemental lighting as needed to provide clear, detailed images.
 - 6. Construction Photographs:
 - a. Purpose: To document the progress of the work.
 - b. Quantity: At least 20 images per week.
 - c. Photo Identity: Give each photo a unique identity number.
 - d. Record: Date and time photo taken, included in filename.
 - 7. Preconstruction Photographs - New Construction: Record existing conditions with emphasis on nearby existing improvements indicated to remain. Clearly record existing damage, if any.
- R. Daily Reports: Provide daily reports and submit to Owner and Architect once per week.
- S. Long Lead Time Items: Time is of the essence in the Contract. Expedite and provide special management for "long lead time" items.
- T. Contractor's Responsibilities Related To The Owner's Management Staff:
- 1. Cooperate with the Owner's management staff.
 - 2. Provide "Weekly Work Plan" each Monday morning by 8:00 am.
 - 3. Provide immediate notification of all unusual conditions and occurrences at the site.
 - 4. Identify all persons at the site, both workers and visitors.
- U. Documents On Site: Maintain the following documents on site and up-to-date:
- 1. Contract Documents.
 - 2. Modifications and changes to Contract Documents.
 - 3. Coordination drawings.
 - 4. Meeting notes for all types of meetings: progress, safety, preinstallation, special, and others.
 - 5. Progress schedules and related information.
 - 6. Project photographs.
 - 7. Daily reports.
 - 8. Submittal log and all submittals.
- 1.11. SUBMITTALS
- A. Form of Submittal: Use Architect's electronic system unless otherwise directed in writing. Comply with Architect's formatting and tel/data requirements. Where the Architect does not use a dedicated ftp site or server, submit documentation via scanned documents and email. Comply with required transmittal and data formats using numbering system approved by Architect.

Required Submittals: Submit shop drawings, product data, initial selection samples, verification samples, calculations, coordination drawings, schedules, and all other submittals as specified in individual specification sections.

1. Provide submittals for cleaning and maintenance products to be used during construction and final cleaning.
- B. Submittal Schedule: Within 30 days after award of contract and before first application for payment, prepare list of submittals in chronological sequence showing all submittals and proposed date first due at Architects office and proposed date due to be returned to Contractor. Note relevant specification section number.
- C. Contractor's Preparation of Submittals: Modify and customize all submittals to show interface with adjacent work and attachment to building. Identify each submittal with name of project, date, Contractor's name, subcontractor's name, manufacturer's name, submittal name, relevant specification section numbers, and Submittal Schedule reference number. Stamp and sign each submittal to show the Contractor's review and approval of each submittal before delivery to Architect's office; unstamped and unsigned submittals will be returned without action by the Architect. Leave 4" x 6" open space for Architect's "action" stamp.
- D. Product Data: Provide manufacturer's preprinted literature including, without limitation, manufacturer's standard printed description of product, materials and construction, recommendations for application and use, certification of compliance with standards, instructions for installation, and special coordination requirements. Collect data into one submittal for each unit of work or system; mark each copy to show which choices and options are applicable to project
1. Submittal Quantities: Unless otherwise requested, provide only electronic format. If hardcopy is requested, submit at least 1 reproducible copy and three additional copies.
 2. Installer Copy: Verify that the Installer has a current copy of the relevant product data, including installation instructions, before permitting installation to begin.
- E. Shop Drawings: Provide accurately prepared, large scale and detailed shop drawings prepared specifically for this project on scannable or reproducible sheets. Show adjacent conditions and related work. Show accurate field dimensions and clearly note field conditions. identify materials and products in the work shown. Note special coordination required.
1. PDF files: Contractor shall submit copies of portable document format files for review. At his discretion, the Architect may request hardcopy as per paragraph 2 below.
 2. Submittal Quantities: Submit at least 1 scannable copy and, if requested, three blackline prints of Shop Drawing submittals.
 3. After Architect's action, follow specified distribution procedure.
- F. Samples: Provide units identical with final materials and products to be installed in the work. Where indicated, prepare samples to match Architect's sample. Label each sample with description, source, generic name or manufacturer's name and model number. Architect will review samples for confirmation of visual design intent, color, pattern, texture and type only; Architect will not test samples for compliance with quality and other Contract requirements which shall remain the exclusive responsibility of the Contractor.
1. Initial Selection Samples Submittal Quantities: Unless a specific, unique product is specified, for initial selection purposes, submit 1 set of samples showing the complete range of colors and finishes available.
 2. Verification Samples Submittal Quantities: For verification of an initial selection, submit 3 sets of samples; one set will be returned to Contractor to be maintained at project site for quality control comparisons.
- G. Timing of Submittals: Submit submittals in a timely fashion to allow at least 10 business days for each office's review and handling. The Architect and their consultants make no commitments as to the duration of review of submittals. This is a condition of the work and Contractors agree that delay claims are exempt from shop drawing review time. This means that submittals which have to be reviewed by the Architect and one of his

consultants require at least 20 business days for review and handling. Add ten business days for each additional consultant who must review a submission.

- H. Architect's Action on Submittals: Architect will review submittals, stamp with "action stamp", mark action, and return to Contractor. Architect will review submittals only for conformance with the design concept of the project. The Contractor is responsible for confirming compliance with other Contract requirements, including without limitation, performance requirements, field dimensions, fabrication methods, means, methods, techniques, sequences and procedures of construction, coordination with other work. The Architect's review and approval of submittals shall be held to the limitations stated in the Owner/Architect Agreement and the Conditions of the Contract.. In no case shall approval or acceptance by the Architect be interpreted as a release of Contractor of his responsibilities to fulfill all of the requirements of the Contract Documents.
1. Required Re-submittal: Unless submittal is noted "reviewed and approved" or "reviewed and approved except as noted, resubmission not required," make corrections or changes to original and resubmit to Architect.
 2. Distribution: When submittal is noted "approved" or "approved as noted, resubmittal not required," make prints or copies and distribute to Owner, Subcontractors involved, and to all other parties requiring information from the submittal for performance or coordination of related work. Print shop drawings for distribution only from the final approved drawings showing all notations and comments.
- I. Mock-ups – General: Provide mock-ups where specified in individual sections or shown on drawings.
- J. Mock-ups – Type 1: Shall be disposable and not considered "In-Place Sample Mock-ups" are required unless otherwise indicated. All mock-ups shall be type 2 below, unless otherwise noted. Purpose and requirements are as follows:
1. To permit Owner and Architect to review and approve assemblies prior to ordering and to be used as sample of acceptable work.
 2. Construct mock-ups as early as possible and before ordering products.
 3. Provide actual materials indicated.
 4. Locate mock-ups as directed by architect.
 5. Develop and prepare mock-up construction drawings.
 6. Protect mock-ups until no longer needed by Owner and Architect.
 7. Demolish, remove and dispose of mock-ups as directed.
 8. Provide indicated mock-ups including the following:
Typical exterior wall assembly not less than 6x8 feet showing each exterior skin assembly, window, window frames, each glass type, flashings, weeps, roof edges, visible joints sealants
Concealed assemblies including concealed exterior wall construction, skin support, framing, concealed flashing, air barriers, dampproofing, waterproofing, concealed joint sealants and other elements concealed in typical assemblies.
- K. Mock-ups – Type 2 : Provide mock-ups indicated in specifications sections which unless otherwise indicated may be left in place if approved after review. Applicable requirements of Type 1 apply to this type of mock-up. All mock-ups shall be type 2 unless otherwise noted.
- I. Sustainable Construction Submittals : Comply with Sustainable Design specifications and requirements, including local municipality regulations and provisions.
- J. Maintain all necessary records in current form throughout the execution of the Work.
- M. The Architect's general approval of a submittal is not intended to modify or waive any requirements of the drawings and specifications. If a submittal proposes to modify materials, size, assembly, quality or appearance as required by the drawings and specifications, said proposed modification will be clearly and boldly marked upon the submittal. Absent Architect's explicit approval of this boldly marked modification, said proposed modification shall not be deemed approved.

1.12. WARRANTIES

- A. Warranties Required: Refer to individual trade sections for specific product warranty requirements.
- B. Procurement: Where a warranty is required, do not purchase or subcontract for materials or work until it has been determined that parties required to countersign warranties are willing to do so.
- C. Warranty Forms: Submit written warranty to Owner through Architect for approval prior to execution. Furnish two copies of executed warranty to Owner for his records; furnish two additional conformed copies where required for maintenance manual
- D. Work Covered: Contractor shall remove and replace other work of project which has been damaged as a result of failure of warranted work or equipment, or which must be removed and replaced to provide access to work under warranty. Unless otherwise specified, warranty shall cover full cost of replacement or repair, and shall not be pro-rated on basis of useful service life.
- E. Warranty Extensions: Work repaired or replaced under warranty shall be warranted until the original warranty expiration date or for ninety days whichever is later in time.
- F. Warranty Effective Starting Date: Guarantee period for all work, material and equipment shall begin on the date of substantial completion, not when subcontractor has completed his work nor when equipment is turned on. In addition to the one year guarantees for the entire work covered by these Contract Documents, refer to the various sections of the specifications for extended guarantee or maintenance requirements for various material and equipment.

1.13. CUTTING AND PATCHING

- A. Limitations: Do not cut and patch any work in a manner that would result in a failure of the work to perform as intended, decreased energy performance, increased maintenance, decreased operational life, or decreased safety.
 - 1. Structural Work: Do not cut structural work or bearing walls without written approval from Architect. Where cutting and patching of structural work is necessary and approved by Architect, perform work in a manner which will not diminish structural capacity nor increase deflection of member. Provide temporary shoring and bracing as necessary. Ensure the safety of people and property at all times.
- B. Cutting and Patching Materials: Use materials identical to materials to be cut and patched. If identical materials are not available or cannot be used, use materials that match existing materials to the greatest extent possible. Provide finished work that will result in equal to or better than existing performance characteristics.
- C. Inspection: Before cutting and patching, examine surfaces and conditions under which work is to be performed and correct unsafe and unsatisfactory conditions prior to proceeding.
- D. Protection: Protect adjacent work from damage. Protect the work from adverse conditions.
- E. Cutting: Cut work using methods least likely to damage adjoining work. Use tools designed for sawing or grinding, not hammering or chopping. Use saws or drills to ensure neat, accurately formed holes to sizes required with minimum disturbance to adjacent work. Temporarily cover openings ; maintain weather-tightness and safety.
 - 1. Utilities: Locate utilities before cutting. Provide temporary utilities as needed. Cap, valve, or plug and seal ends of abandoned utilities to prevent entrance of moisture or other foreign matter.

- F. Patching: Patch with seams and joints which are durable and not visible. Comply with specified tolerances for similar new work; create true even planes with uniform continuous appearance. Restore finishes of patched areas and, if necessary, extend finish restoration onto adjoining unpatched area to eliminate evidence of patching and refinishing. Repaint entire assemblies, not just patched area. Remove and replace work which has been cut and patched in a visually unsatisfactory manner as determined by the Architect.
- E. Qualifications: Retain experienced and specialized firms, original installers if possible, to perform cutting and patching. Workmen shall be skilled in type of cutting and patching required.
- F. Cutting and patching includes coring and core drilling. Cutting and patching not performed by trades shall be performed by the (General) Contractor.

1.14. FIELD ENGINEERING

- A. Provide required field engineering including property metes, bounds and elevation surveying of both land and structures, civil engineering services and structural engineering services.
- B. Quality Assurance: Engage a Registered Land Surveyor registered or where required, a professional engineer in the State where the project is located, to perform land surveying services required.
- C. Surveys & Control Points: Upon request, the Owner will identify existing control points and property line of which he is aware, and when available, will provide copies of site surveys. Where property surveys are not included in the contract documents, generate the needed property survey information as part of the work of this contract.
- D. Verify layout information shown on the Drawings, in relation to the property survey and existing benchmarks before proceeding to layout the Work. Locate and protect existing benchmarks and control points. Preserve permanent reference points during construction.
 - 1. Do not change or relocate benchmarks or control points without prior written approval. Promptly report lost or destroyed reference points, or requirements to relocate reference points because of necessary changes in grades or locations.
 - 2. Promptly replace lost or destroyed project control points. Base replacements on the original survey control points.
- E. Establish and maintain a minimum of two permanent benchmarks on the site, referenced to data established by survey control points.
- F. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
- G. Existing utilities and equipment: 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.
- H. Prior to construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, water service piping, and other underground utilities affected by the work.
- I. Performance: Working from lines and levels established by the property survey, establish benchmarks and markers to set lines and levels at each story of construction and elsewhere as needed to properly locate each element of the Project. Calculate and measure required dimensions within indicated or recognized tolerances. Do not scale Drawings to determine dimensions.
- J. Advise entities engaged in construction activities, of marked lines and levels provided for their use.
- K. As construction proceeds, check every major element for line, level and plumb.
- L. Surveyor's Log: Maintain a surveyor's log of control and other survey Work. Make this log available for reference.

- M. Record deviations from required lines and levels, and advise the Architect when deviations that exceed indicated or recognized tolerances are detected. On Project Record Drawings, record deviations that are accepted and not corrected.
- N. On completion of foundation walls, major site improvements, and other Work requiring field engineering services, prepare a certified survey showing dimensions, locations, angles and elevations of construction and sitework.
- O. Building Lines and Levels: Locate and lay out batter boards for structures, building foundations, column grids and locations, floor levels and control lines and levels required for mechanical and electrical Work.
- P. Existing Utilities: Furnish information necessary to adjust, move or relocate existing structures, utility poles, lines, services or other appurtenances located in, or affected by construction. Coordinate with local authorities having jurisdiction.
- Q. Final Property Survey: Before Substantial Completion, prepare a final property survey showing significant features (real property) for the Project. Include on the survey a certification, signed by the Surveyor, to the effect that principal metes, bounds, lines and levels of the Project are accurately positioned as shown on the survey.

1.15. TEMPORARY FACILITIES AND UTILITIES

- A. Scope of Temporary Work: This article is not intended to limit the scope of temporary work required under the Contract. Provide all temporary facilities and utilities needed and to maintain on-going building operations in the case of existing facilities.
- B. Permits and Fees: Obtain and pay for all permits, fees and charges related to temporary work.
- C. Codes and Authorities Having Jurisdiction for Temporary Facilities and Utilities: Comply with all requirements of authorities having jurisdiction, codes, utility companies, OSHA, and industry standards including, but not limited to the following:
 - 1. NFPA Code 241, Building Construction and Demolition Operations.
 - 2. ANSI-A10 Series, Safety Requirements for Construction and Demolition.
 - 3. NECA National Joint Guideline NJG-6, Temporary Job Utilities and Services.
 - 4. Electrical Service: NEMA, NECA, and UL.
- D. Field Offices: Provide Contractor's field offices as needed. Keep current copies of all Contract Documents and project paperwork neatly on file at jobsite. Permit Architect's unrestricted use of Contractor's field office facilities including copiers, telephones, plan tables, and other equipment. Furnish, maintain, and pay for light, power, phone, fax, and other field office services.
- E. Equipment and Tools: Provide all equipment including, but not limited to, hoists, lifts, scaffolding, machines, tools and the like, as needed for execution of the work. Provide safe access to all parts of the work.
- F. Temporary Enclosures: Provide temporary enclosures to maintain proper temperatures and in no case less than 50 degrees F once temperature or humidity sensitive components are in place and to prevent weather damage, pollutions, dust or excessive noise. Always maintain legal means of egress. Comply with the provisions of "Weather Protection" given below.
- G. For cold weather climates only, Snow and Ice: Remove all snow and ice which interferes with work or safety.
- H. Streets, Walks and Grounds: Maintain public and private roads and walks clear of debris caused by construction operations. Repair all damage caused to streets, drives, curbs, sidewalks, fences, poles and similar items where disturbed or damaged by building construction and leave them in as good condition after completion of the work as before operations started.

- I. Protection: Protect nearby property and the public from construction activities. provide and maintain barricades, warning signs and lights, railings, walkways and similar items. Immediately repair damaged property to its condition before being damaged.
- J. Security: Secure site against unauthorized entry at all times. Provide secure, locked temporary enclosures. Protect the work at all times. Provide watchman service, if necessary, to protect the work.
- K. Signs: Erect project identification signs in compliance with details to be provided by Architect. Signs shall be minimum 4' x 8' exterior grade plywood and shall contain the names of the project, Owner, Architect, major Consultants, Contractor, and major financing institution. Except for safety and warning signs, no other signs are permitted. Location as acceptable to the Architect.
- L. Fire Prevention: Take every precaution to prevent fire. Provide and maintain in good operating condition suitable and adequate fire protection equipment and services, and comply with recommendations regarding fire protection made by the representative of the fire insurance company carrying insurance on the Work or by the local fire chief or fire marshal. The area within the site limits shall be kept orderly and clean, and all combustible rubbish shall be promptly removed from the site.
- M. Egress: Maintain safe and legal means of egress at all times. At all times, provide at least two separate means of egress.
- N. Temporary Elevators, Hoists & Cranes: Provide equipment required to complete the Work as required and to comply with approved schedules. Do not use project elevators for project or construction purposes without express written permission form the elevator manufacturer, the elevator installer and the Owner.

Provide design and engineering services of professional engineers registered in the locality to evaluated temporary elevators, hoists and crane. Systems used shall be based upon engineered documents stamped the Engineer of Record. Such Engineers shall have professional liability insurance covering the value of the Work.

- O. Temporary Roads, Parking and Staging: Provide facilities necessary to accomplish the Work. Build temporary roads of adequate grade, substrate, and layout to provide safe, effective, efficient site work and access. Maintain roads and provide adequate temporary drainage. Provide parking required, whether on or off site. Pay all costs in connection with providing parking and ensure local traffic in, on, and around site is not adversely affected by workers or construction parking.

Provide staging or ensure staging is provided by subcontractors. Ensure staging is properly designed and where required, employ professional engineers in the locality to design or evaluate structural integrity of systems.

Where required provide or ensure subcontractors provide adequate closures of staging to ensure proper work temperatures and environmental safety.

- P. Protecting Installed Construction: Comply with the requirements of Section 01 70 00 Execution and protect work until acceptance and Substantial Completion. Protect work not accepted at Substantial Completion or not yet installed and approved until Final Acceptance.
- Q. Weather protection:
 - a. Provide temporary enclosures and heat to permit construction work to be carried out continuously including during the months of November through March in compliance with M.G.L. Chapter 149, Section 44D(G).
 - b. Enclosures or heat for operations that are not feasible, practical or appropriate in the judgment of the Designer will not be required, and such as site work, steel erection, non-temperature sensitive exterior façade components, roofing and the like.

- c. Weather protection definition: Temporary protection for work adversely affected by moisture, wind, and cold, by means of covering, enclosing and/or heating.
 - d. The General Contractor shall furnish and install all weather protection material and be responsible for all costs, including heating required to maintain a minimum temperature of 50 degrees F. at the working surface.
 - e. Comply with safety regulations, and provide proper ventilation and fire protection systems. Prevent damage to surfaces, finishes and components.
 - f. Monitoring: Provide thermometers throughout work areas spaced at not less than one for every 2000 sf. Submit documentation weekly of temperature recordings at intervals acceptable to the Architect, but taken not less than daily.
- R. Heating during construction:
- a. Submit for approval temporary heating methods within 30 days of contract award or within 14 days of need for same, whichever is sooner.
 - b. The General Contractor shall provide and pay for temporary heating.
 - c. Provide temporary heat continuously as required to provide proper temperatures around, in, and on the Work, its surfaces or components and to prevent the build up of improper amounts of moisture, humidity or other damaging conditions.
 - d. Provide the temperature ranges necessary for the proper condition of the work, but within the range of 50 to 75 degrees F.
 - e. Use of permanent heating system: Subject to review and approval of the Architect and their consultants, the system may be used. The system shall be turned over once the project is complete in like-new condition, completely clean and with warranties unaffected by this use. The General contractor shall pay costs of this use including fuel, power, and labor necessary for the maintaining, operating, monitoring and cleaning of systems to both for utility usage and to subcontractors responsible for providing systems used.

1.16. PRODUCTS AND SUBSTITUTIONS

- A. Specified Products: In all cases in which a manufacturer's name, trade name or other proprietary designation is used in connection with materials or articles to be furnished under this Contract, whether or not the phrase "or equal" is used after such name, the Contractor shall provide the product of the named manufacturers without substitution, unless a written request for a substitution has been submitted by the Contractor and approved in writing by the Architect as follows.
- B. Deviations from Detailed Requirements: If the Contractor proposes to use material which, while suitable for the intended use, deviates in any way from the detailed requirements of the Contract Documents, the Contractor shall inform the Architect in writing of the nature of such deviations at the time the material is submitted for approval, and shall request written approval of the deviation from the requirements of the Contract Documents.
- C. Approval of Substitutions: In requesting approval of deviations or substitutions, the Contractor shall provide evidence, including, but not limited to manufacturer's data, leading to a reasonable certainty that the proposed substitution or deviation will provide a quality of result at least equal to that attainable if the detailed requirements of the Contract Documents were strictly followed. If, in the opinion of the Architect, the evidence presented by the Contractor does not provide a sufficient basis for such reasonable certainty, the Architect may reject such substitution or deviation without further investigation.
- C. Intent of Contract Documents: The Contract Documents are intended to produce a building of consistent character and quality of design. All components of the building including visible items of mechanical and electrical equipment have been selected to coordinate with the Design in relation to the overall appearance of the building. The Architect shall judge the design and appearance of proposed substitutes on the basis of the suitability in relation to the overall design of the Project, as well as for their intrinsic merits. The Architect will not approve, as equal to materials specified proposed, substitutes which in the Architect's opinion, would be out of character, obtrusive, or otherwise inconsistent with the character or quality of design of the Project.

In order to permit coordinated design of color and finishes the Contractor shall furnish the substituted material in any color, finish texture, or pattern which would have been available from the manufacturer originally specified, at no additional cost to the owner.

- D. Additional Costs or Impact: Any additional cost, or any loss or damage arising from the substitution of any material or any method for those originally specified shall be borne by the contractor, notwithstanding approval or acceptance of such substitution by the Owner or the Architect, unless such substitution was made at the written request or direction of the Owner and the Architect. Any decrease in the cost of the substitution shall be returned to the Owner.
 - E. Manufacturers: To the greatest degree possible, provide primary materials and products from one manufacturer for each type or kind. Provide secondary materials as recommended by manufacturers of primary materials.
 - G. Substitution Requests: Refer to relevant section and Substitution Request Form. Submit 3 copies. Identify product to be replaced by substitute by reference to specification sections and drawing numbers. Provide Contractor's certification and evidence to prove compliance with Contract. Document requirements as acceptable to Architect.
 - H. Substitution Conditions: Substitution requests will be returned without action unless one of the following conditions is satisfied. The Contractor shall state which of the following conditions applies to the requested substitution:
 - 1. Request is due to an "or equal" clause.
 - 2. Specified material or product cannot be coordinated with other work.
 - 3. Specified material or product is not acceptable to authorities having jurisdiction.
 - 4. Substantial advantage is offered Owner in terms of cost, time, or other valuable consideration.
 - 5. Specified material or product is not available.
 - 6. Invalid Substitutions: Contractor's submittal and Architect's acceptance of shop drawings, samples, product data or other submittal is not a valid request for, nor an approval of a substitution unless the Contractor presents the information when first submitted as a Request for Substitution.
 - 7. Requests do not meet or exceed Sustainable Design Goals and Requirements.
- 1.17. DELIVERY, STORAGE AND HANDLING
- A. Manufacturer's Criteria: Strictly comply with manufacturer's instructions and recommendations and prevent damage, deterioration and loss, including theft. Minimize long-term storage at the site. Maintain environmental conditions, temperature, ventilation, and humidity within range permitted by manufacturers of materials and products used.
- 1.18. MANUFACTURER RECOMMENDATIONS
- A. Handle, store work as above. Install work according to manufacturer's recommendations, instructions, literature and product limitations. Where conflicts existing between these specifications and manufacturer recommendations, advise Architect in writing and obtain written recommendations to resolve conflict. Failure to install work according to standards, instructions and recommendations shall be the responsibility of the contractor. Replace work at no cost to Owner where not installed according to written requirements, instructions or recommendations.
- 1.19. LABELS
- A. Labels, Trademarks, & Trade names: Locate required labels on inconspicuous surfaces. Do not provide labels, nameplates, or trademarks, which are not required. Provide permanent data plate on each item of equipment stating manufacturer, model, serial number, capacity, ratings and all other essential data.

1.20. RECORD DOCUMENTS

- A. General: Keep record documents neatly and accurately. Record information as the work progresses and deliver to Architect at time of final acceptance. include in record documents all field changes made, all relevant dimensions, and all relevant details of the work. Keep record documents up to date with all field orders and change orders clearly indicated.
- B. Drawings: Keep four separate sets of prints at the site, one set each for mechanical, electrical, plumbing, and architectural/structural disciplines. Neatly and accurately note all deviations from the Contract Documents and the exact actual location of the work as installed. Marked-up and colored prints will be used as a guide to determine the progress of the work installed. Requisitions for payment will not be approved until the record documents are accurate and up-to-date
 - 1. Work Outside Building: Record data outside of building to an accuracy of plus or minus 1 inch and determine and record the invert elevation of all drain lines.
 - 2. At completion of the work, submit one complete set of marked-up prints for review. After acceptance these marked-up prints shall be used in the preparation of the record drawings.
 - 3. Architect shall furnish Contractor with AutoCAD files for originals of the Contract Drawings. Make modifications to these files as shown on the marked-up prints. Remove superseded data to show the completed installation.
 - 4. Deliver the completed AutoCAD record drawings on reproducible sheets and on a CD of the computer files, in the same version as Contract Drawings [unless otherwise directed by the Owner to provide a different AutoCAD version], properly titled and dated to the Architect. Indicate preparer of record drawings. These record drawings shall become the property of the Owner.
- C. Specifications: Maintain one clean copy of complete specifications [including addenda, modifications, and bulletins with changes, substitutions, and selected options clearly noted. Circle or otherwise clearly indicate which manufacturer and products are actually used.
- D. Operating and Maintenance Manuals: Manuals shall be submitted which contain the following:
 - 1. Description of the system provided.
 - 2. Handling, storage, and installation instructions.
 - 3. Detailed description of the function of each principal component of the systems or equipment.
 - 4. Operating procedures, including pre-startup, startup, normal operation, emergency shutdown, normal shutdown and troubleshooting.
 - 5. Maintenance procedures including lubrication requirements, intervals between lubrication, preventative and repair procedures, and complete spare parts list with cross reference to original equipment manufacturer's part numbers.
 - 6. Control and alarm features including schematic of control systems, control loop electric ladder diagrams, controller operating set points, settings for alarms and shutdown systems, pump curves and fan curves.
 - 7. Safety and environmental considerations.
- E. Copies of Operating and Maintenance Manuals: Three copies of the manuals shall be provided within sufficient time to allow for training of Owner's personnel. Submit one copy of the manuals to the Architect for review no latter than 90 calendar days prior to substantial completion, or building turn over, whichever comes first. Submit the remaining five copies within 15 days after first review set is returned to contractor. Progress payment may be withheld if this requirement is not met.
- F. Additional Requirements for Operating and Maintenance Manuals: The requirements for manuals applies to each packaged and field-fabricated operating system. The manuals shall be provided in three-ring side binders with durable plastic covers. The manuals shall contain a detailed table of contents and have tab dividers for major sections and special equipment.

- G. Framed Data: Provide charts and lists of all valves, circuits, switches, controls and equipment. Install on walls under glass at locations directed by Architect
- 1.21. EXTRA STOCK MATERIALS [aka "ATTIC" or "MAINTENANCE "STOCK"]
- A. Provide extra stock materials specified throughout Project Manual. Provide quantities indicated, where extra stock is specified but quantities not indicated carry 1% of surface area of material installed; include at one of every color provided. Provide work in unopened boxes or containers of same lot or run of installed products. Identify, label and store products where directed.
- 1.22. SYSTEM DEMONSTRATION & TRAINING
- A. Provide system demonstration and training as specified throughout the Project Manual and as follows, whether or not specified elsewhere:
 - 1. Demonstrate project equipment and systems to ensure Owner personnel understand operation, functioning and long-term and short term maintenance of equipment and systems.
 - 2. Explain and demonstrate systems restrictions, safety procedures and operational limitations.
 - 3. Provide trained personnel which previous experience training and demonstrating systems. Devote sufficient time to each piece of equipment or system to ensure personnel have an effective understanding of requirements to operate and maintain work being demonstrated.
 - 4. Provide follow-up and additional training where Owner advises that personnel need additional time to fully understand systems or equipment.
 - 5. In general demonstration and training shall be conducted for all systems containing microprocessors, are programmable, convey people or goods, are affected by or part of safety or fire suppression systems, are part of environmental controls or require training in order to use or operate properly.
 - 6. Make a video of demonstration session(s) and provide electronic files of same to the Owner.
- 1.23. PROJECT CLOSE OUT
- A. Complete the following prior to Substantial Completion:
 - 1. Provide Contractor's Punch List of incomplete items stating reason for incompleteness and value of incompleteness.
 - 2. Advise Owner of insurance change over requirements.
 - 3. Submit all warranties, maintenance contracts, final certificates and similar documents.
 - 4. Obtain Certificate of Occupancy and similar releases which permit the Owner's full and unrestricted use of the areas claimed "Substantially Complete".
 - 5. Submit record documents.
 - 6. Deliver maintenance stocks of materials where specified.
 - 7. Make final change over of lock cylinders or cores and advise Owner of change of security responsibility.
 - 8. Complete startup of all systems and instruct Owner's personnel in proper operation and routine maintenance of systems and equipment.
 - 9. Complete clean up and restoration of damaged finishes
 - 10. Satisfy all commissioning requirements.
 - 11. Remove all temporary facilities and utilities that are no longer needed.
 - 12. Request Architect's inspection for Substantial Completion.
 - C. Architect will either issue a Certificate of Substantial Completion or notify Contractor of work which must be performed prior to issue of certificate
 - D. Complete the following prior to Final Acceptance and payment:
 - 1. Obtain Certificate of Substantial Completion.
 - 2. Submit final application for payment, showing final accounting of changes in the work.

3. Provide final releases and lien waivers not previously submitted.
4. Submit certified copy of final punch list stating that Contractor has completed or corrected each item.
5. Submit final meter readings, record of stored fuel and similar information.
6. Submit Consent of Surety for final payment.
7. Submit evidence of Contractor's continuing insurance coverage (if required by Contract Documents).

1.24. REMEDIAL WORK

- A. Extent/Applicability: Remedial work includes cutting and patching associated with:
1. Defective, non-conforming, ill timed, and improperly fitting work.
 2. Removing samples of installed work for testing, inspection, and verification.
 3. Patching of sample removal locations.
- B. Comply with the following:
1. Patching Materials: Identical in quality and appearance to materials to be cut and patched.
 2. Craft: Employ highly skilled trade workers for all patching work.
 3. Subcontractors: Coordinate their work with the General Contractor to minimize remedial work.
 4. Make durable, permanent patches.
 5. Comply with specified tolerances for similar new work.
 6. Match the visual quality and character of adjacent unpatched work in good condition.
 7. Create true, even surfaces with uniform, continuous appearance.
 8. Extend patched area onto adjoining unpatched areas to eliminate visible evidence of patching.
 9. Repaint entire assemblies, not only the patched area, to nearest major change of plane.
 10. Obtain Architect's approval of each patch.
 11. Visible evidence of patching is sufficient cause for rejection and replacement.

1.25. FINAL CLEANING AND REPAIR

- A. The following is a resume of requirements. Refer to section 01 77 00. Note that sequencing and other operations may be superseded by Section 01 49 00 Build Clean Requirements for projects involving cleanrooms and cleanroom-like environments.
- B. Clean Up: immediately prior to the Architect's inspection for Substantial Completion, the Contractor shall completely clean the premises and clean and prepare the completed work in order for it to be used for its intended purpose in accordance with the Contract Documents. Such work shall include, but not be limited to the following:
1. Concrete and ceramic surfaces shall be cleaned and washed.
 2. Resilient coverings shall be cleaned, waxed and buffed as applicable.
 3. Woodwork shall be dusted and cleaned.
 4. Sash, fixtures and equipment shall be thoroughly cleaned.
 5. Stains, spots, dust, marks and smears shall be removed from all surfaces.
 6. Hardware and metal surfaces shall be cleaned and polished.
 7. Glass and plastic surfaces shall be thoroughly cleaned by professional window cleaners. Clean windows inside and outside.
 8. Damaged, broken or scratched glass or plastic shall be replaced by the Contractor at the Contractor's expense.
 9. Vacuum carpeted and soft surfaces with high efficiency particulate arrestor (HEPA) vacuum.
 10. Use low-emitting, environmentally friendly cleaning agents and procedures.' 11. Comply with Owner's requirements for Green Housekeeping.
- C. Repairs: Repair and touch-up all damaged and deteriorated products and surfaces.

1.26. E-DOC & CAD TRANSMITTAL REQUIREMENTS

- A. Provide Electronic exchange of information and acceptable formats and file types; Where practical, all project documents.
- B. Intent / purpose:

1. Purpose: Expediting exchange of information and approvals, and minimize time, cost and paper use, handling and storage.
 2. Intent: To extent possible, provide required documentation in form of computer-readable files - hereafter: "e-docs".
 3. Signing & sealing: As necessary, sign digitally and version-protect project documents so they are legally binding.
 4. Use of paper is discouraged. Unless impractical, paper documents will have corresponding e-docs available and distributed to all parties.
- C. Scope & Exceptions: Unless determined to be impractical for an acceptable reason, provide each of the following as an e-doc:
1. General purpose communications, contact information, meeting scheduling.
 2. RFI inquiries and responses.
 3. Sketches and sketch revisions.
 4. Most submittals, including shop drawings, product information, MSDS representations, manufacturer's catalogs (complete or partial), and other customary submittals, along with Architect disposition of same.
 5. Contractor's progress schedules.
 6. Field orders.
 7. Change order requests and proposals.
 8. Photo documentation.
 9. Punch lists.
 10. Draft versions and review copies of documents requiring original signatures and/or notarization, including payment applications and executed change orders.
- D. Produce and distribute hard copy paper records in quantities required in addition to the e-doc record for at least the following, subject to confirmation with the Architect:
1. Documents requiring multiple original signatures and/or notarization.
 2. Applications for Payment.
 3. Changer Orders.
 4. Warranties.
 5. Equipment operation & maintenance manuals.
- E. File formats & Information Exchange: Comply with the following:
1. Preferred file format: Portable document format, PDF, Adobe Acrobat V.8 or later.
 2. Combined pages: Submit related documents incorporated into single PDF files, as though stapled together. Include transmittal as part of file.
 3. Acceptability: Properly identified, digitally signed/countersigned, pdf documents shall be binding upon the Project and its parties as if issued in paper form.
- F. Email: Electronic email shall be an acceptable e-docs, binding upon the Project and its parties and equal in force to hardcopy or PDFs.
1. Use email applications having interoperability with all parties of the Project.
 2. Use project name in subject line of each and every email issued; and include writer's name, address, telephone number and position in each email.
- G. Acceptable picture / graphic file formats: "TIF", "GIF", and "JPEG".
1. Color in files: Acceptable, but not required.
 2. Do not use other formats without approval of all parties.
- H. Proprietary file formats: Do not use for e-docs unless all parties agree. These include:
1. MS Word.
 2. PowerPoint.
 3. FileMaker.
 4. MS Excel.
 5. Photoshop.
- I. File sizes, formats and naming conventions:

1. Use only agreed to, Project-accepted naming conventions for e-docs.
 2. File sizes: Acceptable to internet service providers and parties servers.
 3. Large files: Use FTP file transfer protocol up/down loads to pre-agreed servers.
 4. Large files: CD ROMs disks may be used, only if FTP or DropBox sites are not available.
 5. Maximum file size: Do not exceed 25 MGs without prior agreement of parties.
 6. Files compression: Do not use Stuff-It, PK-ZIP or the like without prior agreement.
 7. Unacceptable files: Unopenable, illegible, damaged, unintelligible files will be discarded without action. Originator shall correct and re-issue.
- J. Cost of E-Doc Management: Each party to e-doc exchange shall maintain staff, programs and equipment, and storage adequate for generation, processing and archiving of e-docs as appropriate to their needs. Costs of for e-doc exchange and management shall be an internal overhead and administrative cost absorbed by each party.
- K. Paper documents not also issued electronically and received by the Architect from the Contractor will be sent out for scanning to e-doc file and charged to Contractor or deducted from the Contract Sum.
- L. If requested, Contractor, vendors, suppliers and subcontractors shall create their submittals in BIM file formats per Owner requirements with appropriate tags for facility management applications.
- M. Terms, Conditions and requirements for transmittal of CAD files:
1. Unless otherwise indicated, computer-aided-design files will be furnished as “shells” only of architect/engineer drawings.
 2. As a condition of receipt of files of this kind, sign a release in the form provided by the Architect – who, upon receipt of same, will issue the indicated drawings.
 3. Comply with the following:
 - a. The Contractor may use information for preparation of base sheets for “Coordination Drawings” and “Record Drawings”, but not for “Shop Drawings”.
 - b. The Architect and the Architect’s consultants retain all copyrights to their documents.
 - c. The Architect and the Architect’s consultants give the Contractor a limited and nontransferable license to use their documents for the sole purpose of preparing “Coordination Drawings” and “Record Drawings” for this project only. No other use or purpose is authorized or permitted.
 - d. The Contractor shall not copy, distribute, or disseminate the documents furnished to him for any use or purpose other than the purposes authorized by this Agreement.
 - e. The Architect and the Architect’s consultants do not warrant that the documents furnished to the Contractor are complete or accurate. All addenda and modifications may not have been incorporated into the documents furnished to the Contractor.
 - f. The documents will be furnished in their existing layering, filing, and directories. No special layering, file organization, directory organization, or compilation will be created for the Contractor.
 - g. The Architect and the Architect’s consultants do not warrant that the electronic documents furnished to the Contractor are usable with any computer hardware or software other than the computer hardware and software used by the Architect and the Architect’s consultants. The Architect and the Architect’s consultants may have used multiple different and non compatible computer hardware and software systems and products.
 - h. The Contractor shall check the information contained in the documents furnished by the Architect and the Architect’s consultants. The Contractor shall be solely responsible for the completeness and accuracy of the “Coordination Drawings” and “Record Drawings” prepared using the documents furnished by the Architect and the Architect’s consultants.
 - i. The Contractor shall remove the Architect’s and the Architect’s consultants! professional seals from “Coordination Drawings” and “Record Drawings” prepared using the documents furnished to him.
 - j. The Contractor shall indemnify and hold harmless the Architect and the Architect’s consultants and the officers, employees, and assigns of the Architect and the Architect’s consultants from all damages and claims resulting from the use of documents furnished to him.

- k. Documents will be made available to the Contractor on an internet FTP [File Transfer Protocol] site.
 - 1) A user ID and password may be required to access information.
- l. These terms and conditions constitute the complete Agreement between the Contractor and the Architect and the Architect's consultants.
- m. These terms and conditions may only be modified in writing by mutual agreement of all parties to this Agreement.
- n. This Agreement is governed by the laws of the state where the Architect has their principal place of business.

PART 2 -PRODUCTS [Not Used]

PART 3 -EXECUTION [Not Used]

END OF SECTION

SECTION 01 11 00

SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Phased construction.
4. Work by Owner.
5. Work under separate contracts.
6. Future work.
7. Purchase contracts.
8. Owner-furnished products.
9. Contractor-furnished, Owner-installed products.
10. Access to site.
11. Coordination with occupants.
12. Work restrictions.
13. Specification and drawing conventions.
14. Miscellaneous provisions.

B. Related Requirements:

1. Section 01 50 00 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

- A. Project Identification: O'Keefe Center Roof Replacement, Plaza Repair & Gym Humidification.

- B. Owner: Salem State University.

1. Owner's Representative: Salem State University Capital Projects Department or as otherwise noted in Contract Documents.

- C. Designer: Winter Street Architects, Inc. or as otherwise noted in Contract Documents.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work consists of the Work identified in the Contract Documents to include Asbestos Removal from roof areas; Demolition and replacement of the roofs of the Rocket Arena

and Administrative Wing of the O'Keefe Center Complex, Plaza Repairs and Gasset
Center Gym Humidification and Gym Floor Repair, Striping and Refinishing

B. Type of Contract:

1. Project will be constructed under a single prime contract.

1.5 PHASED CONSTRUCTION

- A. The Work shall be conducted in one phase.

1.6 WORK BY OWNER

- A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate Work of this Contract with work performed by Owner.
- B. Work by Owner: None .

1.7 WORK UNDER SEPARATE CONTRACTS

- A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.
- B. Work Under Separate Contracts: None.

1.8 PURCHASE CONTRACTS

- A. General: Owner may have negotiated purchase contracts with suppliers of material and equipment to be incorporated into the Work. Owner will assign these purchase contracts to Contractor. Include costs for purchasing, receiving, handling, storage if required, and installation of material and equipment in the Contract Sum, unless otherwise indicated.
- B. Purchase Contracts: None.

1.9 OWNER-FURNISHED PRODUCTS

- A. Owner will furnish products indicated. The Work includes receiving, unloading, handling, storing, protecting, and installing Owner-furnished products and making building services connections as identified by Drawings.
- B. Owner-Furnished Products: None.

1.10 ACCESS TO SITE

- A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by Contract limits and as indicated by requirements of this Section.
- B. Use of Site: Limit use of Project site to areas identified within Contract Documents. Do not disturb portions of Project site beyond areas in which Work is indicated.

1. Limits: Confine construction operations to limits as shown in Contract Documents.
 2. Keep driveways, parking garage, loading areas, and entrances serving premises clear and available at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.
 - 1) Timing of deliveries shall be in accordance with applicable Laws and Owner's directions.
 - 2) Prevent delivery trucks servicing or supplying the Project from running their motors while sitting idle.
 3. Take all necessary precautions to ensure safety of bicyclists and pedestrians using campus roads and sidewalks.
 4. Clean driveways, walkways, and entrances affected by Work and maintain such in dust free, safe, and usable conditions for motorists, bicyclists, and pedestrians.
- C. Parking: Contractors are subject to Owner's parking regulations, enforcement, and procedures. Parking for personal vehicles on campus is not provided. Limit parking of company vehicles and storage of materials as can be accommodated within limits of Site. It shall be understood that parking for Contractor, Subcontractor, trades, and materialmen engaged upon the Work may not be available immediately adjacent to Site and Contractor may be directed to remotely park some, most, or all such vehicles.

1.11 COORDINATION WITH OCCUPANTS

- A. Full Owner Occupancy: Owner will occupy Site and adjacent buildings during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner's usage and academic schedule. Perform Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.
1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without consent of Owner and approval of authorities having jurisdiction.
 2. Notify Owner not less than 14 calendar days in advance of activities that will affect Owner's operations and academic schedule.
 3. Remove special protections and construction equipment from occupied areas as work is completed.

1.12 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction. Procure all required street closure and connection permits.

- B. On-site Work Hours: Limit Work to normal business working hours of 8:00 a.m. to 5:00 p.m., Monday through Friday, unless otherwise indicated.
1. Notify Owner not less than 14 calendar days in advance of proposed off-hours work.
 2. Obtain Owner's written permission before proceeding with off-hours work.
 3. Weekend Hours: **8:00 a.m. to 5:00 p.m.**
 4. Early Morning Hours: After midnight and before 7:00 a.m.; coordinate with Owner.
 5. Hours for Utility Shutdowns: After midnight and before 7:00 a.m.; coordinate with Owner.
- C. Work Hours Restrictions:
1. Be advised that residence hall move in and move out days occur in August and May; academic finals occur one week in May and one week in December; and commencement activities occur one week in May. Construction activities shall cease, be limited, or temporarily curtailed during those events; their specific dates will be provided to Contractor at Preconstruction Conference.
- D. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
1. Notify Owner not less than 14 calendar days in advance of proposed utility interruptions. Interruptions, depending upon type, generally must be scheduled on weekends, evenings, or during holiday periods. Contract consideration is deemed to include necessary overtime and premium time required by Contractor to complete utility shutdowns and cutovers.
 2. Obtain Owner's written permission before proceeding with utility interruptions.
 3. Temporary Connections: In the event Contractor disrupts any existing services, immediately make temporary connection to place such service back into operation and maintain the temporary connection until permanent connection is made.
 4. Interruptions critical to completion of Project shall be listed as Milestones on the Progress Schedule. Program Work such that service is restored in minimum possible time. Cooperate with Owner in reducing shutdowns of utility systems.
 5. Owner reserves the right to deny shutdown requests based on its scheduled work load, research projects, and usage of surrounding buildings or other activities planned on campus.
- E. Noise, Vibrations, and Odors: Take extreme care to limit noise, vibrations, and odors whenever building is occupied by students, faculty, and staff. Work causing noise, vibrations, or odors that, in sole opinion of Owner's Representative, are disturbing or disruptive to students, faculty, and staff shall be re-scheduled to off-hours or when classes are not in session. Machines shall not be left idling. Electric power shall be used in lieu of internal combustion engine power wherever possible. Equipment shall be maintained to reduce noise from vibration, faulty mufflers, or other sources.
- F. Tobacco-Free Campus: Smoking of any nature and chewing of tobacco or similar products is prohibited on University property. Strictly enforce this prohibition and immediately remove offenders from Site. Such action shall not constitute grounds for a delay claim.
- G. Drug-Free Campus: The unlawful possession, use, or distribution of illicit drugs and

- alcohol on University property is prohibited. Strictly enforce this prohibition and immediately remove offenders from Site. Such action shall not constitute grounds for a delay claim.
- H. Persons Performing the Work – Respectful Behavior: All construction personnel shall be respectful of all members of the University community. Any incidents of disrespect, verbal abuse, threatening statements, unwelcome comments, unwelcome interaction, or any form of harassment from any construction personnel toward any member of the University community is strictly prohibited. Any such act shall be deemed sufficient cause for the University to permanently remove any individual from the project and University property, and such action shall not constitute grounds for a delay claim.
- I. Persons Performing the Work – Responsive Behavior: All construction personnel shall be responsive to requests to act on any requirements of the Contract Documents and/or to correct any endangerment to the health and safety of the public. Any individual employee who ignores or refuses to take immediate action shall be identified as generating sufficient cause for the University to permanently remove them from the project and University property, and such action shall not constitute grounds for a delay claim.
- J. Hot Work: Defined as operations involving an open flame, or that generate either sparks or hot slag or both; it includes, but is not limited to, brazing, cutting, grinding, soldering, thawing of pipes, torch applied roofing, and welding. Contact Salem Fire Department and arrange for a paid fire detail for hot work performed either indoors or on the exterior of occupied buildings or both. Restrict hot work to unoccupied periods. Ensure that all welders are properly trained and certified in the specific type of equipment they are to use.
- K. Key Protocol: Furnish to Owner's Representative a list of all rooms (including mechanical and electrical rooms) to which Contractor will need access. Owner's Representative will furnish a key ring for access to those specific areas. Upon completion of Project return key ring to Owner's Representative.
- L. Control of Construction Water: Provide impermeable floor coverings and suitable dams to prevent damage by water used for Work. Immediately clean up and remove all surplus water and water spilled in non-working areas. Do not allow water to overflow gutters or flood streets.
- 1.13 SPECIFICATION AND DRAWING CONVENTIONS
- A. Specification Content: The Specifications use certain conventions for style of language and intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall", "shall be", or "shall comply with", depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to

Work of all Sections in Specifications.

- C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in Specifications. One or more of the following are used on Drawings to identify materials and products:
1. Terminology: Materials and products are identified by typical generic terms used in individual Specifications Sections.
 2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.
 3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual or as detailed in Contract Documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 21 00

ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Supplementary General Conditions and 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. Lump-sum allowances.
 - 2. Unit-cost allowances.
 - 3. Quantity allowances.
 - 4. Contingency allowances.
 - 5. Testing and inspecting allowances.
- C. Related Requirements:
 - 1. Section 01 27 00 "Unit Prices" for procedures for using unit prices.
 - 2. Section 01 33 00 "Submittal Procedures" for action and informational submittals.

1.3 SELECTION AND PURCHASE

- A. At earliest practical date after award of Contract, advise Designer of date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying Work.
- B. At Designer's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
- C. Purchase products and systems selected by Designer from the designated supplier.

1.4 ACTION SUBMITTALS

- A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

1.5 INFORMATIONAL SUBMITTALS

- A. Submit invoices or delivery slips to show actual quantities of materials delivered to 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 Work.

1.6 COORDINATION

- A. Coordinate allowance items with other portions of Work. Furnish templates as required to coordinate installation.

1.7 LUMP-SUM, UNIT-COST AND QUANTITY ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Designer under allowance and shall include taxes, freight, and delivery to Project site.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials under allowance shall be included as part of Contract Sum and not part of allowance.
- C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
 - 1. If requested by Designer, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

1.8 CONTINGENCY ALLOWANCES

- A. Use contingency allowance only as directed by Owner for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.
- B. Contractor's overhead, profit, and related costs for products and equipment ordered by Owner under contingency allowance are included in allowance and are not part of Contract Sum. These costs include delivery, installation, taxes, insurance, equipment rental, and similar costs.
- C. Owner may request Change Orders authorizing use of contingency funds. Change Orders will include Contractor's related costs and overhead and profit margins as defined in Owner's General Conditions.
- D. At Project closeout, credit unused amounts remaining in contingency allowance to Owner by Change Order.

1.9 TESTING AND INSPECTING ALLOWANCES

- A. Testing and inspecting allowances include cost of engaging testing agencies, actual tests and inspections, and reporting results.

- B. The allowance does not include incidental labor required to assist testing agency or costs for retesting if previous tests and inspections result in failure. The cost for incidental labor to assist testing agency shall be included in Contract Sum.
- C. Costs of services not required by Contract Documents are not included in allowance.
- D. At Project closeout, credit unused amounts remaining in testing and inspecting allowance to Owner by Change Order.

1.10 ADJUSTMENT OF ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on difference between purchase amount and allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
 - 1. Include installation costs in purchase amount only where indicated as part of allowance.
 - 2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
 - 3. Submit substantiation of change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
 - 4. Owner reserves right to establish quantity of work-in-place by independent quantity survey, measure, or count.
- B. Submit claims for increased costs because of change in scope or nature of allowance described in Contract Documents, whether for purchase order amount or Contractor's handling, labor, installation, overhead, and profit.
 - 1. Do not include Contractor's or subcontractor's indirect expense in Change Order cost amount unless it is clearly shown that nature or extent of work has changed from what could have been foreseen from information in Contract Documents.
 - 2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of same scope and nature as originally indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine products covered by 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 each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

Refer to Scope of Work or Contract Documents for allowances, if required.

END OF SECTION

SECTION 01 25 00

SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
 - 1. Section 01 21 00 "Allowances" for products selected under an allowance.

1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by 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 not required to meet other Project requirements but that 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 CSI Form 13.1A.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - b. Coordination information, including list of changes or revisions needed to other parts of Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of 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 Work specified.
- d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects with project names and addresses and names and addresses of Designers and owners.
 - h. Material test reports from qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project.
 - j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on overall Contract Time. If specified product or method of construction cannot be provided within Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - k. Cost information, including a proposal of change, if any, in Contract Sum.
 - l. Contractor's certification that proposed substitution complies with requirements in Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
 - m. 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. Designer's Action: If necessary, Designer will request additional information or documentation for evaluation within seven calendar days of receipt of request for substitution. Designer will notify Contractor of acceptance or rejection of proposed substitution within 15 calendar days of receipt of request, or seven calendar days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order, Construction Change Directive, or Designer's Supplemental Instructions for minor changes in Work.
 - b. Use product specified if Designer does not issue a decision on use of 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 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 calendar days prior to time required for preparation and review of related submittals.

1. Conditions: Designer will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Designer will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution is consistent with 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 Work.
 - g. Requested substitution has been coordinated with other portions of 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 Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Not allowed.

PART 3 - EXECUTION (Not Used)

END OF SECTION

SUBSTITUTION REQUEST FORM

No substitutions will be considered without this completed substitution request form and supporting documentation.

Substitutions made without completion of this form will be considered defective work as defined by the General Conditions of the Contract.

Date: _____ No.: _____

Project Name: _____

Project address: _____

To: Architect of Record

Re: _____

The Contractor proposes the following substitution in accordance with the Contract Documents.

Scope of Substitution _____

Spec. Section Reference _____

Drawing Reference _____

Drawing Reference _____

Reason for proposed Substitution _____

Impact on project cost _____

Impact on sustainable design characteristics _____

Impact on project Schedule _____

Impact on project _____

Guarantees & Warranties _____

Coordination _____

required
with adjacent
materials
and systems

List deviations
from specified
requirements

Coordination
required
with adjacent
materials
and systems

Attachments: Attach supporting documentation sufficient for Architect to evaluate substitution.
[Substitution forms lacking adequate documentation will be returned without review.]

Attachments

Response date: List date by which response by Architect is requested to maintain project schedule and allow sufficient time for inclusion of proposed substitution.

Response Date

Submitted by

Firm

Address

Signature below signifies acceptance of responsibility for accuracy and completeness of information included in this Substitution Request Form.

Authorized
signature

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 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling and processing contract modifications.

1.3 MINOR CHANGES IN THE WORK

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

1.4 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: The Architect will issue a detailed description of proposed changes in the Work that will require adjustment to the Contract Sum or Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Proposal requests issued by the Architect are for information only. Do not consider them as an instruction either to stop work in progress or to execute the proposed change.
 - 2. Within 20 days of receipt of a proposal request, submit an estimate of cost necessary to execute the change to the Architect for the Owner's review.
 - a. Include a list of quantities of products required and unit costs, with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include a statement indicating the effect the proposed change in the Work will have on the Contract Time.
- B. Contractor-Initiated Proposals: When latent or unforeseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a request for a change to the Architect.
 - 1. Include a statement outlining the 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 Contract Time.
 - 2. Include a list of quantities of products required and unit costs, with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
 - 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - 4. Comply with requirements in Section "Product Substitutions" if the proposed change requires substitution of one product or system for a product or system specified.
- C. Proposal Request Form: Use AIA Document G709 for Change Order Proposal Requests.
 - 1. Where Owner has forms: Use forms provided by the Owner for Change Order Proposals.
 - 2. If sample copies are not included at the end of this Section, obtain from Owner.

1.5 ALLOWANCES

- A. Allowance Adjustment: For allowance-cost adjustment, base each Change Order Proposal on the difference between the actual purchase amount and the allowance, multiplied by the final measurement of work-in-place. Where applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
 - 1. Include installation costs in the purchase amount only where indicated as part of the allowance.
 - 2. When requested, prepare explanations and documentation to substantiate the margins claimed.
 - 3. Submit substantiation of a change in scope of work claimed in the Change Orders related to unit-cost allowances.
 - 4. The Owner reserves the right to establish the actual quantity of work-in-place by independent quantity survey, measure, or count.

- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or the Contractor's handling, labor, installation, overhead, and profit. Submit claims within 21 days of receipt of the Change Order or Construction Change Directive authorizing work to proceed. The Owner will reject claims submitted later than 21 days.
 - 1. Do not include the Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in Contract Documents.
 - 2. No change to the Contractor's indirect expense is permitted for selection of higher or lower-priced materials or systems of the same scope and nature as originally indicated.

1.6 CONSTRUCTION CHANGE DIRECTIVE

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

1.7 CHANGE ORDER PROCEDURES

- A. Upon the Owner's approval of a Proposal Request, a Change Order shall be issued for signatures of the Owner and the Contractor on AIA Form G701.
 - 1. Change orders shall be issued by the party indicated by the terms of the separate Architect and Contractor Agreements.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

SECTION 01 29 00

PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Supplementary General 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.
- B. Related Requirements:
 - 1. Section 01 21 00 "Allowances" for procedural requirements governing the handling and processing of allowances.
 - 2. Section 01 25 00 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
 - 3. Section 01 27 00 "Unit Prices" for administrative requirements governing the use of unit prices.
 - 4. Section 01 32 00 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of Contractor's construction schedule.

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 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 Owner 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 Major Work Divisions as a guide to establish line items for schedule of values, as applicable.
1. Identification: Include the following Project identification on schedule of values:
 - a. Project name and location.
 - b. Name of Designer.
 - c. Designer's project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
 - f. Owner's Purchase Order Number.
 2. Arrange schedule of values consistent with format of AIA Document G703.
 3. Provide breakdown of Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of ten percent of Contract Sum.
 4. Round amounts to nearest whole dollar; total shall equal Contract Sum.
 5. Provide separate line item in schedule of values for each part of 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. Include evidence of insurance and Bill of Lading.
 6. Allowances: Provide a separate line item in 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 Contract Documents to determine quantities.
 7. Purchase Contracts: Provide a separate line item in schedule of values for each purchase contract. Show line-item value of purchase contract. Indicate Owner payments or deposits, if any, and balance to be paid by Contractor.
 8. Each item in 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 schedule of values or distributed as general overhead expense.

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 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: Submit Application for Payment to Owner by 25th day of month. The period covered by each Application for Payment is one month, ending on last day of the month.
1. Submit draft copy of Application for Payment seven days prior to due date for review by Owner.

- C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Owner will return incomplete applications without action.
 - 1. Entries shall match data on 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 approved before last day of construction period covered by application.
- E. 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.
- F. Transmittal: Submit one signed and notarized original copy of each Application for Payment to Owner by a method ensuring receipt. Application for Payment shall include waivers of liens and similar attachments.
- G. 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 previous application. Waivers shall also be submitted from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to 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. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of 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.
- H. 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. Contractor's construction schedule (preliminary if not final).

4. Submittal schedule (preliminary if not final).
 5. Copies of permits, if applicable.
 6. Copies of authorizations and licenses from authorities having jurisdiction for performance of Work, if applicable.
 7. Initial progress report.
 8. Owner's "Contractor Payment Affidavit, Release and Waiver of Liens."
- I. Application for Payment at Substantial Completion: After Owner issues Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of Work claimed as substantially complete.
1. Include documentation supporting claim that Work is substantially complete and statement showing an accounting of changes to Contract Sum.
 2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of Work.
- J. 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 Contract Sum.
 4. Owner's "Contractor Final Payment Affidavit, Release and Waiver of Liens."
 5. Evidence that claims have been settled.
 6. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of Work.
 7. Final liquidated damages settlement statement, if applicable.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

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 Conditions and Supplementary General 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.
- C. Related Requirements:
 - 1. Section 01 32 00 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
 - 2. Section 01 70 00 "Execution Requirements" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 3. Section 01 77 00 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

- A. RFI: Request from Owner, Designer, 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 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.
- B. Key Personnel Names: Before 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.

1.5 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of Specifications to ensure efficient and orderly installation of each part of Work. Coordinate construction 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 Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.

- B. 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 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.

- C. 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.

- D. 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 Work. Such administrative activities include, but are not limited to, the following:
 - 1. Preparation of Contractor's construction schedule.
 - 2. Preparation of Schedule of Values.
 - 3. Installation and removal of temporary facilities and controls.
 - 4. Delivery and processing of submittals.
 - 5. Progress meetings and meeting minutes.
 - 6. Photographic documentation.
 - 7. Preinstallation conferences.
 - 8. Project closeout activities.
 - 9. Startup and adjustment of systems.

10. Track and provide documentation of all cost events including but not limited to:
Change Orders, allowances, unit prices, and contingencies.

- E. Conservation: Coordinate construction activities to ensure operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

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 applicable Drawings 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 addition of trade-specific information to coordination drawings by multiple contractors in a sequence that best provides for coordination of 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 life of 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 Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Designer indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

- B. Coordination Digital Data Files: Prepare coordination digital data files according to specification.

1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings or as directed by Owner or Designer.
2. File Submittal Format: Submit or post coordination drawing in a format directed by Owner or Designer.

1.7 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of need for additional information or interpretation of Contract Documents, prepare and submit an RFI in the form specified.

1. Designer will return RFIs submitted to Designer 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 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 Designer
 6. 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 Contract Time or Contract Sum, state impact in 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 with substantially the same content as indicated above, acceptable to Designer.
1. Attachments shall be electronic files in Adobe Acrobat PDF format.
- D. Designer's Action: Designer will review each RFI, determine action required, and respond. Allow 5 business days for Designer's response for each RFI. RFIs received by Designer after 1:00 p.m. will be considered as received the following business 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 Contract Time or Contract Sum.
 - f. Requests for interpretation of Designer's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 2. Designer's action may include a request for additional information, in which case Designer's time for response will date from time of receipt of additional information.
 3. Designer's action on RFIs that may result in a change to Contract Time or 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 Contract Time or Contract Sum, notify Designer in writing within 5 business days of receipt of RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by RFI number. Submit log bi-weekly. A spreadsheet with the following information is acceptable:
1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Designer.
 4. RFI number including RFIs that were returned without action or withdrawn.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Designer's response was received.
- F. On receipt of Designer's action, update RFI log and immediately distribute RFI response to affected parties. Review response and notify Designer within seven calendar days if Contractor disagrees with response.
1. Identification of related Minor Change in Work, Construction Change Directive, and Proposal Request, as appropriate.
 2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.8 PROJECT MEETINGS

- A. General: Contractor will schedule, conduct, and document meetings and conferences at Project site unless otherwise indicated.
1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Designer of scheduled meeting dates and times.
 2. Agenda: Prepare meeting agenda. Distribute agenda to all invited attendees.
 3. Minutes: Contractor will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned within five business days of the meeting.
- B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Designer, but no later than 10 business days after execution of Agreement.
1. Conduct conference to review responsibilities and personnel assignments.
 2. Attendees: Authorized representatives of Owner, Designer, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at 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.
 - 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. Pre-installation Conferences: Conduct a pre-installation 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 Designer and Owner 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 Work and reconvene the conference at earliest feasible date.
- D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Designer, but no later than 30 calendar days prior to the scheduled date of Substantial Completion.
1. Conduct the conference to review requirements and responsibilities related to Project closeout.
 2. Attendees: Authorized representatives of Owner, Designer, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Preparation of record documents.
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Submittal of written warranties.
 - d. Requirements for preparing operations and maintenance data.
 - e. Requirements for delivery of material samples, attic stock, and spare parts.
 - f. Requirements for demonstration and training.
 - g. Preparation of Contractor's punch list.
 - h. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - i. Submittal procedures.
 - j. Coordination of separate contracts.
 - k. Owner's partial occupancy requirements.
 - l. Installation of Owner's furniture, fixtures, and equipment.
 - m. Responsibility for removing temporary facilities and controls.
 4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- E. Progress Meetings: Conduct progress meetings at a minimum of biweekly intervals or as directed by the Scope of Work.
1. Coordinate dates of meetings with preparation of payment requests.
 2. Attendees: In addition to representatives of Owner and Designer, 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 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 Contract Time.
 - 1) Review schedule for next period.
 - 2) Provide and review a 3-week look-ahead schedule.
 - b. Review present and future needs, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Resolution of BIM component conflicts.
 - 4) Status of submittals.
 - 5) Deliveries.
 - 6) Off-site fabrication.
 - 7) Access.
 - 8) Site utilization.
 - 9) Temporary facilities and controls.
 - 10) Progress cleaning.
 - 11) Quality and work standards.
 - 12) Status of correction of deficient items.
 - 13) Field observations.
 - 14) Status of RFIs.
 - 15) Status of proposal requests.
 - 16) Pending changes.
 - 17) Status of Change Orders.
 - 18) Pending claims and disputes.
 - 19) Documentation of information for payment requests.
 4. Minutes: Contractor to record and distribute the meeting minutes to each party present and to parties requiring information.
 - a. Schedule Updating: Revise construction schedule after each progress meeting where revisions to schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
- F. Coordination Meetings: Conduct Project coordination meetings as directed by Owner or as needed. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and pre-installation conferences.
1. Attendees: In addition to representatives of Owner and Designer, each contractor 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 meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Combined Contractor's Construction Schedule: Review progress since last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined 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 Contract Time.
 - b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting where revisions to schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
 - c. Review present and future needs of project, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Resolution of BIM component conflicts.
 - 4) Status of submittals.
 - 5) Deliveries.
 - 6) Off-site fabrication.
 - 7) Access.
 - 8) Site utilization.
 - 9) Temporary facilities and controls.
 - 10) Work hours.
 - 11) Hazards and risks.
 - 12) Progress cleaning.
 - 13) Quality and work standards.
 - 14) Change Orders.
 - 15) Regulatory Agencies.
 3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 32 00

CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Supplementary General 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.
 - 5. Material location reports.
 - 6. Site condition reports.
 - 7. Special reports.
- B. Related Requirements:
 - 1. Section 01 33 00 "Submittal Procedures" for submitting schedules and 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.
 - 1. Critical Activity: An activity on the critical path that must start and finish on 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. Cost Loading: Allocation of schedule of values for completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by Designer.
- C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and critical path of Project.
- D. Critical Path: Longest connected chain of interdependent activities through the network schedule that establishes minimum overall Project duration and contains no float.
- E. Event: Starting or ending point of an activity.

- F. Float: Measure of leeway in starting and completing an activity.
 - 1. Float time belongs to Owner.
 - 2. Free float is the amount of time an activity can be delayed without adversely affecting early start of the successor activity.
 - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting planned Project completion date.
- G. Resource Loading: Allocation of manpower and equipment necessary for 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. Startup construction schedule.
 - 1. Approval of cost-loaded, startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.
- C. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.
- D. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
 - 1. Submit 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.
- E. Construction Schedule Updating Reports: Submit with Applications for Payment.
- F. Daily Construction Reports: Submit at monthly intervals or as directed by Owner.
- G. Material Location Reports: Submit at monthly intervals or as directed by Owner.
- H. Site Condition Reports: Submit at time of discovery of differing conditions.
- I. Special Reports: Submit at time of unusual event.
- J. Qualification Data: For scheduling consultant.

1.5 QUALITY ASSURANCE

- A. Scheduling Consultant Qualifications: If required by Contract Documents, an experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Designer's request.
- B. Prescheduling 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 preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:

1. Review software limitations and content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Discuss constraints, including phasing, work stages, area separations, interim milestones, and partial Owner occupancy.
4. Review delivery dates for Owner-furnished products.
5. Review schedule for work of Owner's separate contracts.
6. Review submittal requirements and procedures.
7. Review time required for review of submittals and resubmittals.
8. Review requirements for tests and inspections by independent testing and inspecting agencies.
9. Review time required for Project closeout and Owner startup procedures, including commissioning activities if required.
10. Review and finalize list of construction activities to be included in schedule.
11. Review procedures for updating schedule.

1.6 COORDINATION

- A. Coordinate Contractor's construction schedule with schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.
 1. Secure time commitments for performing critical elements of 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 Notice to Proceed to date of Substantial 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. Activities: Treat each story or separate area as a separate numbered activity for each main element of Work. Comply with the following:
 1. Activity Duration: Define activities so no activity is longer than 10 working days, unless specifically allowed by Owner.
 2. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 calendar days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 3. Submittal Review Time: Include review and resubmittal times indicated in Section 01 33 00 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
 4. Startup and Testing Time: Include no fewer than 5 working days for startup and testing.

5. **Substantial Completion:** Indicate completion in advance of date established for Substantial Completion, and allow time for Designer's administrative procedures necessary for certification of Substantial Completion.
 6. **Punch List and Final Completion:** Include not more than 10 working days for completion of punch list items and final completion.
- C. **Constraints:** Include constraints and work restrictions indicated in Contract Documents and as follows in schedule and show how sequence of Work is affected.
1. **Phasing:** Arrange list of activities on schedule by phase.
 2. **Work under More Than One Contract:** Include a separate activity for each contract.
 3. **Work by Owner:** Include a separate activity for each portion of Work performed by Owner.
 4. **Products Ordered in Advance:** Include a separate activity for each product. Include delivery date indicated in Section 01 11 00 "Summary of Work." Delivery dates indicated stipulate earliest possible delivery date.
 5. **Owner-Furnished Products:** Include a separate activity for each product. Include delivery date indicated in Section 01 11 00 "Summary of Work." Delivery dates indicated stipulate earliest possible delivery date.
 6. **Work Restrictions:** Show effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Limitations of continued occupancies.
 - c. Uninterruptible services.
 - d. Partial occupancy before Substantial Completion.
 - e. Use of premises restrictions.
 - f. Provisions for future construction.
 - g. Seasonal variations.
 - h. Environmental control.
 7. **Work Stages:** Indicate important stages of construction for each major portion of Work, including, but not limited to, the following:
 - a. Subcontract awards.
 - b. Submittals.
 - c. Purchases.
 - d. Mockups.
 - e. Fabrication.
 - f. Sample testing.
 - g. Deliveries.
 - h. Installation.
 - i. Tests and inspections.
 - j. Adjusting.
 - k. Curing.
 - l. Building flush-out.
 - m. Startup and placement into final use and operation.
 8. **Construction Areas:** Identify each major area of construction for each major portion of 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.
9. Other Constraints as described in the Scope of Work and not included elsewhere.
- D. Milestones: Include milestones indicated in Contract Documents in schedule, including, but not limited to, Notice to Proceed, Substantial Completion, final completion and any interim milestones as described in Scope of Work and not included elsewhere.
- E. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of 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.
- F. 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.
- G. 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 schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.
- H. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
1. Use Microsoft Project compatible with Owner's operating system.

2.2 STARTUP CONSTRUCTION SCHEDULE

- A. Bar-Chart Schedule: Submit startup, horizontal, bar-chart-type construction schedule within 7 calendar days of date established for Notice to Proceed.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for remainder of Work and a cash requirement prediction based on indicated activities.

2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-

type, Contractor's construction schedule within 14 calendar days of date established for Notice to Proceed. Base schedule on startup construction schedule and additional information received since start of Project. Schedule shall indicate critical path of Project.

- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

2.4 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 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.

2.5 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 bi-weekly intervals, update schedule to reflect actual construction progress and activities. Issue schedule at each 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 Work progresses, indicate final completion percentage for each activity.

- B. **Distribution:** Distribute copies of approved schedule to Designer, 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 same parties and post in same locations. Delete parties from distribution when they have completed their assigned portion of Work and are no longer involved in performance of construction activities.

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Requirements:
 - 1. Section 01 29 00 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
 - 2. Section 01 32 00 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
 - 3. Section 01 77 00 "Closeout Procedures" for submitting record Drawings, record Specifications, and record Product Data.
 - 4. Section 01 78 23 "Operation and Maintenance Data" for submitting operation and maintenance manuals.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Designer's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Informational Submittals: Written and graphic information and physical samples that do not require Designer's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and serves as 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.
- D. 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 Designer and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, schedule of values, and Contractor's construction schedule.
2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 calendar days of construction. List those submittals required to maintain orderly progress of Work and those required early because of long lead-time for manufacture or fabrication.
3. Final Submittal: Submit concurrently with 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 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 Work covered.
 - f. Scheduled date for Designer's final release or approval.
 - g. Scheduled date of fabrication.
 - h. Scheduled dates for purchasing.
 - i. Scheduled dates for installation.
 - j. Activity or event number.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Designer's Digital Data Files: Electronic digital data files of the Contract Drawings may be provided by Designer for Contractor's use in preparing submittals.
 1. Designer will furnish Contractor one set of digital data drawing files of Contract Drawings for use in preparing Shop Drawings and Project record drawings at no cost to Contractor or Owner.
 - a. Designer makes no representations as to accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
 - b. Digital Drawing Software Program: Contract Drawings are available in AutoCAD.
 - c. Execute a data licensing agreement in form of Agreement acceptable to Owner and Designer.
- 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 same Specification Section as separate packages under separate transmittals.
 4. Coordinate transmittal of different types of submittals for related parts of Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Designer 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 Designer's receipt of submittal. No extension of Contract Time will be authorized because of failure to transmit submittals enough in advance of Work to permit processing, including resubmittals.
1. Initial Review: Allow 10 business days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Designer 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 10 business days for review of each resubmittal.
 4. Sequential Review: Where sequential review of submittals by Designer's consultants, Owner, or other parties is indicated, allow 15 business days for initial review of each submittal.
 5. Concurrent Consultant Review: Where Contract Documents indicate submittals may be transmitted simultaneously to Designer and to Designer's consultants, allow 10 business days for review of each submittal.
- D. Paper Submittals: Shall be provided only at request of Owner with exception of samples, color charts, and other items related to visible selection of materials. Refer to section 2.1D.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Designer.
 3. Include the following information for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name of Designer.
 - d. Name of Contractor.
 - e. Name of subcontractor.
 - f. Name of supplier.
 - g. Name of manufacturer.
 - h. Submittal number or other unique identifier, including revision identifier.
 - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 06100.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 06100.01.A).
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.

- k. Location(s) where product is to be installed, as appropriate.
 - l. Other necessary identification.
4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Designer observes noncompliance with provisions in Contract Documents, initial submittal may serve as final submittal.
 - a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Designer.
5. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Designer will return without review submittals received from sources other than Contractor.
 - a. Transmittal Form for Paper Submittals: Provide locations on form for the following information:
 - 1) Project name.
 - 2) Date.
 - 3) Destination (To:).
 - 4) Source (From:).
 - 5) Name and address of Designer.
 - 6) Name of Contractor.
 - 7) Name of firm or entity that prepared submittal.
 - 8) Names of subcontractor, manufacturer, and supplier.
 - 9) Category and type of submittal.
 - 10) Submittal purpose and description.
 - 11) Specification Section number and title.
 - 12) Specification paragraph number or drawing designation and generic name for each of multiple items.
 - 13) Drawing number and detail references, as appropriate.
 - 14) Indication of full or partial submittal.
 - 15) Transmittal number.
 - 16) Submittal and transmittal distribution record.
 - 17) Remarks.
 - 18) Signature of transmitter.
- E. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
 1. Assemble complete submittal package into 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., LNHS-06100.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g.,LNHS-06100.01.A).
 3. Provide means for insertion to permanently record Contractor's review and approval

markings and action taken by Designer.

4. Transmittal Form for Electronic Submittals: Use form acceptable to Owner, containing the following information:
 - a. Project name.
 - b. Date.
 - c. Name and address of Designer.
 - d. Name of Contractor.
 - e. Name of firm or entity that prepared submittal.
 - f. Names of subcontractor, manufacturer, and supplier.
 - g. Category and type of submittal.
 - h. Submittal purpose and description.
 - i. Specification Section number and title.
 - j. Specification paragraph number or drawing designation and generic name for each of multiple items.
 - k. Drawing number and detail references, as appropriate.
 - l. Location(s) where product is to be installed, as appropriate.
 - m. Related physical samples submitted directly.
 - n. Indication of full or partial submittal.
 - o. Transmittal number.
 - p. Submittal and transmittal distribution record.
 - q. Other necessary identification.
 - r. Remarks.

- F. Options: Identify options requiring selection by Designer.

- G. 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 Designer on previous submittals, and deviations from requirements in Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

- H. 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 Designer's action stamp.

- I. 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.

- J. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals marked with approval notation from Designer'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 or if directed by Designer through post electronic submittals as PDF electronic files directly to an FTP site as directed by Designer.
 - a. Designer will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
2. Action Submittals and Informational Submittals: Submit three paper copies of each submittal if requested by Designer.
3. 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 digital signature with digital certificate in form acceptable to Designer on electronically submitted certificates and certifications where indicated.
 - b. Provide a notarized statement on original paper copy certificates and certifications where indicated.
- B. Product Data: Collect information into 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 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 Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in 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, but no larger than 36 by 48 inches.
 3. Submit Shop Drawings in the following format:
 - a. PDF electronic file.
 - b. Three paper copies of each submittal if requested by Owner. Designer will retain two copies; remainder will be returned.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for 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 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 undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are property of Contractor.
 5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing 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. Designer 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 three sets of Samples. Designer will retain two 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 Sample, submit at least three sets of paired units that show approximate limits of variations.
- E. Coordination Drawing Submittals: Comply with requirements specified in Section **01310** "Project Management and Coordination."
- F. Contractor's Construction Schedule: Comply with requirements specified in Section **01320** "Construction Progress Documentation."
- G. Application for Payment and Schedule of Values: Comply with requirements specified in Section **01290** "Payment Procedures."
- H. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section **01400** "Quality Requirements."
- I. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section **01770** "Closeout Procedures."
- J. Maintenance Data: Comply with requirements specified in Section **01782** "Operation and Maintenance Data."
- K. 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 Designers and owners, and other information specified.
- L. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- M. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- N. Manufacturer Certificates: Submit written statements on manufacturer's letterhead

certifying that manufacturer complies with requirements in Contract Documents. Include evidence of manufacturing experience where required.

- O. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in Contract Documents.
- P. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in Contract Documents.
- Q. 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 Contract Documents.
- R. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by qualified testing agency, or on comprehensive tests performed by qualified testing agency.
- S. 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.
- T. Preconstruction Test Reports: Submit reports written by 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 Contract Documents.
- U. Compatibility Test Reports: Submit reports written by 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.
- V. 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 Contract Documents.
- W. 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 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 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 written request for additional information to Designer.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file, 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 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 Contract and for compliance with Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Designer.
- B. Project Closeout and Maintenance Material Submittals: See requirements in Section **01770** "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 Contract Documents.

3.2 DESIGNER'S ACTION

- A. Action Submittals: Designer will review each submittal, make marks to indicate corrections or revisions required, and return it. Designer will stamp each submittal with action stamp and will mark stamp appropriately to indicate action.
- B. Informational Submittals: Designer will review each submittal and will not return it, or will return it if it does not comply with requirements. Designer will forward each submittal to appropriate party.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Designer.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Submittals not required by Contract Documents may be returned by Designer without action.

END OF SECTION

SECTION 01 35 30 - SAFETY

PART 1 - GENERAL

1.1 SUMMARY

- A. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section Includes, without limitation, providing:
 - 1. Work place safety.
 - 2. Public safety.
 - 3. Compliance with OSHA and applicable safety provisions in force.
 - 4. Safety officers.
 - 5. Safety plan.
 - 6. Emergency response.
 - 7. Safety and accident reporting.
- C. Extent: The Contractor is solely responsible for providing for job site, work place and public safety and for complying with:
 - 1. Applicable codes, laws, rules, regulations, and requirements of authorities having jurisdiction including, without limitation, Building Codes and OSHA regulations.

1.2 REFERENCES

- A. Review safety provisions requirements. Confer with authorities having jurisdiction including:
 - 1. Building officials.
 - 2. Fire Department.
 - 3. Police Department.
- B. Without limitation, ensure compliance with:
 - 1. 29 CFR, Part 1910: Occupational Safety and Health Administration (OSHA) General Industry and Health Standards.
 - 2. 29 CFR, Part 1926: OSHA Construction Industry Standards.
 - 3. 40 CFR, Part 61: National Emission Standards for Hazardous Air Pollutants.
 - 4. 40 CFR, Part 261: Environmental Protection Agency (EPA) Characteristics of Hazardous Waste.
 - 5. 40 CFR, Part 761, EPA Polychlorinated Biphenyls (PCBs), Manufacturing, Processing, Distribution in Commerce and Use Prohibitions.
 - 6. 40 CFR, Part 763: EPA Asbestos.

1.3 SAFETY OFFICERS

- A. Designate a Primary Safety Officer and Deputy Safety Officer. Each Safety Officer shall:
 - 1. Be responsible for safety at the Project site.
 - 2. Have at least 5 years experience as a Safety Officer.
 - 3. Be formally trained:
 - a. With at least 10 hours of OSHA regulations training.
 - b. In first aid and CPR.
 - c. In Federal, State, and Local environmental rules and regulations.
 - 4. Be on site whenever any Contract activity is in progress.
 - 5. Have the authority to direct all workers and subcontractors to prevent unsafe conditions.
 - 6. Have the authority to penalize subcontractors and workers for safety violations.
 - 7. Be subject to approval of the Owner and Architect. Replace unacceptable persons.
- B. The Safety Officer may be the Project Superintendent or other employees.
- C. The Deputy Safety Officer may cover the Primary Safety Officer's reasonable absences.

1.4 SAFETY PLAN

- A. Documentation: At least 10 days prior to beginning any work on site, prepare and submit a written Safety Plan.
1. The Owner and Architect may review the safety plan and may make suggestions.
 2. The Owner's and Architect's option to review and suggest does not transfer any safety responsibility to the Owner or Architect. The Contractor remains solely responsible for safety.
- B. Enforcement: The General Contractor shall enforce the Safety Plan and require all on-site workers to comply with the Safety Plan.
- C. Plan Content: Address at least the following topics:
1. OSHA requirements including 29CFR1926 and applicable parts of 29CFR1910.
 2. Applicable State and local regulations.
 3. Safety Officer identification and responsibilities including daily inspections.
 4. Deputy Safety Officer identification and responsibilities including daily inspections.
 5. Safety Officer and Deputy Safety Officer shall meet the OSHA "Competent Person Standard".
 6. Emergency response procedures.
 7. Accident avoidance.
 8. Hazard communications including HazCom program and MSDS program.
 9. Work Hazard Analysis and Response created and followed for each work activity.
 10. Safety Plan orientation for all workers prior to their beginning work on site.
 11. Weekly safety meetings and training with attendance required and attendance log maintained.
 12. Accident Reports within 24 hours after each incident. See additional requirements below.
 13. Principal's Meeting within 72 hours after each Lost Time Accident.
 14. Action Plan for immediate dangers to health and safety.
 15. Worker discipline program including verbal warning, written warning, and dismissal.
 16. Subcontractor discipline program including warnings and penalties.
 17. Personal Protective Equipment standards including, without limitation:
 - a. Hard hats.
 - b. Safety glasses.
 - c. Foot wear.
 - d. Clothing including shirt sleeves and pants length.
 - e. Occupational noise protection.
 - f. Respirators.
 18. Controlled substances including illegal drugs and alcohol.
 19. Worker disputes and fighting.
 20. Possession of weapons on site.
 21. Daily scaffolding inspection and documentation.
 22. Fall protection including without limitation:
 - a. "Baker" stages and working platforms 48 inches or higher.
 - b. Steel erection with 100 percent individual worker restraint as primary protection.
 - c. Holes, pits, excavations, openings in decks, and similar hazards.
 23. "Hot work" permits, fire prevention, and fire watches.
 24. Independent third party inspection of cranes, hoists, lifts, and similar machines.
 25. Temporary electric power including ground fault circuit interrupter protection.
 26. Electric powered tools including double insulation requirements.
 27. Electric extension power cords including condition, grounding, and capacity requirements.
 28. Confined spaces special procedures including OSHA 1910.146.
 29. House keeping, general cleaning, and combustible waste storage and removal.
 30. Flammable material use, storage, and disposal requirements.
 31. Protection of public ways and management of danger to the public.
 32. Additional topics determined by the Contractor.

1.5 SPECIAL FIRE SAFETY & HOT WORK PRECAUTIONS

- A. Comply with section 01 73 60; if not included, as follows:

- B. Ensure operations involving use of open-flame, electrical arc equipment or flammable substances are not conducted until a permit for welding, cutting, and burning has been completed, signed and issued by authorities having jurisdiction.
- C. Prior to commencing operations, a positive determination shall be made that it is impractical to conduct the hot work in a shop area or outside of the building. Coordinate suitable locations for hot equipment operations agreeable to Owner's Representatives.
- D. Provide precautions recommended by the Fire Department and at least the following:
 - 1. Absences of flammable liquids or vapors in the vicinity of the work.
 - 2. Minimum radius of combustibles near the work, or provision of fire blankets or other suitable protectives and baffles.
 - 3. Inspection of hot work areas not less than 60 minutes after completion.
 - 4. Portable fire extinguishers or operational sprinkler system.
 - 5. Trained fire watch personnel.

1.6 EMERGENCY RESPONSE

- A. Plans: As part of the Safety Plan, prepare "Emergency Response Plans" which identify actions to be taken, persons responsible for each action, contact telephone numbers of all authorities having jurisdiction, governmental emergency telephone numbers, and other information. Prepare separate "Emergency Response Plans" for each of the following situations.
 - 1. Personal injury.
 - 2. Fire.
 - 3. Explosion.
 - 4. Chemical hazard.
 - 5. Environmental hazard.
 - 6. Electrical hazard.
 - 7. Wind storm.
- B. First Aid: Provide and maintain, well supplied, industrial quality, first aid kits.
- C. Emergency Assistance Access: Post emergency telephone numbers for medical, fire, and police in clearly visible locations. Provide readily available and accessible telephones and radios.
- D. Accident Reports: Prepare detailed, written reports for each incident including:
 - 1. A brief summary of the incident.
 - 2. A chronological list of the sequence of events.
 - 3. Names of all persons involved in the incident.
 - 4. List of injuries and damage with as much detail as possible.
 - 5. The actions and emergency response to the incident including names of persons taking action.
 - 6. Other important and relevant information.
 - 7. Comply with insurance carrier requirements and unless otherwise indicated submit accident reports to within time required, as specified herein or less.

1.7 FINES & PENALTIES

- A. Fines and penalties assessed by authorities having jurisdiction for safety violations are not a valid cost of the work and will not be paid or reimbursed by the Owner.
- B. Payment: Pay assessments promptly to prevent delay of work.

PART 2 - PRODUCTS Not used.

PART 3 - EXECUTION.

3.1 EMERGENCY SUSPENSION OF WORK

- A. When the Contractor becomes aware or is notified of non-compliance with safety or health provisions immediately, correct the unsafe or unhealthy condition.
 - 1. When, in the opinion of authorities having jurisdiction, satisfactory corrective action has been taken by the Contractor, work shall resume.
 - 2. No extension of time or compensation for damages in connection with a work stoppage for an unsafe or unhealthy condition will be permitted.

3.2 PROTECTION OF PERSONNEL

- A. Take all necessary precautions to prevent injury to the public, occupants, or damage to property of others. The public and occupants includes all persons not employed by the Contractor or a subcontractor.
- B. Wherever practical, the work area shall be fenced, barricaded or otherwise blocked off from the public or occupants to prevent unauthorized entry into the work area.
 - 1. Provide traffic barricades and traffic control signage where construction activities occur in vehicular areas.
 - 2. Corridors, aisles, stairways, doors and exitways shall not be obstructed or used in a manner to encroach upon routes of ingress or egress utilized by the public or occupants, or to present an unsafe or unhealthy condition to the public or occupants.
 - 3. Store, position and use equipment, tools, materials, scraps and trash in a manner that does not present a hazard to the public or occupants by accidental shiftings, ignition or other hazardous activity.
 - 4. Store and transport refuse and debris in a manner to prevent unsafe and unhealthy conditions for the public and occupants. Cover refuse containers, and remove refuse on a frequent regular basis acceptable to the Contracting Officer. Use tarpaulins or other means to prevent loose transported materials from dropping from trucks.

3.3 ENVIRONMENTAL PROTECTION

- A. Dispose of solid, liquid and gaseous contaminants in accordance with local codes, laws, ordinances and regulations.
- B. Comply with applicable federal, state and local noise control laws, ordinances and regulations, including but not limited to 29 CFR 1910.95 and 29 CFR 1926.52.

END OF SECTION

SECTION 01 45 50 – ENGINEERING BY CONTRACTOR

PART 1 - GENERAL

1.1 SUMMARY

- A. Related Documents: All Contract Documents, including Drawings, General and Supplementary Conditions and Division 1 General Requirements apply to this Section.
- B. Section includes, without limitation, administrative and procedural requirements for engineering services and:
 - 1. General requirements for engineering by the Contractor.
 - 2. Civil engineering services.
 - 3. Structural engineering services.
- C. Related work: Section 01 00 00 –Consolidated General Requirements..

1.2 REQUIREMENTS

- A. General: Certain sections require work of the Contract to be engineered by qualified professionals employed by the Contractor. The following requirements apply:
 - 1. Minimum intent: Meet the design intent, performance, appearance and minimums indicated in the Contract Documents. Even when engineering may provide for lesser values do not reduce specified or indicated minimums, such as metal gage, wind speeds and the like.
- B. Engineers' responsibilities shall include:
 - 1. Being solely professionally responsible for the work.
 - 2. Calculate, design, engineer, and document the work.
 - 3. Meet requirements of authorities having jurisdiction including applicable Codes.
 - 4. Meet requirements specified in Contract Documents including visual requirements.
 - 5. Meet applicable industry standards, unless higher are indicated herein.

1.3 SUBMITTALS

- A. Comply with Division 01 and:
 - 1. Prepare, professionally seal, sign and submit calculations, shop fabrication drawings, erections and installation drawings and other documents needed to show compliance with Contract requirements.
 - 2. Architect's [of Record] Review: Limited solely to review of visual appearance and design intent.
 - 3. Project Record Documents: Submit a record of Work performed required under provisions of Sections "Submittals" and "Project Closeout".

1.4 QUALITY ASSURANCE / SUBSTITUTIONS

- A. Engineer: Engage a Professional Engineer of the discipline required, registered in the state in which the Project is located, to perform required engineering services.
- B. Work engineered by the Contractor which deviates from Contract requirements shall comply requirements affecting Substitutions.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION & PERFORMANCE

- A. Comply with the following:
 - 1. Verify layout information shown on the Drawings, and existing benchmarks before proceeding to design, engineer or layout the Work.
 - 2. Coordinate with and comply with requirements of Division 01 where Field engineering is required.
 - 3. Engineer construction and assemblies required by or indicated in the Contract Documents.

END OF SECTION

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 Conditions and Supplementary General 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.
- B. Related Requirements:
 - 1. Refer to the Scope of Work for limitations on work restrictions and utility interruptions.

1.3 USE CHARGES

- A. General: Include installation and removal of and use charges for temporary facilities in 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. Water Service: Pay water-service use charges for water used by all entities for construction operations.
- C. Electric Power Service: Pay electric-power-service use charges for electricity used by all entities for construction operations.

1.4 INFORMATIONAL SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel for approval by Owner.
- B. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- C. 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, concrete work, 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.

- D. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:
 1. Locations of dust-control partitions at each phase of work.
 2. HVAC system isolation schematic drawing.
 3. Location of proposed air-filtration system discharge.
 4. Waste handling procedures.
 5. Other dust-control measures.

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.

- C. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.

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. Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch-OD corner and pull posts.

- B. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch-OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide concrete bases for supporting posts.

- C. Wood Enclosure Fence: Plywood, 6 feet high, framed with four 2-by-4-inch rails, with preservative-treated wood posts spaced not more than 8 feet apart.

- D. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.

- E. Dust-Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches.
- F. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

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: Provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 - 2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction and marked for intended location and application.
- C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate facilities 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.
 - 1. Locate facilities to limit site disturbance as specified in Section 01100 "Summary."
- 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.

1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction. If connection to Owner's existing water service facilities is approved, 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.
 1. Toilets: Use of Owner's existing toilet facilities will be not be permitted,

- E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

- F. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
 1. Prior to commencing work, isolate the HVAC system in area where work is to be performed according to coordination drawings.
 - a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
 - b. Maintain negative air pressure within work area using HEPA-equipped air filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
 2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust producing equipment. Isolate limited work within occupied areas using portable dust containment devices.
 3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter equipped vacuum equipment.

- G. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
 1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.

- H. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
 1. Install electric power service overhead unless otherwise indicated.
 2. Connect temporary service to Owner's existing power source, as directed by Owner.

- I. 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. Install lighting for Project identification sign, if required.
 - 3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
 - 1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
 - 2. Maintain support facilities until Designer schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Parking: Coordinate with Owner for any allowance for Construction Personnel parking and are not to park in any loading docks or adjacent to buildings where public parking is otherwise not permitted.
- C. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
 - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
 - 2. Remove snow and ice as required to minimize accumulations.
- D. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
 - 1. Identification Signs: Provide Project identification signs as indicated on Drawings.
 - 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.
- E. Waste Disposal Facilities: Comply with requirements specified in Section 01 57 10 "Construction Waste Management."
- F. 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 70 00 "Execution Requirements."
- G. 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.
- H. Existing Elevator Use: Use of Owner's existing elevators will not be permitted unless authorized by Owner
- I. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.
- J. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.
 1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.
- K. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities and Pedestrians: Provide pedestrian protection at walkways and building entrances that are occupied during construction. Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site, 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 to minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
 1. Comply with work restrictions specified in Section 01 11 00 "Summary of Work."
- C. 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.
- D. 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.
- E. 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: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.

2. Maintain security by limiting number of keys and restricting distribution to authorized personnel.
- F. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.
- G. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- H. Temporary Egress: Provide and/or maintain temporary egress from existing occupied facilities as indicated and as required by project phasing and/or authorities having jurisdiction.
- I. Covered Walkway: Erect protective, covered walkway for passage of individuals through or adjacent to Project site. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction.
 1. Construct covered walkways using scaffold or shoring framing.
 2. Provide overhead decking, protective enclosure walls, handrails, barricades, warning signs, exit signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage.
 3. Paint and maintain appearance of walkway for duration of the Work.
- 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.
 1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.
- K. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.
 1. Protect air-handling equipment.
 2. Provide walk-off mats at each entrance through temporary partition.
- L. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Manage fire-prevention program; comply with NFPA 241 and authorities having jurisdiction.
 1. Prohibit smoking in construction areas.
 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.
 4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be

removed. Match hose size with outlet size and equip with suitable nozzles.

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.
- C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
 - 1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
 - 2. Keep interior spaces reasonably clean and protected from water damage.
 - 3. Periodically collect and remove waste containing cellulose or other organic matter.
 - 4. Discard or replace water-damaged material.
 - 5. Do not install material that is wet.
 - 6. Discard, replace, or clean stored or installed material that begins to grow mold.
 - 7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

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. 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. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape

development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt, and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.

3. 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

SECTION 01 53 50 - OCCUPIED FACILITIES REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
- B. Section includes complying with :
 - 1. Requirements for occupied facilities.
- C. Related Requirements:
 - 1. Section 01 00 00 – Consolidated general requirements.

1.2 INFORMATIONAL SUBMITTALS

- A. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation.
 - 1. Locations of dust-control partitions at each phase of work.
 - 2. Waste handling procedures.
 - 3. Other dust-control measures.

1.3 QUALITY ASSURANCE

- A. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.4 PROJECT CONDITIONS

- A. Maintain occupancy during construction.
- B. Basic requirements:
 - 1. Confine work, storage, traffic, and personnel to areas preapproved by the Owner.
 - 2. Do not:
 - a. Disturb building occupants.
 - b. Disrupt normal operations of building occupants.
 - c. Create any nuisance condition.
 - d. Damage property outside work areas.
- C. Occupant interactions, communications and conflicts:
 - 1. Conflicts: Avoid conflicts. In cases of conflict, yield to building occupants' normal operations.
 - 2. Except for emergencies: Do not communicate directly with building occupants.
 - a. Building occupants will be directed to communicate only through the Owner's Representative.
 - b. Building occupants will be directed to not communicate directly with the Contractor.
 - c. Notify Owner's Representative of all communications received directly from building occupants.
 - 3. During emergencies, communicate directly with building occupants to prevent injury and damage.
- D. Special Accommodation: Do not disturb occupants, nor disrupt normal operations and without cost to the Owner, restrict work hours or implement additional measures required.
- E. Contract Activities Adjacent To Occupied Areas:
 - 1. Confine Contract activities within the approved work limits.
 - 2. Provide "Temporary Interior Partitions" to separate Contract areas from occupied areas.
 - 3. Provide "Temporary Exterior Assemblies" to separate occupied areas from the exterior.
- F. Dust and Odor Control:
 - 1. Occupied Areas: Maintain positive air pressure with high quality, conditioned, fresh outdoor air.
 - 2. Contractor Areas: Maintain negative air pressure. Exhaust to the exterior.

- a. Filtration: Do not exhaust particulates greater than two times the limit specified in Section 01 51 50 Construction Indoor Air Quality. Filter exhaust air to achieve this requirement.
 3. Cross Contamination: Do not allow Contractor area exhaust air to enter occupied areas.
 4. Owner Approval Required: Do not use any interior or exterior materials including cleaners which produce odors until the material has been submitted to the Owner for approval. Special accommodation work hour restrictions may be required.
- G. Egress: Maintain legal, Code complying egress from occupied areas at all times.
- H. Intentional Utility Service Interruptions: Maintenance of building occupancy requires maintenance of all utility services to occupied areas including, without limitation, electric power, water, sewer, utility fuels, and all communications systems. When service interruption to occupied areas is unavoidable:
1. Work Plan: Provide at least five days written advance work plan of service interruption.
 2. Dates, Times: Define the dates and times of proposed service interruptions.
 3. Low Occupancy: Schedule service interruptions during days and times of lowest occupancy.
 4. Costs: Include all costs, "premium time", and "over time" in the Contract Amount. No additional payments will be made for scheduling service interruptions and work during periods of lowest occupancy.
 5. Approval: Obtain written approval from Owner prior to interrupting services.
- I. Unintentional Utility Service Interruptions:
1. Switches, Breakers: Never turn off switches or breakers without first confirming the result.
 2. Valves: Never close valves without first confirming the result.
 3. Concealed Utilities, Accidental Breakage: Thoroughly investigate existing conditions and check for concealed utilities prior to cutting, drilling, demolition, and other activities which could damage utilities. Check concealed conditions with metal detectors, density change detectors, and other instruments.
 4. Contract Document Limitations: All existing utilities are not shown. Existing utilities which are shown are only shown in approximate locations.
 5. Accidental Damage and Service Interruptions: Notify the Owner and Architect immediately.
 6. Take effective action to minimize damage and disruption to occupied areas. Provide equivalent temporary utilities. Restore permanent utilities as quickly as possible.
 7. Costs: All costs including, without limitation, investigation of existing conditions, temporary utilities, repairs, "premium time", and "over time" shall be paid by the Contractor. No additional payments will be made related to unintentional service interruptions.
- J. Owner's Equipment: Do not use any Owner's equipment including ladders with or without permission of the Owner's personnel. Indemnify and hold the Owner harmless from all losses related to use of Owner's equipment.
- K. Special Restrictions on Vibration: Occupied areas include vibration sensitive equipment.
1. Cooperate with the Owner's vibration monitoring program, if any.
 2. Comply with vibration limits specified by Owner. Ambient is background vibration without Contract activity.
 3. Use means, methods, and techniques to minimize vibrations.
 4. Schedule Contract activities which produce objectionable vibrations at times directed by Owner.
 5. Provide Special Accommodation, specified in this section, to accommodate vibration limitations.
- L. Worker Conduct and Appearance "Work Rules": Professional appearance and conduct is required.
- M. Worker Badges and Identification: Require worker and visitor identification in form acceptable to Owner.

PART 2 - PRODUCTS

2.1 MATERIALS - GENERAL

- A. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil (0.25-mm) minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.
- B. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 FLOOR DUST & DEBRIS CONTROL

- A. Tacky Mats:
1. Provide and maintain tacky mats on floors at every door and passage between Contract work areas and non work areas including stair doors.
 2. Product: Equal to "Trim Tack Adhesive Mat", Markel Industries, Inc., www.markelind.com.
 3. Width: Full width of door way or passage way.
 4. Length: At least 45 inches from demarcation line between Contract and non Contract areas.
 5. Maintenance: Remove layers and provide fresh tacky surface at least every day and more frequently as needed to control particulates, dust, and soil.
- B. Walk-off Mats
1. Provide and maintain mats on floors to reduce soiling of tacky mats.
 2. Product: "Heavy Duty Astro Turf Mat", North American Mat Company, www.northamericanmat.com.
 3. Location: On the Contract work area side of every tacky mat.
 4. Width: Full width of door way or passage way.
 5. Length: At least five feet from tacky mat extending into Contract work area.
- C. Maintenance: Vacuum turf mat at least weekly and more frequently as needed to control dirt.
- D. Signs: Provide signs facing the work area: "Wipe your feet before leaving work area".

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Comply with applicable Division 01, related applicable sections and the following:
- B. Locate facilities 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.

3.2 TEMPORARY UTILITIES INSTALLATION

- A. General: Maintain existing or install new temporary service or connect to existing service to maintain services required by occupants..
- B. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
- C. Ventilation and Humidity Control: Provide temporary ventilation required for occupants.
1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.

3.3 SUPPORT FACILITIES INSTALLATION

- A. Traffic Controls: Comply with requirements of authorities having jurisdiction.
1. Protect existing site improvements to remain including curbs, pavement, and utilities.
- B. Egress – General:
1. Maintain access for fire-fighting equipment and access to fire hydrants.
 2. Egress includes access to egress and egress discharge.
 3. Provide Code complying EXIT signs.
 4. Provide Code complying lighting.
 5. When egress is required through "Temporary Interior Partitions", provide:
 - a. Provide self-closing, 45 minute fire rated door assemblies.

- b. Provide panic exit devices.
 - C. Temporary Stairs: Until permanent stairs are available, provide temporary stairs for occupants. Stairs shall comply with applicable egress codes and requirements. Do not use ladders for occupants.
 - D. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner.
 - 1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.
 - E. Do not permit scaffolding, stages, and incidental support facilities from impeding use or unreasonably degrading appearance of occupied facilities.
- 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.
- 3.5 OPERATION, TERMINATION, AND REMOVAL
- A. Comply with applicable requirements of Division 01.

END OF SECTION

SECTION 01 57 10 - CONSTRUCTION WASTE MANAGEMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section includes, without limitation, providing:
 - 1. Implementation of waste management controls and systems for the duration of the Work.

1.2 INTENT

- A. To minimize waste and maximize recycling in accordance with current Best Practices.
- B. The Owner and Architect have established that this Project shall generate the least amount of waste practical and that processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors shall be employed.
- C. Of the waste that is generated, as many of the waste materials as economically feasible shall be reused, salvaged, or recycled. Waste disposal in landfills shall be minimized to the greatest extent practical.
- D. With regard to these goals the Contractor shall develop, for the Architect's review, a Waste Management Plan for this Project.
- E. Each Subcontractor shall be responsible for segregating his own waste into different dumpsters as directed by the Contractor.
- F. Where Owner, Tenant or Building Management maintains standards for demolition and materials waste handling, comply with same. Refer to Owner for applicable documents.
- G. Contractor shall be responsible for ensuring that debris will be disposed of at appropriately designated licensed solid waste disposal facilities, local and state codes.

1.3 SUBMITTALS

- A. Provide a complete set of submittals including the following:
 - 1. Waste Management Plan.
 - 2. Landfill options.
 - 3. Alternatives to Landfill.
 - 4. Planned meetings.
 - 5. Materials handling procedures.
 - 6. Materials transportation procedures.
 - 7. Progress and final reports.
- B. Waste Management Plan: Within 21 calendar days after receipt of Notice to Proceed, the Contractor shall provide a plan containing the following:
 - 1. Analysis of the proposed job site waste to be generated, including types and rough quantities.
 - 2. Landfill Options: The name of the landfills where trash and building debris will be disposed of, the applicable landfill tipping fees, and the projected cost of disposing of all Project waste in the landfills.
 - 3. Landfill Certification: Contractor's statement of verification that landfills proposed for use are licensed for types of waste to be deposited and have sufficient capacity to receive waste from this project.
 - 4. Alternatives to Land filling: A list of each material proposed to be salvaged or recycled during the course of the Project. Include the following and any additional items proposed:
 - a. Cardboard.
 - b. Clean dimensional wood.
 - c. Beverage containers.
 - d. Land clearing debris.

- e. Concrete.
 - f. Bricks and masonry.
 - g. Asphalt.
 - h. Metals from framing, banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized sheet steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
 - i. Mechanical and electrical equipment.
 - j. Building components which can be removed relatively intact from existing construction.
 - k. Packaging materials.
- 5. Meetings: A description of the regular meetings to be held to address waste management.
 - 6. Materials Handling Procedures: A description of the means by which any waste materials identified above will be protected from contamination, and a description of the means to be employed in recycling the above materials consistent with requirements for acceptance by designated facilities.
 - 7. Transportation: A description of the means of transportation of the recyclable materials (whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site) and destination of materials.
- B. Waste Management Progress Report: Concurrent with each Application for Payment, submit a written Waste Management Progress Report in the same format as required for Final Report.
 - C. Waste Management Final Report: Prior to Substantial Completion, submit a written Waste Management Final Report summarizing the types and quantities of materials recycled and disposed of under the Waste Management Plan. Include the name and location of disposal facilities.

1.4 CONTRACTOR

- A. Contractor may subcontract work of this Section to a sub-contractor specializing in recycling and salvaging of construction waste.

PART 2 PRODUCTS Not Used.

PART 3 EXECUTION

3.1 RECYCLING

- A. Metal, including but not limited to aluminum stairs, structural beams and sections, and reinforcing steel shall be recycled.
- B. Wood that is not painted and does not contain preservatives (i.e. creosote, arsenic, and chromium-containing preservatives) shall be segregated and recycled.

3.2 WASTE MANAGEMENT PLAN IMPLEMENTATION

- A. Manager: The Contractor shall designate an on-site person responsible for instructing workers and overseeing and documenting results of the Waste Management Plan for the Project.
- B. Distribution: The Contractor shall distribute copies of the Waste Management Plan to the Job Site Foreman, each Subcontractor, the Owner and the Architect.
- C. Instruction: The Contractor shall provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the Project.

- D. Separation Facilities: The Contractor shall lay out and label a specific area to facilitate separation of materials for recycling, salvage, reuse, and return. Recycling and waste bin areas are to be kept neat and clean and clearly marked in order to avoid contamination of materials. Location shall be acceptable to the Architect.
- E. Hazardous Wastes: Any unforeseen hazardous wastes shall be separated, stored, and disposed of according to local regulations and as directed by the Owner.

END OF SECTION

SECTION 01 70 00

EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Supplementary General 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. Installation of the Work.
 - 2. Cutting and patching.
 - 3. Coordination of Owner-installed products.
 - 4. Progress cleaning.
 - 5. Starting and adjusting (see Section 23 00 00 HVAC).
 - 6. Protection of installed construction.
 - 7. Correction of the Work.
- B. Related Requirements:
 - 1. Section 01 10 00 "Summary" for limits on use of Project site.
 - 2. Section 01 33 00 "Submittal Procedures" for submitting surveys.
 - 3. Section 01 77 00 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

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 business days prior to 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.
- C. Certified Surveys: Submit 3 paper copies and one electronic copy signed and sealed by land surveyor.
- D. Final Property Survey: Submit 3 paper copies and one electronic copy signed and sealed by land surveyor showing the Work performed and record survey data.

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 Designer of locations and details of cutting and await directions from Designer 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. Operational elements include the following:
 - a. Primary operational systems and equipment.
 - b. Fire separation assemblies.
 - c. Air or smoke barriers.
 - d. Fire-suppression systems.
 - e. Mechanical systems piping and ducts.
 - f. Control systems.
 - g. Communication systems.
 - h. Fire-detection and -alarm systems.
 - i. Conveying systems.
 - j. Electrical wiring systems.
 - k. Operating systems of special construction.
 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. Other construction elements include but are not limited to the following:
 - a. Water, moisture, or vapor barriers.
 - b. Membranes and flashings.

- c. Exterior curtain-wall construction.
 - d. Sprayed fire-resistive material.
 - e. Equipment supports.
 - f. Piping, ductwork, vessels, and equipment.
 - g. 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 Designer's opinion, reduce 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 fullest extent possible.
1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Designer for 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 existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
1. Before construction, verify 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 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 written report listing conditions detrimental to performance of Work is required by other Sections, include the following:
1. Description of 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 Owner 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 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 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 need for clarification of Contract Documents caused by differing field conditions outside control of Contractor, submit a request for information to Designer according to requirements in Section 01 31 00 "Project Management and Coordination."
- E. Surface and Substrate Preparation: Comply with manufacturer's written recommendations for preparation of substrates to receive subsequent work.

3.3 INSTALLATION

- A. General: Locate Work and components of 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 96 inches in occupied spaces and 90 inches in unoccupied spaces.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at time and under conditions that will ensure best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of 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 parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm 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 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 Designer.
 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 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.

3.4 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 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 11 00 "Summary of Work."
- 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 new space. Provide 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 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 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.

3.5 OWNER-INSTALLED PRODUCTS

- A. Site Access: Provide access to Project site for Owner's construction personnel.
- B. Coordination: Coordinate construction and operations of Work with work performed by Owner's construction personnel.
 1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
 2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of Work depend on Owner's construction.

3.6 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 calendar days during normal weather or three calendar days if temperature is expected to rise above 80 degrees F.
 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.
 4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to level of cleanliness necessary for proper execution of Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of Work, broom-clean or vacuum 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 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 57 10 "Construction Waste Management."
- 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 remainder of construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure no part of construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during construction period.

3.7 STARTING AND ADJUSTING

- A. Coordinate startup and adjusting of equipment and operating components with requirements in Section 23 00 00 HVAC requirements."

3.8 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

DOCUMENT 01 70 53 – TAX EXEMPTION USAGE REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Document Includes, without limitation, requirements for usage of:
 - 1. Owner's tax exemption.
- C. Tax exemption: The Owner is exempt for the payment of sales taxes on materials and products permanently incorporated into the work.
- D. Extent of Contractor responsibilities for tax exemption usage, without limitation, includes:
 - 1. Notices & verification:
 - a. Obtain from Owner their tax exempt documentation and obtain.
 - b. Complete forms required by the state Department of Revenue.
 - c. Comply with state filing and regulatory requirements.
 - 2. Records: Providing Owner with one copy of each purchase order, invoice, and receipt which used the Owner's tax exemption certificate number.
 - 3. Certification: Upon Contract completion, provide a notarized certification to the Owner stating that all purchases made under the Owner's tax exemption certificate number were legitimate, for this Contract, and entitled to the exemption.
- E. Penalties: Pay all penalties assessed by authorities having jurisdiction for the Contractor's improper or illegal use of the Owner's tax exemption certificate number.

END OF DOCUMENT

SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Supplementary General Conditions and 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.
- B. Related Requirements:
 - 1. Section 01 70 00 "Execution Requirements" for progress cleaning of Project site.
 - 2. Section 01 78 23 "Operation and Maintenance Data" for operation and maintenance manual requirements.

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 value of each listed item and reasons why Work is incomplete.

- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 working 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.
 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 Owner. 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 Owner'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 working 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. Coordinate final changeover of permanent locks with Owner's Locksmith. 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.
 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 written request for inspection to determine Substantial Completion a minimum of 10 working days prior to date Work will be completed and ready for final inspection and tests. On receipt of request, Designer will either proceed with inspection or notify Contractor of unfulfilled requirements. Designer will prepare Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Designer, that must be completed or

corrected before certificate will be issued.

1. Reinspection: Request reinspection when 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 Designer's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Designer. Certified copy of 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 written request for final inspection to determine acceptance a minimum of 10 working days prior to date Work will be completed and ready for final inspection and tests. On receipt of request, Designer will either proceed with inspection or notify Contractor of unfulfilled requirements. Designer will prepare 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 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 starting with exterior areas first and proceeding from lowest floor to highest floor.
 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 top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Designer.
 - d. Name of Contractor.
 - e. Page number.
 4. Submit list of incomplete items in the following format:
 - a. MS Excel electronic file. Designer will return annotated file.

1.9 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Designer for designated portions of 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 working days of completion of designated portions of 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 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 paper.
 - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify product or installation. Provide typed description of product or installation, including name of product and name, address, and telephone number of Installer.
 - 3. Identify each binder on front and spine with 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 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 surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
 - 1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with California Code of Regulations maximum allowable VOC levels.

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. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. 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.
 - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Sweep concrete floors broom clean in unoccupied spaces.
 - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
 - j. 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.
 - k. Remove labels that are not permanent.
 - l. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - o. 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.
 - p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
 - q. 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 57 10 "Construction Waste Management."

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

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 Conditions and Supplementary General 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. Operation manuals for systems and equipment.
 - 3. Product maintenance manuals.
 - 4. Systems and equipment maintenance manuals.
- B. Related Requirements:
 - 1. Section 01 33 00 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.

1.3 CLOSEOUT SUBMITTALS

- A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Owner 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 Designer.
 - 2. Three paper copies. Include complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Designer will return one copy.
- C. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least [10] business days before commencing demonstration and training. Designer will return copy with comments.
 - 1. Correct or revise each manual to comply with Designer's comments. Submit copies of each corrected manual within [10] business days of receipt of Designer'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 products and equipment.
- B. 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.
- C. Identification: In documentation directory and in each operation and maintenance manual, identify each system, and piece of equipment with same designation used in 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 Designer.
 - 8. Names and contact information for major consultants to Designer that designed systems contained in the manuals.
 - 9. 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 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 single binder.
- E. **Manuals, Electronic Files:** Submit manuals in form of 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 system, subsystem, and equipment names in readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- F. **Manuals, Paper Copy:** Submit manuals in form of hard copy, bound and labeled volumes.
1. **Binders:** Heavy-duty, three-ring, vinyl-covered binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch 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 manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in 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 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 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 sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.4 PRODUCT MAINTENANCE MANUALS

- A. Content: Organize manual into 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.

2.5 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. Product Maintenance Manual: Assemble complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- C. Operation and Maintenance Manuals: Assemble 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.

- D. **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 tabular format, identify each item using appropriate references from 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.

- E. **Drawings:** Prepare drawings supplementing manufacturers' printed data to illustrate 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.

- F. Comply with Section 01 77 00 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION

SECTION 01 89 20 – RENOVATION REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section Includes, without limitation, providing:
 - 1. Compliance with renovation requirements.
- C. Extent of renovation work: Renovate, reconstruct, rebuild, and repairing existing construction and surfaces to eliminate damaged and deteriorated materials and construction, H and as follows:
 - 1. At each interface between new and existing work.
 - 2. Where damage or holes are caused by installation of new work.
 - 3. At each location of demolition and removal of existing work.
 - 4. Wherever the Contract Documents indicate work on existing surfaces.

1.2 QUALITY ASSURANCE

- A. Comply with Division 01 requirements and governing codes and regulations.
- B. Preconstruction Photographs for Renovation Work:
 - 1. Prior to beginning work at the site, provide a complete and detailed record of existing conditions with emphasis on existing items and surfaces indicated to remain and existing damage and deterioration.
 - 2. Basic Photography Requirements: Comply with applicable requirements of Division 01.
 - 3. Identify each photo by room number or similar exterior description.
- C. Project/environmental conditions: Protect work according to best practices and as specified below:
 - 1. Because the Project Cost is based on existing conditions, the Contractor shall maintain existing conditions.
 - 2. If the scope or cost of renovation work increases because of worsening conditions or degradation of conditions, the Contractor shall be solely responsible for the increased scope and costs since the Contractor had responsibility to maintain the existing condition and to prevent the degradation and worsening condition.
 - 3. At no increase cost to the Owner, expand and extend the renovation work to correct degraded and worsened existing conditions. Eliminate all loose, deteriorated, and damaged conditions, finishes, surfaces, and substrates, which are not maintained to the condition existing at the beginning of the contract.
- D. Study Existing Field Conditions: Thoroughly study, examine, and investigate existing field conditions including, without limitation, conditions in all crawl spaces, plenums, attics, accessible chases, and above accessible ceilings
 - 1. Compare the Contract Documents with existing field conditions prior to beginning any work on site. Fully understand the full extent of the renovation work.
 - 2. Field Measurements: Measure existing conditions and coordinate new work with existing conditions. Review details of construction with the Architect prior to beginning work.

1.3 GENERAL RENOVATION REQUIREMENTS

- A. Contract drawing limitations: The Contract Documents do not show
 - 1. Every existing conditions.
 - 2. Nor all new work to existing condition interfaces.
 - 3. Nor complete and precise extent of patching, repair and renovation required.
 - 4. The above are not indicated everywhere since the Contractor has control over means methods, and techniques of selective demolition and integrating new and existing construction.
- B. Cutting requirements: Comply with applicable requirements of Division 01 including documents relating to cutting and patching, selective demolition and remedial work.
- C. Existing to Remain” and “Existing to be Relocated” Requirements: Throughout the Contract, effectively protect and maintain existing conditions, finishes, surfaces, and substrates indicated to remain “as is”, indicated to remain “with specific cleaning”, or indicated to remain “ with new finishes”.

PART 2 - PRODUCTS

2.1 RE-USED & REPLACED MATERIALS

- A. Existing re-used or new replaced materials and surfaces shall meet the following criteria:
1. Sound solid materials, free of cracks, chips or other damage.
 2. Functional for intended use.
 3. Free of stains or abrasions or other degraded materials.
 4. Consistent shape and size matching typical adjacent components.

PART 3 - EXECUTION

3.1 RENOVATION

- A. Pipes, Chases, and Enclosures for Renovation Work: Not all chases and enclosures required in renovated areas are shown on Drawings.
1. Provide metal framed, gypsum drywall chases and enclosures to enclose and completely conceal all new piping, ducts, cables and conduits located in renovated finished spaces other than dedicated mechanical rooms, electrical rooms or Tele/Data rooms.
 2. Provide fire-rated chases and enclosures to meet Building Code requirements.
- B. Holes in Floors, Walls, Roof, and Existing Construction: Patch, repair, rebuild, and rework to eliminate all holes including, without limitation, holes resulting from removal of partitions, pipes, ducts, conduits, equipment, and other work. Make patches and repairs match the material, quality, fire rating, and load capacity of the adjacent existing condition. Frame, reinforce, and support patches and repairs so they cannot fall out or fall through the opening.
- C. Transition of New to Existing Work:
1. Unless specifically indicated or specified otherwise, provide a smooth, continuous, monolithic and uniform appearance with no visible evidence of patching, rebuilding, or repair and no visually discernible difference between new work and existing work.
 2. Control Joints: Where this requirement is not possible, and after obtaining Architect's prior written approval, provide a controlled, defined straight line break and a control joint between new work and existing work.
 3. Painting and Finishing: Unless specifically indicated or specified otherwise, uniformly extend painting and finishing of rebuilt and repaired work over adjacent existing unprepared surfaces to the nearest significant change of plane.
 4. Create and Maintain Planes: Where the removal of existing construction (example: existing partition removal) creates new spaces and new planes, rework and rebuild adjacent planar surfaces (examples: walls, ceilings, and floors) to create new smooth planes free from holes, valleys, depressions, bumps, offsets, breaks, and other defects. Conceal and eliminate all visible evidence of construction removed.

3.2 CLEANING

- A. Immediately before Owner occupancy:
1. Thoroughly and completely strip, scrub and clean all vinyl floor tile and vinyl base, cabinetry and equipment, window treatments, and interior sidelights, glass and exterior window glazing and all other interior finishes in the work area.
 2. Remove all dirt, soil, stains and marks from all surfaces whether existing, new, re-built or replaced.

END OF SECTION

SECTION 02 22 00 – EXISTING CONDITIONS ASSESSMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section Includes, without limitation, providing:
 - 1. Assessing existing conditions.
 - 2. Reviewing available existing conditions documentation.
- C. Existing conditions information:
 - 1. Was collected by Owner and Architect for use in designing the project.
 - 2. Is not part of Contract Documents.
 - 3. Is not guaranteed by Owner nor Architect as complete or accurate.
 - 4. Made available to Contractor solely as a courtesy.
 - 5. Used by the Contractor at their sole risk, liability and judgment.
- D. Additional Existing Conditions Information Obtained By Contractor: The Contractor may obtain additional existing condition information and may perform selective exploratory demolition by making a specific written request to the Owner and obtaining his pre-approval.
- E. Concealed and Unknown Conditions: Comply with the Conditions of the Contract for Construction. The following conditions are not “concealed” or “unknown” for the purposes of claims:
 - 1. Conditions above lay-in ceilings.
 - 2. Conditions shown on existing building drawings or record drawings.
- F. Existing Building Drawings: Where existing buildings are part of the project, existing building drawings may be available for Contractor’s review. Refer to Architect.

1.2 SUBMITTALS

- A. Comply with Division 01 General Requirements and submit for approval:
 - 1. Existing conditions drawings: Show location and elevation of each measurement required or indicated below.
 - a. Field Measurements: Take accurate field measurements and indicate same on drawings.

PART 2 - PRODUCTS

2.1 NEW MATERIALS USED IN CONNECTION WITH ASSESSEMENT

- A. Match existing, as applicable.

PART 3 - EXECUTION

3.1 GENERAL

- A. Comply with the provisions of Section 01 70 00 - especially requirements related to:
 - 1. Inspection and examination. Tolerances and measurement.
 - 2. Approvals, inspections and filed quality control.
 - 3. Layout. Adjusting.
 - 4. Cleaning. Protection.
- B. Install materials and systems in accordance with manufacturer’s instructions, limitations and restrictions and approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections.

END OF SECTION

SECTION 02 41 10 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

- A. Related Documents: All Contract Documents, including Drawings, General and Supplementary Conditions and Division 1 General Requirements apply to this Section.
- B. Section includes, without limitation, providing:
 - 1. Protection of work to remain
 - 2. Pollution and dust control
 - 3. Removing work indicated not to remain.
 - 4. Structural elements
 - 5. Temporary supports
 - 6. Doors, windows frames and the like
 - 7. Electrical, plumbing and heating components
 - 8. Coordination with related work and separate Owner contracts
- C. Extent includes, without limitation:
 - 1. Provide demolition work necessary for execution and completion of the Work whether shown on the drawings or not.

1.2 QUALITY ASSURANCE:

- A. Legal Requirements: Work under this section shall be done in full conformance with all governing local, state and federal laws, codes and regulations, including, but not limited to:
 - 1. Occupational Safety and Health Standards (29 CFR 1910).
 - 2. Department of Public Health regulations.
 - 3. State and local Waste Specific Restrictions.
- B. Permits: Obtain all agency and utility company permits required for the work of this section.
- C. Interface between work to remove and work to remain: Perform all removals of existing construction neatly, to sharp cut-off points or lines as shown, unless otherwise indicated.
- D. Qualifications: Personnel employed by the contractor to survey or verify the condition of structures shall be competent to determine both the condition of the framing, floors, and walls and the possibility of unplanned collapse of any portion of the structure and shall have the authority to take prompt corrective action when necessary

1.3 SUBMITTALS

- A. Demolition Plan and Schedule: Submit an itemized plan and schedule of demolition for review prior to the start of work.
- B. Project Record Documents: Provide written graphic description of unanticipated structural, electrical, or mechanical conditions.
- C. List of items to be salvaged: For approval and coordination.

1.4 INTENT

- A. A major intent of the work of this section is to demolish, remove from the site and legally dispose of items to be completely or selectively demolished as required to complete the work shown on the drawings.
- B. Upon completion of work, remove tools, materials and equipment and dispose of scrap. Leave interior areas broom clean. Leave exterior areas free of debris. Remove all nails, hangers, system components, and other items down to bare substrates unless otherwise indicated.
- C. Comply with requirements of applicable Federal, State, and local safety and health regulations, regarding demolition of structures including ANSI/NFPA 241 – Building Construction and Demolition Operations.

- D. The Owner intends to investigate the facility after major demolition work is complete to survey and document conditions to ensure design intent and layout requirements are met. Include time in job schedules for this activity.

1.5 JOB CONDITIONS

- A. Existing Conditions: The owner assumes no responsibility for actual condition of structures or portions of structures to be demolished.
- B. Explosives: Use of explosives will not be necessary nor permitted.
- C. Traffic: Do not close or obstruct streets, ways or occupied facilities without written permission from owners and governmental authorities, as appropriate. Perform demolition operations and removal of debris so as to minimize conflict with normal use of such off-site streets, ways and facilities.
- D. Disposal of Debris: Make arrangements necessary for legal and proper execution of the work.
- E. Public protection: Take protective measures as required to prevent spread of dirt and debris, damage to adjacent properties, and injury to occupants and passers-by. To this end control noise, vibration, and spread of dust; keep all life-safety hazards enclosed, and take measures as required to prevent and suppress fire. Make provisions for medical first-aid as required.
- F. Barriers: Within the area of the work, provide safety barriers, rails and closures as required at all hazardous areas including floor and roof edges and openings. Take all measures as required by O.S.H.A. and by other Government Authorities and as prudent to protect workers against, hazards to health and safety. Do not allow dust or odors to migrate into adjacent occupied areas.
- G. Unforeseen Conditions and Occurrences: Promptly advise the responsible authorities and Architect of:
 - 1. Any conditions of site or structure which appear unsafe, unsound or disintegrated and which may require removal or special protective measures.
 - 2. Any occurrences involving injuries to persons on or off site, or damage to structures on or off site.
 - 3. If unanticipated mechanical, electrical, or structural elements which conflict with intended function or design are encountered, investigate and measure both the nature and extent of the conflict. Submit report to Contractor/Construction Manager orally and in written, accurate detail, with a copy to the Architect. Pending receipt of directive from the architect, rearrange demolition schedule as necessary to continue overall job progress without delay.
- H. Utilities: Coordinate utility shutoff and obtain all utility company requirements and written approvals for demolition work. Utilities required temporarily for Contractor operations and for on-going occupancy shall not be discontinued. Do not interrupt existing utility services to other properties, except when properly authorized. In such cases, provide temporary services as required.
- I. Damages: Promptly repair, at no cost to the owner, damages caused to facilities to remain.

1.6 POLICE AND FIRE DEPARTMENT

- A. Coordinate demolition schedule with the Chiefs of Police and Fire Departments in the locality having jurisdiction.
- B. Promptly notify Police and/or Fire Department of any occurrences, planned or unexpected, requiring their knowledge or assistance.

1.7 HAZARDOUS MATERIALS

- A. Detection, removal and disposal of hazardous materials, including lead and asbestos, are not within the scope of documents prepared by the Architect of Record. Such work shall be performed in accordance with the law, by duly qualified and licensed firm[s]. Promptly report to the Owner any materials discovered in the course of the work, which are suspected of being hazardous. Do not proceed with work on such materials until so directed by the Owner.

PART 2 - PRODUCTS Not used.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities to be permanently or temporarily shut off have been disconnected and sealed.
- B. Survey existing conditions and correlate with drawings and specifications to determine extent of demolition, salvage, protection, or temporary construction required.
- C. Insofar as is practicable, arrange operations to reveal unknown or concealed structural conditions for examination and verification before removal or demolition.
- D. Verify actual conditions to determine in advance whether or demolition of any element will result in deficiency, overloading, failure, or unplanned collapse.
 - 1. Comply with the requirements of Section 01 54 10 – Temporary Shoring & Bracing.
- E. Perform continuing surveys as the work progresses to detect hazards resulting from demolition or construction activities.

3.2 SALVAGE

- A. Do not commence work until Owner's salvage requirements are understood and list of items to be salvaged has been approved in writing.

3.3 PREPARATION

- A. Protection: Ensure safe passage of persons around area of demolition
 - 1. Conduct operations so as to prevent damage to structures to remain.
 - 2. Erect temporary covered passageways as required by authorities having jurisdiction.
- B. Protect walls, floors, and other new or existing work damage during demolition operations.
Temporary Partitions: Construct temporary partitions where directed by construction manager.
- C. Exterior closures: Provide weatherproof closure constructed to prevent water leakage, insulated to prevent excessive heat loss or gain to occupied areas, and sealed to prevent excessive air filtration.
- D. Structural Support: Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or unplanned collapse of structures to be demolished and adjacent facilities to remain as well as new work to be installed. Increase or add new supports as required by the progress of the work.
- E. Damages: Promptly repair, at no cost to the owner, damages caused to facilities to remain.
- F. Salvage: Turn over any work indicated for salvage and store on site in a location designated by Owner. Protect the work from damage during the work and until reinstalled or removed from the site by Owner.
- G. Finishes: Where finishes are to be removed, remove completely remove adhesives, mastics, undercoats, setting beds and leveling coats to smooth, plane surface and leave no residues which could adversely affect the installation of new finishes.

3.4 POLLUTION CONTROLS

- A. For exteriors: Use water sprinkling, temporary enclosures, and other suitable methods to limit spread of dust and dirt.
- B. For interiors: Erect dust barriers and the like. For concrete, masonry and other major gut demolition projects proper use of water sprinkling may be required.
- C. Prevent and limit the spread of dust and dirt. Comply with governing regulations pertaining to environmental protection. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.

3.5 DEMOLITION - PROCEDURES

- A. Remove: Items indicated to be removed, or required to be removed for the proper installation of new work, and not otherwise indicated to be reinstalled or salvaged shall be removed and disposed of by the contractor, at no additional cost to the Owner.
- B. Scrap: Remove and dispose of items indicated.
- C. Existing to Remain: Construction or items indicated to remain shall be protected against damage during demolition operations. Where practical, and with the Owner's permission, the contractor may elect to remove items to a suitable storage location during demolition and then properly clean and reinstall the items.
- D. Perform work in a systematic manner.
- E. Demolish and remove existing construction only to the extent required by new construction and as indicated in the contract documents.
- F. Use such methods as are necessary to complete the work within the limitations of governing regulations and the requirements of the contract documents.

3.6 SUSTAINABILITY

- A. Comply with Section 01 57 10 – Construction waste management, and site separate materials as required to section provisions.

3.7 DISPOSAL OF DEMOLISHED MATERIALS:

- A. Promptly dispose of materials resulting from demolition operations. Dispose of debris in a systematic manner at regular intervals and to ensure speedy, proper prosecution of the Work. Do not allow materials to accumulate on site in excess of amounts normally removed at the intervals scheduled.
- B. Transport materials resulting from demolition operations and legally dispose of off-site.
- C. Do not burn removed materials on project site.
- D. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
- E. Transport and dispose of all debris in a legal manner and at legal disposal site, as it is removed.

3.8 CLEANING

- A. Remove debris daily.
- B. Clean soil and dust from surfaces to remain.
- C. Replace or repair damaged work to the satisfaction of the Architect, and return such work to remain to condition equal or better than at commencement of work.

END OF SECTION

SECTION 02 82 33

REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING MATERIALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS/REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Supplementary General Conditions and Division 01 Specification Sections, apply to this Section.
- B. For the purpose of this Section, specification requirements are to be performed by an Asbestos Abatement Contractor.
- C. Owner will retain services of independent third-party consulting firm as Environmental Consultant for purpose of Project Management during Asbestos Abatement.
- D. Examine the following site specific asbestos related documentation:
 - 1. Asbestos Survey Report – Roof and Kalwall Clerestory Window Replacement Project – O'Keefe Center; Salem State University; 225 Canal Street, Salem MA.by TRC.

1.2 SUMMARY

- A. Section Includes:
 - 1. Pre-abatement activities including pre-abatement meeting(s), inspection(s), notifications, permits, submittal approvals, work-site preparations, emergency procedures arrangements, and standard operating procedures for Class II asbestos abatement work.
 - 2. Compliance with all applicable Federal, State, and Local regulations pertaining to work practices.
 - 3. Protection of workers, visitors to Site, and persons occupying areas adjacent to Site.
 - 4. Abatement activities including removal, cleanup, and disposal of ACM waste, recordkeeping, security, monitoring, and inspections.
 - 5. Cleaning and decontamination activities including final visual inspection, air monitoring, and certification of decontamination.
- B. Related Requirements:
 - 1. Section 01 33 00 Submittal Procedures.
 - 2. Section 07 01 50.19 Preparation for Re-roofing.

1.3 DEFINITIONS

- A. For the purpose of this Section, the following definitions apply:
 - 1. Abatement: Procedures to control fiber release from asbestos-containing materials. Includes removal, encapsulation, enclosure, demolition, and renovation activities

- related to asbestos containing materials (ACM).
2. Asbestos Abatement Contractor: Contractor performing asbestos removal and disposal under this Section.
 3. Asbestos-Containing Material (ACM): Any material containing more than one percent of asbestos.
 4. Asbestos Hazard Emergency Response Act (AHERA): Asbestos regulations for schools issued in 1987.
 5. Competent person: In addition to the definition in 29 CFR 1926.32(f), one who is capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, who has the authority to take prompt corrective measures to eliminate them, as specified in 29 CFR 1926.32(f); in addition, for Class I and II work who is specially trained in a training course which meets the criteria of EPA's Model Accreditation Plan (40 CFR 763) for supervisor.
 6. Consultant: Environmental Consultant hired by Owner, and its designated, authorized representatives.
 7. Contractor's Professional Industrial Hygienist (CPIH/CIH): Asbestos abatement contractor's industrial hygienist. The industrial hygienist must meet the qualification requirements of a PIH and may be a certified industrial hygienist (CIH).
 8. Industrial hygienist (IH): A professional qualified by education, training, and experience to anticipate, recognize, evaluate, and develop controls for occupational health hazards. Meets definition requirements of the American Industrial Hygiene Association (AIHA).
 9. Professional IH (PIH): An IH who meets the definition requirements of AIHA; meets the definition requirements of OSHA as a "Competent Person" at 29 CFR 1926.1101 (b); has completed two specialized EPA approved courses on management and supervision of asbestos abatement projects; has formal training in respiratory protection and waste disposal; and has a minimum of four projects of similar complexity with this project of which at least three projects serving as the supervisory IH.
 10. Remove: Removal and disposal of referenced materials.

1.4 SUBMITTALS

- A. Under provisions of Section 01 33 00 Submittal Procedures submit the following to General Contractor for preparation and submittal to Designer:
 1. Copies of required permits and licenses to perform asbestos abatement work as required by Federal, State, and Local regulations.
 2. Detailed work schedule for Asbestos Abatement.
 3. Staff organization chart showing all personnel who will be working on the Project; their capacity and function; their qualifications, training, accreditations, and licenses; each person's "Certificate of Worker's Acknowledgment"; and each person's "Affidavit of Medical Surveillance and Respiratory Protection".
 4. Asbestos Hazard Abatement Plan developed specifically for this project, incorporating requirements of Specifications, prepared, signed, and dated by CPIH/CIH.
 5. Specifics regarding materials and equipment to be used, including manufacturer names, model numbers, performance characteristics, and pictures/diagrams for the following:
 - a. Supplied air system, negative air machines, HEPA vacuums, air monitoring pumps, calibration devices, pressure differential monitoring device, and emergency power generating system.
 - b. Waste water filtration system, shower system, and containment barriers.

- c. Encapsulants, surfactants, hand-held sprayers, airless sprayers, and fire extinguishers.
 - d. Respirators, protective clothing, and personal protective equipment.
 - e. Fire safety equipment to be used in the regulated area.
6. Name, location, and phone number of approved landfill; proof/verification landfill is approved for ACM disposal; landfill's requirements for ACM waste; type of vehicle to be used for transportation; and name, address, and phone number of transporter. Provide proof of asbestos training for transportation personnel.
7. Copies of required notifications and arrangements made with regulatory agencies having regulatory jurisdiction and the specific contingency/emergency arrangements made with local health, fire, ambulance, hospital authorities and any other notifications/arrangements.
8. Name, location, and verification of laboratory and/or personnel to be used for analysis of air and/or bulk samples.
9. Evidence of qualifications, including current contact information, as follows:
 - a. Asbestos Abatement Company: Project experience within past three years, first listing projects most similar to this project. Indicate project Name; type of abatement; duration; cost; reference name/phone number; final clearance; and completion date.
 - b. List of project(s) halted by owner, architect/engineer, IH, regulatory agency within last three years. Indicate project name; reason; date; reference name/number; resolution.
 - c. List asbestos regulatory citations (e.g., OSHA), notices of violations (e.g., Federal and State EPA), penalties, and legal actions taken against company or company's officers or both, including damages paid, within last three years. Provide copies and all information needed for verification.
10. Affidavit signed by the CPIH/CIH stating that all personnel have medical records in accordance with OSHA 29 CFR 1926.1101(m) and 29 CFR 1910.20 and company has implemented a medical surveillance program and written respiratory protection program, and maintains recordkeeping in accordance with above regulations.
11. Copies of State license for asbestos abatement; copy of insurance policy, including exclusions with letter from agent stating in plain language the coverage provided and that asbestos abatement activities are covered by the policy; copy of AHAP(s) incorporating the requirements of this Specification; information on who provides your training, how often; who provides medical surveillance, how often; who performs and how is personal air monitoring of abatement workers conducted; list of references of independent laboratories/IH's familiar with your air monitoring and standard operating procedures; and copies of monitoring results of the five referenced projects listed and analytical method(s) used.
12. Before start of work, manufacturer's technical data for all types of encapsulants, all MSDS, and application instructions.
13. Documentation that personnel wearing respirators have a current quantitative fit test conducted in accordance with 29 CFR 1910.134 (f).
14. The Competent Person shall maintain and submit a daily log at the regulated area documenting dates and times of the following: purpose, attendees, and summary of meetings; all personnel entering/exiting regulated area; document and discuss resolution of unusual events such as barrier breaching, equipment failures, emergencies, and any cause for stopping work; representative air monitoring and results/TWAs/ELs. Submit this information daily to the CPIH/CIH.
15. The CPIH/CIH shall document and maintain the inspection and approval of the regulated area preparation prior to start of work and daily during work.

- a. Removal of any poly barriers.
 - b. Visual inspection/testing by the CPIH/CIH or IH Technician prior to application of lockdown encapsulant.
 - c. Packaging and removal of ACM waste from regulated area.
 - d. Disposal of ACM waste materials; copies of Waste Shipment Records/landfill receipts to Owner's representative on weekly basis.
16. At completion of abatement submit a project report consisting of daily logbook requirements and documentation of events during abatement project including Waste Shipment Records signed by landfill's agent. Include information on containment and transportation of waste from the containment with applicable Chain of Custody forms. Include a certificate of completion, signed and dated by the CPIH/CIH, in accordance with **Appendix A**. All clearance and perimeter area samples must be submitted.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Qualifications of Asbestos Abatement Contractor:

- a. Work performed under this Section shall be by a single subcontractor.
- b. Subcontractor shall have a minimum five years of experience as an approved asbestos abatement contractor.
- c. Subcontractor shall be licensed to perform asbestos abatement operations as required by the Massachusetts Division of Occupational Safety ("DOS"), 453 CMR 6.0 Regulations, and shall have workers and supervisors who have successfully completed required EPA training requirements for asbestos project workers and/or supervisors. Workers shall be licensed as asbestos project workers and/or supervisors as required by DOS.

2. Qualifications of Asbestos Abatement Personnel:

- a. Work shall be completed utilizing fully qualified persons trained, experienced, and knowledgeable in proper techniques and procedures for asbestos abatement activities.
- b. Workers performing asbestos-related work shall be currently certified as AHERA asbestos workers.
- c. Asbestos in Construction Contractor Supervisor: Currently certified as an AHERA Asbestos Contractor Supervisor.

B. Regulatory Requirements: All asbestos removal work shall be performed in accordance with requirements of Federal, State, and Local regulations as follows:

1. Federal Regulations:

- a. U.S. Department of Labor, Occupational Safety and Health Administration (OSHA):
 - 1) Asbestos Standard: Title 29, Part 1910, Section 1001.
 - 2) Respiratory Protection: Title 29, Part 1910, Section 134.
 - 3) Construction Industry: Title 29, Part 1926, Section 1101.
 - 4) Hazard Communication: Title 29, Part 1910, Section 1200.

2. State and Local Regulations: Abide by all State and Local regulations that govern asbestos abatement work and storage of asbestos waste materials:
 - a. Massachusetts Division of Occupational Safety (DOS):
 - 1) 453 CMR 6.00 Regulations, "The Removal, Containment, or Encapsulation of Asbestos".
 - b. Massachusetts Department of Environmental Protection (MA DEP):
 - 1) Policy Statement Concerning Non-Friable Asbestos Containing Materials, Policy BWP-96-012.

1.6 PROJECT CONDITIONS

A. Existing Conditions:

1. Building materials that contain asbestos are known to be present at Project Site. Building materials that have not been previously tested, that may be affected by project scope, should be assumed to contain asbestos and handled according to this Section. (See [Appendix A](#) for asbestos testing results).
 - a. If any other materials found are suspected of containing asbestos or other hazardous materials immediately stop work in affected area and notify Owner. Handle suspected asbestos containing material according to this Section.
2. Owner will occupy adjacent areas during course of the Work. Work under this Section shall not affect Owner's operation of adjacent areas.
3. Asbestos Abatement Contractor is responsible for notifying other subcontractors in writing regarding asbestos work per OSHA requirements (29 CFR 1926.1101).

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Plastic Sheeting: Fire retardant polyethylene sheeting conforming to NFPA 701 and ASTM S502-74T for surface flammability and smoke density. A single polyethylene film in the largest sheet size possible to minimize seams, 6 mils thick, clear, frosted, or black as indicated.
- B. Disposal Bags: 6-mil polyethylene with pre-printed label.
- C. Duct Tape: Provide duct tape in 2 inch or 3 inch widths as indicated, with adhesive formulated to stick aggressively to polyethylene sheeting.
- D. Surfactant (wetting agent): 50 percent polyoxyethylene ether and 50 percent polyoxyethylene ester, or equivalent, mixed with water to provide concentration of one ounce surfactant to five gallons of water, or as directed by manufacturer.
- E. Spray Adhesive: Shall not contain methylene chloride, as listed on product's label and/or Material Safety Data Sheet (MSDS). Provide spray adhesive in aerosol cans that is specifically formulated to stick aggressively to polyethylene sheeting.

- F. Containers: Impermeable, air- and water-tight, labeled in accordance with OSHA Standard 29 CFR 1926.1101 and EPA 40 CFR Part 61.152 as appropriate.
- G. Labels and Signs: Conform to OSHA Standard 29 CFR 1928.1101.
- H. Encapsulant: Bridging or penetrating type. Usage in accordance with manufacturer's printed technical data. Compatible with new materials being installed.

2.2 TOOLS AND EQUIPMENT

- A. Air monitoring equipment of type and quantity required to monitor operations and conduct personnel exposure surveillance per OSHA requirements.
- B. Protective clothing, respirators, filter cartridges, air filters, and sample filter cassettes.
- C. Electrical equipment, protective devices (e.g., emergency generators), and power cables conforming to applicable codes.
- D. Temporary shower facility: One shower stall per eight workers.
- E. Exhaust air filtration units equipped with HEPA filters capable of providing sufficient air exhaust to create a pressure differential of 0.02 inches of water and to allow sufficient flow of air through the area. An automatic warning system incorporated in the equipment to indicate pressure drop or unit failure.
- F. Vacuum units of suitable size and capabilities, with HEPA filters capable of trapping and retaining at least 99.97 percent of all mono-dispersed particles of three micrometers in diameter or larger.
- G. Ladders and/or scaffolds of adequate length, strength, and quantity to support the work schedule. Other materials such as lumber, nails, and hardware necessary to construct and dismantle the decontamination enclosures and barriers used to isolate the Work Area.

PART 3 - EXECUTION

END OF SECTION

SECTION 03 01 06.1 – CAST-IN-PLACE CONCRETE REPAIRS & CLEANING

PART 1 - GENERAL

1.1 SUMMARY

- A. Related Documents: All Contract Documents, including Drawings, General and Supplementary Conditions and Division 1 General Requirements apply to this Section.
- B. Section includes, without limitation, providing:
 - 1. Primers
 - 2. Flash patches
 - 3. Joint and crack repair
 - 4. Fillers and leveling compounds
 - 5. Sealers.
 - 6. Concrete cleaning.
 - 7. Pneumatic air blow high pressure cleaning.
 - 8. Power washing.
- C. Scope/Extent, without limitation, includes: Work shown, if not, as follows
 - 1. Work of this section applies to existing cast in place
 - 2. Repair of damaged concrete surfaces.
 - 3. Cleaning concrete exposed in final construction.
 - 4. Use power washing where practical to clean concrete.
- D. Related Work, without limitation, includes:
Division 03 00 00 – Cast in place concrete:

1.2 QUALITY ASSURANCE

- A. The installer shall be an authorized applicator or otherwise be approved by the product manufacturer with not less than 5 years experience on comparable projects.
- B. Use only equipment of types approved by the manufacturer for the application.
- C. Comply with OSHA standards and requirements; in particular for high pressure air, water and sand blasting.

1.3 SUBMITTALS

- A. Submit in accordance with the requirements of Division 01 or as otherwise directed.
- B. Product Data: Provide manufacturer's descriptive literature for proposed products. Include information necessary to establish conformance with specified performance criteria; instructions for installing, curing and repairing work.
- C. Mix designs: Submit proposed mix designs and compressive strength ranges where not already indicated in manufacturer product submittals.
- D. Mock-ups: Provide mock-up of each type of repair or cleaning required of size appropriate to application, and as follows:
 - 1. Crack repairs: Not less than 24 inches long.
 - 2. Patches: Not less than 24 inches square.
- E. Test reports: Provide copies of field quality control tests, where strengths vary depending upon contractor selected field mixes.

1.4 PRODUCT DELIVERY AND STORAGE

- A. Deliver materials in original unopened packages and protect from exposure to the elements, moisture and the like. Remove damaged, expired or deteriorated materials from site.

1.5 JOB CONDITIONS

- A. Environment requirements:
 - 1. Comply with applicable federal, state and local regulations and Owner standards or requirements.
 - 2. Comply with product and equipment manufacturer requirements, restrictions and limitations.
- B. After installation, provide adequate ventilation to ensure completion of drying process.
- A. Provide a written warranty by the concrete restoration installer which shall guaranty prompt repair of defective work for a period of not less than one (1) year at no cost to the owner.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with specifications, provide products or approved equals from:
 - 1. Concrete patching: Silpro Corporation.
 - 2. Concrete cleaning: ProSoCo.
 - 3. Polymer modified repairs: Silpro, Fosroc or Sika.
 - 4. Zinc-rich primers: Duncan Galvanizing, Tnemec, Sherwin Williams.

2.2 REPAIR PRODUCTS

- A. Provide recommended products for application as required including:
 - 1. Vo Patch: Fast setting, structural repair mortar, Portland cement based, designed for vertical and overhead patches.
 - 2. Weld-O-Bond Plus: A water based polyvinyl acetate resin formulated for bonding Portland Cement mixes to interior or exterior concrete or masonry.
 - 3. Seal Cote: A Portland cement based coating to waterproof, protect and decorate new and old concrete and masonry. Brush applied, leak-preventative with sandy finish.
 - 4. C-21 Acrylic Latex: A water based bonding agent, admix and primer.

2.3 SLAB REPAIRS

- A. Provide recommended products for application as required including:
 - 1. Mascrete Latex Cement: Heavy duty wearing surface repair product can be installed 1/8 to 1-1/2 inch neat and 3 inch with aggregate. Flexible high density patching material mixed with formulated Portland cement base and Latex admix.
 - 2. Masco Latex cement: Same as one except can be applied 1/2 inch to feather edge, when using fine aggregate.
 - 3. Fastcrete: Fast setting Mascrete.
 - 4. Speedtop: 1/2 inch to feather edge, fast setting Masco.
 - 5. Crete Seal: Clear urethane acrylic sealer, voc compliant.

2.4 VERTICAL SURFACE REPAIR PRODUCTS

- A. Provide recommended products for application as required including:
 - 1. C-21 Acrylic Latex: A water based bonding agent, admix and primer.
 - 2. Vo Patch: Fast setting, structural repair mortar, Portland cement based, designed for vertical and overhead patches.
 - 3. FSB – Fiberglass Surface Bonding Cement: High performance Portland cement surface bond coating, polymer modified, fiberglass reinforced for use as base over old masonry; trowel applied up to 1/2 inch per lift.
 - 4. Epoxy Adhesive: ASTM C 881, two-component, 100% solids material suitable for use on dry or damp surfaces. Provide material type, grade, and class to suit Project requirements.
 - a. Acceptable Product: Provide Epiweld 580 or Epiweld 560 (Gel). By Lambert Corp as above.
- B. Cleaning products: As recommended by manufacturer for the application.

2.5 MECHANICAL STRIPPING EQUIPMENT

- A. Components recommended by waterproofing manufacturers for chipping, grinding or peeling for removal.

2.6 POWER WASHING MATERIALS AND EQUIPMENT

- A. General: Use of products, materials, equipment and systems is subject to their successful use during field sample/mock-ups and test applications. Spray or apply materials only as recommended by manufacturers.
- B. Water for Cleaning: Clean, potable, free of oils, acids, alkalis, salts, and organic matter. In general, use heated water at a temperature of 140 degrees F – 180 degrees F.
- C. Cleaning agents:
 - 1. Individually approved products recommended for application and individually tested in mock-up.
 - 2. Cleaning agents shall be approved for use in power washing by AHJ.
- D. Provide equipment for controlled spray application of water and chemical cleaners, if any, at rates indicated for pressure, measured at spray tip, and for volume.
- E. For spray application of water provide fan-shaped spray tip which disperses water at angle of not less than 15 degrees.
- F. For spray application of heated water, provide equipment capable of maintaining water temperature between 140°F and 180°F at flow rates indicated.
- G. Do not use admixtures of any kind, unless otherwise indicated.

2.7 SANDBLASTING

- A. Perform sandblasting only if this method is approved in writing by the Architect, and if approved, as follows:
- B. Use materials and equipment as necessary to achieve approved results shown in accepted mock-ups.
- C. Abrasive materials used shall be appropriate to achieve desired results and may include:
 - 1. Bead blasting.
 - 2. Soda blasting.
 - 3. Sand blasting
- D. For the purposes of this section, "sand blasting" shall include any appropriate abrasive material including softer and finer materials than shot, sand, or glass.
- E. For shot blasting, refer to Section

2.8 PNEUMATIC AIR BLOW DUST GUN HIGH PRESSURE CLEANING MATERIALS AND EQUIPMENT

- A. General: Use of products, materials, equipment and systems is subject to their successful use during field sample/mock-ups and test applications. Spray or apply materials only as recommended by manufacturers.
- B. Air for Cleaning: Clean, free of oils, debris or other matter.
- C. Provide equipment for controlled air blast application at rates indicated for pressure, measured at air nozzle, and for volume and suitable for the application.
 - 1. Use multiple nozzle types and configuration to suit application.
- D. Do not use additives, sand of any kind, unless otherwise indicated and approved in writing.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine all surfaces to receive work prior to installation. Do not commence work in any area where conditions exist which would adversely affect the adhesion and strength of the product until corrective work has been completed. Starting of work in any area shall constitute acceptance of conditions in that area and full responsibility for the satisfactory interfacing of his work with existing construction.

1. Surfaces to receive work shall be thoroughly clean, free of mud, oil, grease or any other contaminants which may degrade the final product.

3.2 PREPARATION

- A. Surfaces to be repaired shall be made clean and sound. Remove all curing compounds, waxes, oils, paints, grease, form-release agents, dirt, mildew, water-soluble adhesives, friable materials, deteriorating concrete, loose material, and foreign matter.
- B. Prepare surfaces in accordance with manufacturers recommendations. Thoroughly clean out spalls and other repair areas including rock pockets, voids over 1-inch in any dimension, and holes left by tie rods and bolts down to solid concrete. Make edges of cuts perpendicular to the concrete surface.
- C. Protect new glass, unpainted metals and polished stone from contact or power wash etching.
- D. Unless intended to be cleaned, protect unpainted metal from contact by covering them either with liquid strippable masking agent or polyethylene film and waterproof masking tape.
- E. Mechanically clean exposed steel and reinforcing to remove loose rust and scale and then to expose bare metal.
- F. Coat exposed steel and reinforcing bars as follows:
 1. With epoxy adhesive or with
 2. 2 coats zinc-rich primer in 3 mil dry film thickness minimum.
 3. Allow to dry.
 4. Areas without existing steel reinforcement:
- G. Cleaning areas to be repaired or restored:
 1. Comply with manufacturer requirements and the following:
 2. Clean and rinse the excavated concrete surface to remove dust and debris.
 3. Pre-dampen repair areas with water for not less than 2-hours prior to application of cementitious patching compounds. Surfaces shall be "saturated surface dry".
- H. Apply bonding agent before application of coatings.
- I. Structural Repairs: Perform structural repairs with prior approval of Architect for method and procedure, using epoxy adhesive and mortar.
- J. Alternative Repair Methods: Methods not specified above may be used, subject to acceptance of Architect.

3.3 CONCRETE SURFACE REPAIRS

- A. Leveling Floor Surfaces: Prior to placement of self-leveling underlayment, uniformly apply continuous film of acrylic bonding agent or epoxy adhesive as recommended by manufacturer. Apply cementitious underlayment material while bonding agent or epoxy adhesive is still tacky. Where bonding agent or epoxy adhesive has dried, apply new coat of bonding agent.
- B. Horizontal Repair Applications Less Than 1/2-Inch Thick: Brush-coat the area to be repaired with acrylic bonding agent. Place repair compound or mortar before bonding agent has dried.
- C. Horizontal Repair Applications Greater Than 1/2-Inch Thick: Combine one part Portland cement to one and one-half parts fine sand by volume, and a 2:1 mixture of acrylic bonding admixture and water to form the consistency of thick paint. Brush-coat 1/8-inch thick slurry to area to be repaired, then apply repair product before slurry has dried.
- D. Vertical (and Overhead) Repair Applications: Combine one part portland cement to one and one-half parts fine sand by volume, and a 2:1 mixture of acrylic bonding admixture and water to form the consistency of thick paint. Brush-coat 1/8-inch thick slurry to area to be repaired.
 1. Place repair compound in dry-pack method
- E. Curing: Keep repaired area continuously moist for at least 72 hours, using visqueen or burlap methods.

- F. Waterproof Cement Plug Type Repair: After mixing, force hydraulic plug material into crack or cavity, compressing firmly with gloved hand, trowel, wood block or other rigid form type material. Hold in place for not less than 1- minute. Do not brush or trowel over surface. Shave excess material from repair area.

3.4 CLEANING

- A. Protect the building, its interior, pedestrians, landscaping, vehicles and the site from all risks associated with the work. Do not work in winds that would cause drifting of spray of cleaning materials or rinse water. Protect glass, aluminum, polished stone, and all other surfaces as required.
- B. Apply cleaners in areas of repair patches only after repair materials have cured sufficiently as recommended by the repair material manufacturer.
- C. Apply cleaners to substrates in accordance with manufacturer's printed instructions. Prewet the surface prior to applying cleaning materials. When cleaning vertical surfaces, keep lower surfaces wet to avoid streaking. Scrub surfaces with cleaning brushes to loosen dirt and contaminants.
- D. Rinse surfaces using low pressure (less than 400 psi) equipment.
- E. Manufacturer's Field Services: Provide the services an authorized field representative from the manufacturer to verify that test sections, surface preparation and application of cleaning materials is in accordance with manufacturer's instructions and the project requirements.

3.5 SANDBLASTING

- A. Comply with requirements of Division 01 and the following:
 1. Sandblast interior surfaces to match approved in-place samples
 2. Provide uniform final appearance for each substrate.
 3. Use the least destructive methods and techniques which produce acceptable results.
 4. Avoid damaging and removing masonry mortar.
 5. Do not change masonry shapes. Do not round masonry edges.
 6. Do not gouge wood and soft substrates.
 7. Provide a uniform, light "sand" texture on all substrates.
 8. Do not create heavy, fuzzy wood surfaces.
 9. Brush and vacuum sandblasted surfaces to remove loose particles.
 10. Vacuum and remove all used sandblast media and debris.

3.6 POWER WASHING

- A. Comply with manufacturer's recommendation. Where such recommendations are at variance with the provision of these specifications obtain written clarification from the Architect.
- B. Proceed with cleaning in an orderly manner; work from top to bottom at each scaffold setting width from one end of each elevation to the other.
 1. Where cleaning agents have been approved are in use, work upwards and then rinse downwards.
- C. Use only those cleaning methods recommended for each type of material and location.
 1. Do not hold spray guns directed at one point for extended periods.
- D. Perform each cleaning indicated in a manner which results in uniform coverage of all surfaces, including corners, moldings, interstices and which produces an even effect without streaking or damage to masonry surfaces.
- E. Rinse off existing residue, debris and soil by working upwards from bottom to top of each treated area at each stage or scaffold setting.
- F. Water Application Methods
 1. Spray Applications: Spray-apply water to surfaces to comply with requirements indicated for location, purpose, water temperature, pressure, volume and equipment. Unless otherwise indicated, hold spray nozzle not less than 6" from surface and apply water from side to side in overlapping bands to produce uniform coverage and an even effect.
 - a. Low Pressure Spray: 100-400 psi; 3-6 gal/min
 - b. Medium Pressure Spray: 400-800 psi; 3-6 gal/min

- c. High Pressure Spray: 800-1200 psi; 3-6 gal/min
 - G. High pressure spray equipment shall be utilized in the pre-wetting and rinsing operations. Equipment providing minimum volumes of four to six gallons of water per minute at 200 to 300 psi is recommended.
 - 1. In the event applications of cleaning solutions are required, do not exceed 50 psi.
 - H. Steam Wash: Apply steam to surfaces at pressures not exceeding 80 psi. Hold nozzle no less than 6" from surface and apply steam from side to side or in direction of tooling in overlapping bands to produce uniform coverage and an even effect.
 - I. Comply with the following:
 - 1. Keep work as clean as possible.
 - 2. Surfaces shall be thoroughly washed and cleaned with clear water or steam.
 - 3. Where stubborn stains or debris is encountered use fiber brush to remove stains, dirt and dust.
- 3.7 PNEUMATIC HIGH PRESSURE AIR CLEANING
- A. Comply with manufacturer's recommendation. Where such recommendations are at variance with the provision of these specifications obtain written clarification from the Architect.

END OF SECTION

SECTION 03 01 55 – SHOT BLASTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section Includes, without limitation, providing:
 - 1. Shot blasting to remove unsound or unacceptable concrete surfaces.
- C. Extent, without limitation, includes: As shown, if not, Indicated slabs, or slabs as directed.
- D. Related requirements includes, without limitation:
 - 1. Section 03 01 06.1 - Cast-in-Place Concrete Repairs & Cleaning.
 - 2. Section 03 30 00 - Cast in place concrete.

1.2 QUALITY ASSURANCE

- A. The installer shall be an authorized applicator or otherwise be approved by the equipment manufacturer with not less than 5 years experience on comparable projects.
- B. Use only equipment of types approved by the manufacturer for the application.
- C. Pre-installation conference: Held at site to review specifications, application procedure, quality control, inspection and acceptance criteria.

1.3 SUBMITTALS

- A. Comply with Division 01 General Requirements and submit for approval:
 - 1. Product Data: Provide manufacturer's descriptive literature for proposed equipment including application instructions, use restrictions and limitations as well as information necessary to establish conformance with specified performance criteria; instructions for applying and repairing work.
 - 2. Shop drawings: Layout of area to be finished showing any required expansion joints, construction joints and cove base assembly. Show all termination details and any floor drain connections.
 - 3. Mock-ups: Provide mock-up of each type cleaning or re-surfacing required of size appropriate to application, and as follows:
 - a. Shot blasting: Not less than 16 square feet down to acceptable surface.

1.4 JOB CONDITIONS

- A. Environment requirements:
 - 1. Comply with applicable federal, state and local regulations and Owner standards or requirements.
 - 2. Comply with product and equipment manufacturer requirements, restrictions and limitations.
 - 3. Fully close off work areas with dust-proof enclosures.

PART 2 - PRODUCTS (not used)

PART 3 - EXECUTION

3.1 GENERAL

- A. Comply with the provisions of Section 01 70 00 - including requirements related to:
 - 1. Inspection.
 - 2. Tolerances and measurement.
 - 3. Approvals, inspections and filed quality control.
 - 4. Layout.
 - 5. Adjusting.
 - 6. Cleaning.

7. Protection.

3.2 EXAMINATION

- A. Examine and verify conditions per Section 01 70 00 and as follows:
 - 1. Before installation, examine rough-in and built-in construction for mechanical/electrical and other systems to verify actual locations of connections.

3.3 PREPARATION / SHOT BLASTING

- A. Mask and protect areas, surfaces and openings not part of this work from adverse affections of preparation and installation
- B. Mechanical surface preparation Shot blast all surfaces indicated or required with a mobile steel shot, dust recycling machine (Blastrac or equal).
- C. Intent: To remove unsound or unacceptable concrete and all embedded odors. All surface and embedded accumulations of paint, toppings hardened concrete layers, laitance, power trowel finishes and other similar surface characteristics shall be completely removed leaving a bare concrete surface having a minimum profile of CSP 4-5 as described by the International Concrete Repair Institute or as required to reach a sound, acceptable level.
 - 1. Floor areas inaccessible to the mobile blast machines shall be mechanically abraded to the same degree of cleanliness, soundness and profile using diamond grinders, needle guns, bush hammers, or other suitable equipment.
 - 2. Wherever a free edge will occur, including doorways, wall perimeters, expansion joints, columns, doorways, drains and equipment pads, a ¼ inch deep by 3/16 inch wide keyways shall be cut in.
 - 3. Cracks and joints (non-moving) greater than 1/4 inch wide are to be chiseled or chipped-out and repaired per manufacturer's recommendations.
 - 4. At spalled or worn areas, mechanically remove loose or delaminated concrete to a sound concrete.

3.4 ADJUSTING / CLEANING / PROTECTION

- A. Comply with Section 01 70 00 and the following:
 - 1. Adjusting:
 - 2. Cleaning:
 - 3. Protection:
- B. Remove masking. Perform detail cleaning at installation completion leaving clean, smooth, unblemished, dust-free surfaces.
- C. Protect surfaces until acceptance or application of new toppings.

END OF SECTION

SECTION 03 21 00

EPOXY-COATED REINFORCING STEEL

PART 1 GENERAL

1.1 SUMMARY

- A. This Section specifies the supply, fabrication and installation of new epoxy-coated reinforcement for repairs and new cast-in-place concrete.
- B. Related Sections include the following:
 - 1. Section 03 01 34 - Architectural Concrete Replacement
 - 2. Section 03 30 00 - Cast-in-Place Concrete

1.2 REFERENCES

- A. Reference Standards: All standards latest edition as of the date of the Specification.
 - 1. American Concrete Institute (ACI)
 - a. ACI 315 - Details and Detailing of Concrete Reinforcement
 - b. ACI SP-66 - Detailing Manual
 - c. ACI 318 - Building Code Requirements for Structural Concrete
 - 2. American Society for Testing and Materials (ASTM)
 - a. ASTM A82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
 - b. ASTM A185 - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
 - c. ASTM A193 - Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications
 - d. ASTM A615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
 - e. ASTM A775 - Standard Specification for Epoxy-Coated Reinforcing Bars
 - f. ASTM A884 - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Fabric for Reinforcement
 - g. ASTM D3963 - Standard Specification for Fabrication and Handling of Epoxy-Coated Steel Reinforcing Bars
 - 3. American Welding Society (AWS)
 - a. AWS D1.4 - Structural Welding Code - Reinforcing Steel
 - 4. Concrete Reinforcing Steel Institute (CRSI)
 - a. Manual of Standard Practice for Reinforced Concrete Construction

1.3 SUBMITTALS

- A. Submit the following information a minimum of one week prior to scheduled work:
 - 1. Mill test reports for steel reinforcement, including adequate information on chemical and physical properties to demonstrate conformance to ASTM A615 and ASTM A185.
 - 2. Certification statements for coating process, material, and properties to demonstrate

conformance to ASTM A775 and ASTM A884, including the preheat temperatures, cure times, thickness checks, holidays detected, and bend test results for each bar size. Certification statement indicating that the coating applicator is certified by the CRSI Voluntary Certification Program for Fusion Bonded Epoxy Coating Application Plants.

3. For installer of epoxy-grouted dowels: ACI-CRSI Certification as Adhesive Anchor Installer.

1.4 QUALITY ASSURANCE

- A. Perform concrete reinforcement work in accordance with CRSI Manual of Standard Practice for Reinforced Concrete Construction.
- B. Comply with the following ACI Standards:
 1. ACI 315, "Details and Detailing of Concrete Reinforcement"
 2. ACI 318, "Building Code Requirements for Structural Concrete"

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle steel reinforcement to prevent bending and damage.
- B. Store reinforcement and accessories off of the ground and floors on platforms, skids, cribbing, or other supports.
- C. Avoid damaging coating on reinforcing steel. Use padded or nonmetallic slings and straps when transporting. Handle bundled and individual bars in manner which will prevent excessive sagging of the bars that may damage the coating. Do not drop or drag bundled or individual bars. Do not expose to moisture at any time. If, in the opinion of the Engineer, the coated bars have been extensively damaged, the bars will be rejected.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Reinforcing Bars: Deformed bars with a 60,000 psi minimum yield strength corresponding to Grade 60 as defined in ASTM A615. Sizes as shown on Drawings.
- B. Welded Wire Fabric Reinforcing: Flat sheets of orthogonal plain wires welded at each wire-to-wire intersection per ASTM A185, and fabricated from as-drawn plain steel wire with a 65,000 psi minimum yield strength per ASTM A82.
 1. For topping slab: WWF 4x4-W4.0xW4.0

2.2 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric reinforcing in place. Bar supports shall be manufactured from steel wire, plastic, or precast concrete in accordance with "Bar Support Specifications and Standard Nomenclature" as contained in the CRSI "Manual of Standard Practice". Welded wire fabric reinforcing shall be supported by slab bolsters. Metal chairs and supports shall be coated with epoxy, plastic, or other inert dielectric polymer coating.

- B. Plastic Coated Tie Wire: Wire used to secure bars during concrete placement shall be 16-gauge steel wire meeting ASTM A82, and shall be plastic coated to protect the reinforcing coating from physical damage. Grouted Dowels: As shown on drawings and noted below.
1. ASTM A615, Grade 60, plain steel bars, cut true to length with ends square and free of burrs.
 2. ASTM A193, Type 316 stainless steel, ¼ in. diameter, threaded rods, cut true to length with ends square and free of burrs.
- C. Epoxy Grout for Dowels:
1. Hilti Inc.; HIT HY-150 Adhesive Anchor System
 2. Powers Fasteners; AC100 Plus
 3. Simpson Strong Tie; Simpson Set-XP

2.3 EPOXY COATING

- A. All reinforcing steel bars and welded wire mesh shall be epoxy-coated. The coating material shall be a powdered epoxy resin meeting the requirements of ASTM A775 or ASTM A884. The manufacturer of the resin shall provide written certification that the material furnished for the coating of the reinforcing steel meets the requirements contained in ASTM A775 or ASTM A884.
- B. The coating shall consist of a fusion-bonded protective coating of epoxy powder applied by electrostatic spray method or electrostatic fluidized-bed method in accordance with the resin manufacturer's recommendations and these Specifications. Coating shall be applied in a uniform, smooth film with a thickness after curing of at least 7 mils, measured in accordance with ASTM A775 or ASTM A884.
- C. The coated reinforcing shall be free of slivers and from visible holes, voids, contamination, cracks, and other defects, with less than 1 percent of the coating damaged in a given length of bar or wire. The continuity and flexibility of the coating shall be checked in accordance with ASTM A775 or ASTM A884 and shall meet the requirements described therein.
- D. The coated reinforcing shall meet the physical properties specified in Article 2.1 - Materials above, and may be inspected for approval at the coating plant. All epoxy-coated reinforcing shall be supplied by an epoxy-coating application plant certified by the CRSI Voluntary Certification Program for Fusion Bonded Epoxy Coating Application Plants. A statement certifying this shall be furnished with each shipment.
- E. Patching or Repair Materials: Liquid, two-part, epoxy repair coating; compatible with the epoxy coating on reinforcement and inert in concrete, shall be supplied by the epoxy resin manufacturer. The material shall be suitable for repairing areas of damaged coating and cut ends and shall comply with the requirements of ASTM A775 or ASTM A884.

2.4 FABRICATION

- A. Fabricate and detail steel reinforcement to shapes and dimensions shown on Drawings in accordance with ACI 315 and the CRSI "Manual of Standard Practice" within the fabricating tolerances shown in the CRSI "Manual of Standard Practice."

- B. All bends and hooks shall conform to the bend dimensions defined as “ACI Standard Hooks” in the CRSI “Manual of Standard Practice” unless otherwise shown on the plans.
- C. Reinforcing bars shall not be bent or straightened in a manner that will injure the coating material. For some bar sizes, the rate of bending may need to be reduced to minimize cracking or debonding of the coating. Visible cracking or debonding of the coating in the bending area of bars bent in accordance with the Drawings shall be patched, except that a hairline crack (0.003 in. or less in width) at the base of the deformation will not be cause for rejection, nor will patching of these cracks be required. All patching shall be done promptly after bending.

PART 3 EXECUTION

3.1 PLACING REINFORCEMENT

- A. General: Comply with the CRSI “Manual of Standard Practice” and the Drawings for the placement of reinforcement.
- B. Before placing concrete, clean reinforcement of loose rust and mill scale, earth, ice, dust, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement to prevent displacement during the concrete placement. Locate and support reinforcement with bar supports to maintain specified minimum concrete cover. All dowels must be wired in place before depositing concrete.
- D. All bar splices, concrete cover and bar spacings shall conform to the Drawings, ACI 315, and the CRSI “Manual of Standard Practice”.
- E. Unless permitted by the Engineer/Architect, reinforcing shall not be bent after being embedded in hardened concrete.
- F. Welded wire fabric shall be placed in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one and a half mesh spacings. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire. Placement of welded wire fabric shall be in accordance with ACI 315 and the CRSI “Manual of Standard Practice”. Place welded wire fabric continuous between expansion and control joints; stop at expansion joints and cut through half of wires at control joints unless noted otherwise.
- G. Tie wires shall be bent and turned with their ends directed towards the inside of the concrete section, not toward exposed concrete surfaces.
- H. Runways or another approved protection scheme shall be provided for reinforcing located in or extending into a placement, in order to prevent damage from moving or pumping equipment during concrete placement.
- I. The Contractor shall obtain approval from the Engineer as to the condition and placement of the reinforcing prior to completing formwork and ordering concrete for a given concrete placement, or prior to shotcrete work.

3.2 PATCHING OF DAMAGED EPOXY COATINGS

- A. Patching material shall be applied to all sheared ends, areas of coating damage, and contact areas for hangers or couplers. Patching material shall be applied as soon as possible after to damage to coating, whether such damage occurs during coating application, fabrication, transportation, or installation. Areas to be patched shall be clean and free of surface contaminants. They shall be promptly treated in accordance with the resin manufacturer's recommendations and before detrimental oxidation occurs. Such rust that does occur shall be removed by suitable means prior to application of the epoxy repair coating. Patching of cut and damaged epoxy coatings shall be in accordance with ASTM D3963.

END OF SECTION

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Supply and placement of cast-in-place concrete including concrete materials, mix design, batching procedures, placement procedures, finishes, and curing for the plaza topping slab.

1.2 REFERENCES

- A. Definitions:
1. Cementitious Materials: Portland cement alone or in combination with one or more of fly ash, silica fume, and other pozzolans, or slag cement.
- B. Reference Standards: Latest edition as of Specification date.
1. American Concrete Institute (ACI):
 - a. 117: Specification for Tolerances for Concrete Construction and Materials and Commentary.
 - b. 301: Specifications for Structural Concrete.
 - c. 305R: Guide to Hot Weather Concreting.
 - d. 306R: Guide to Cold Weather Concreting.
 - e. 347: Guide to Formwork for Concrete.
 2. ASTM International:
 - a. C31/C31M: Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 - b. C33/C33M: Standard Specification for Concrete Aggregates.
 - c. C39/C39M: Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - d. C42/C42M: Standard Test Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
 - e. C94/C94M: Standard Specification for Ready-Mixed Concrete.
 - f. C143/C143M: Standard Test Method for Slump of Hydraulic-Cement Concrete.
 - g. C150/C150M: Standard Specification for Portland Cement.
 - h. C171: Standard Specification for Sheet Materials for Curing Concrete.
 - i. C172: Standard Practice for Sampling Freshly Mixed Concrete.
 - j. C231/C231M: Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
 - k. C260/C260M: Standard Specification for Air-Entraining Admixtures for Concrete.
 - l. C309: Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - m. C494/C494M: Standard Specification for Chemical Admixtures for Concrete.
 - n. C618: Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
 - o. C856: Standard Practice for Petrographic Examination of Hardened Concrete.
 - p. C1064/C1064M: Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.

- q. C1152/C1152M: Standard Test Method for Acid-Soluble Chloride in Mortar and Concrete.
- r. C1218/C1218M: Standard Test Method for Water-Soluble Chloride in Mortar and Cement.
- s. C1260: Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method).
- t. C1524: Standard Test Method for Water-Extractable Chloride in Aggregate (Soxhlet Method).

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate Work to ensure that adjacent areas are not adversely affected. Coordinate:
 - 1. With Owner's Representative.
 - 2. With other trades:
 - a. To ensure that work done by other trades is complete and ready to for concrete Work.
 - b. To avoid or minimize work on, or in immediate vicinity of, concrete Work in progress.
 - c. To ensure that subsequent work will not adversely affect installed concrete.
- B. Pre-placement Meeting:
 - 1. Conduct meeting at Site.
 - 2. Review requirements for concrete Work, including:
 - a. Construction schedule
 - b. Availability of materials, personnel, equipment, and facilities needed to make progress and avoid delays.
 - c. Site use, access, staging, and set-up location limitations.
 - d. Forecast weather conditions.
 - e. Surface preparation and substrate condition.
 - f. Placement procedures.
 - g. Special details.
 - h. Minimum cure period.
 - i. Testing and inspection requirements.
 - j. Temporary protection and repair of damaged concrete.
 - k. Structural loading limitations of deck.
 - l. Government regulations.
 - 3. Contractor's Site superintendent, Owner's Representative, and Architect/Engineer shall attend.

1.4 SUBMITTALS

- A. Product Data: Manufacturer's literature and technical data, including VOC contents, for admixtures, curing compounds, and other products.
 - 1. Include Safety Data Sheets (SDS) for information only; safety restrictions are sole responsibility of Contractor.
- B. Shop Drawings: For formwork, finished slopes (to drains), phasing, and location of control joints.
- C. Mockup: Provide a mockup 10 square feet in size that shows the color and finishing, including control joints, which will be used for the project for Owner review and approval. The mockup is to remain onsite and will serve as the standard for coloring and finishing.
- D. Design Mixes: For each concrete mixture, include:
 - 1. Proportions of materials.

2. Mill tests and certification for cement, fly ash, and slag cement. Certification for silica fume.
 3. Sieve analysis for fine and coarse aggregate.
 4. Test results for deleterious substances in aggregates and potential aggregate reactivity.
 5. Slump during laboratory tests.
 6. Shrinkage during laboratory tests.
 7. Air content during laboratory tests.
 8. Three-, seven-, and 28-day laboratory compression test results. Minimum three cylinders at each test age.
 9. Indicate:
 - a. Amount of mix water to be withheld for later addition at Site.
 - b. Range of high-range, water-reducing admixture dosage that may be added at Site without adversely affecting hardened concrete.
- E. Field Quality Control: Batch tickets for ready-mix concrete.
- F. Joint Layout: Proposed construction, control, and isolation joint layout required to construct structure, subject to approval by Architect/Engineer.
- G. Contractor Qualifications: Evidence that Contractor's *existing company* has minimum five years of continuous experience in similar concrete work; list of at least five representative, successfully-completed projects of similar scope and size, including:
1. Project name.
 2. Owner's name.
 3. Owner's Representative name, address, and telephone number.
 4. Description of work.
 5. Types of concrete work.
 6. Project supervisor.
 7. Total cost of concrete work and total cost of project.
 8. Completion date.

1.5 QUALITY ASSURANCE

- A. Contractor Qualifications: Experienced firm that has successfully completed concrete work similar in material, design, and extent to that indicated for the Project. Must have successful construction with specified materials in local area in use for a minimum of five years.
1. Employ foreman with minimum five years of experience as foreman on similar projects, who is fluent in English, to be on Site at all times during the Work. Do not change foremen during the course of the Project except for reasons beyond the control of Contractor; inform Architect/Engineer in advance of any changes.
 2. Provide at least one individual who is certified by ACI as Finisher/Technician for type of work being performed, during concrete pours.
- B. Ready-Mix Supplier Qualifications: ASTM C94/C94M; Certification of Production Facilities and Delivery Vehicles by National Ready Mixed Concrete Association.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. If concrete is to be site-batched:
1. Deliver, store, and handle materials according to manufacturer's recommendations and in such manner as to prevent damage to materials or structure.

2. Deliver materials to Site in original bags and containers with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, lot number, and directions for storing.
3. Keep materials dry and do not allow materials to be exposed to moisture during transportation, storage, handling, or installation. Reject and remove from Site new materials which exhibit evidence of moisture during application, or have been exposed to moisture.
4. Store materials in original, undamaged bags or containers in clean, dry, protected location on raised platforms with weather-protective coverings, within temperature range required by manufacturer. Manufacturer's standard packaging and covering is not considered adequate weather protection.
 - a. Store cement bags on pallets.
 - b. Store fine and coarse aggregates away from normal drainage paths and cover with canvas or plastic if necessary to keep dry.
 - c. Protect materials from dirt, dust, and other contaminants.
5. Limit stored materials on structures to safe loading capacity of structure at time materials are stored, and to avoid permanent deck deflection.
6. Conspicuously mark damaged or opened bags or containers or bags or containers with contaminated materials, and remove from Site as soon as possible.

1.7 PROJECT CONDITIONS

- A. Comply with Owner's limitations and restrictions for Site use and accessibility.
- B. Handle materials in strict accordance with safety requirements required by material manufacturers; Safety Data Sheets (SDS); and local, state, and federal rules and regulations. Maintain Safety Data Sheets (SDS) with materials in storage area and available for ready reference on Site.

PART 2 PRODUCTS

2.1 FORM MATERIALS

- A. Forms: Plywood, lumber, metal, plastic, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
 1. Do not use rust-stained, steel, form-facing material.
- B. Accessories:
 1. Form-Release Agent: Commercially-formulated form-release agent that will not bond with, stain, or adversely affect the concrete surface and will not impair subsequent treatments of concrete surface.
 - a. Formulate form-release agent with rust inhibitor for steel form-facing materials.

2.2 CONCRETE MATERIALS

- A. Source Limitations: Obtain each type or class of cementitious material of same brand from same manufacturer's plant, each aggregate from one source, and admixtures through one source from single manufacturer.
- B. Portland cement shall conform to ASTM C150, Type I.
- C. Fly Ash: ASTM C618, Class F or C

- D. Ground-Granulated Blast-Furnace Slag (GGBFS): ASTM C595.
- E. Silica Fume: ASTM C1240, amorphous silica.
- F. The following types of admixtures may be used when approved by the Engineer.
 - 1. Air-entraining Admixtures ASTM C260
 - 2. Chemical Admixtures ASTM C494
 - 3. CHROMIX Admixture for Color Conditioned Concrete ASTM C979 for topping slab, as requested by the Owner
- G. Calcium chloride shall not be permitted in the concrete as an intentional additive.
- H. Coarse aggregate: C33, Class 4S. Aggregates for the topping slab shall be normal-weight crushed stone or gravel. Fine aggregate shall be natural or manufactured sand. Aggregate particles shall be clean, hard, and angular, of uniform quality, and free from soft, thin elongated pieces, disintegrated stone, dirt, organic, or other injurious materials occurring either free or as a coating. Aggregates shall be supplied from a source acceptable to the Engineer, and shall be free of chert and other aggregates susceptible to volume instability under freezing conditions. Aggregates shall conform to ASTM C33, Class 4S with the following limitations:
 - 1. Minimum percentage of coarse aggregate by weight of total aggregate shall be 60 to 68 percent.
 - 2. Maximum coarse aggregate size shall be 3/4 in. for the topping slab.
- I. Mixing water shall be potable and free of injurious quantities of substances known to be harmful to portland cement.
- J. Water: Potable.

2.3 CURING MATERIALS

- A. Moisture-Retaining Cover: ASTM C171, white burlap-polyethylene sheet.
- B. 3M Waterproof Tape
- C. Water: Potable.

2.4 AUXILIARY MATERIALS

- A. Joint Filler: Semi-rigid, 100-percent-solids, epoxy; Shore A hardness of at least 85.
 - 1. Use MM-80 Semi-Rigid Epoxy Joint Filler, manufactured by Metzger/McGuire, www.metzgermcguire.com, 800-223-MM80, or approved equal.”

2.5 CONCRETE MIXES

- A. Prepare design mixes for each type and strength of concrete determined by either laboratory trial mixes or field-test data, according to ACI 301.
 - 1. Use qualified independent testing agency for preparing and reporting proposed mix designs for laboratory trial mix basis.
- B. Proportion normal-weight concrete mix as follows:
 - 1. 28-day Compressive Strength: 4,000 pounds per square inch.
 - 2. Maximum Water-Cementitious Materials Ratio, by weight: 0.45.

3. Fly Ash: Include 20 to 30 percent by mass of total cementitious materials, as cement replacement, unless otherwise approved.
4. Shrinkage: 700 micro-strain maximum at 90 days when tested according to ASTM C157, modified as follows:
 - a. Wet cure for seven days after casting, then store specimens in drying room.
5. Slump: 4 inches maximum.
 - a. With High-Range, Water-Reducing Admixture:
 - 1) 2- to 4-inch slump prior to adding admixture.
 - 2) 8 inches maximum slump after admixture is added.
6. Air Content: Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having air content of 4.5 to 7.5 percent, unless otherwise indicated.
7. Admixtures: Use admixtures according to manufacturer's written instructions.
 - a. Use water-reducing admixture. Alternately use high-range, water-reducing admixture (superplasticizer), as required, for placement and workability.
 - b. Use retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
8. No chlorides shall be intentionally introduced into concrete mix.
 - a. In hardened concrete, limit acid-soluble chloride ion content to 0.10 percent by weight of cement when tested according to ASTM C1152/C1152M, or water-soluble chloride ion content to 0.08 percent by weight of cement when tested according to ASTM C1218/C1218M.
 - b. If hardened concrete exceeds chloride ion limits above, limit water-extractable chloride ion content to 0.08 percent by weight of cement when tested according to ASTM C1524.
 - c. Provide test results necessary to demonstrate concrete and aggregates do not exceed chloride ion limits, unless waived by Architect/Engineer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements and other conditions affecting the installation or performance of the concrete Work.
 1. Ensure that work done by other trades is complete and ready for concrete Work.
 2. Verify that areas and conditions under which concrete Work is to be performed permit proper and timely completion of Work.
 3. Notify Architect/Engineer in writing of conditions which may adversely affect the installation or performance of the concrete Work and recommend corrections.
 4. Do not proceed with concrete Work until adverse conditions have been corrected and reviewed by Architect/Engineer.
 5. Commencing concrete Work constitutes acceptance of Work surfaces and conditions.

3.2 PROTECTION

- A. Take precautions to ensure the safety of people, including building users, passers-by, and workmen, and animals, and protection of property, including adjacent building elements, landscaping, and motor vehicles.

- B. Prevent construction debris and other materials from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
- C. Protect paving and sidewalks, and adjacent building areas from mechanical damage due to scaffolding and other equipment.
- D. Limit access to Work areas.
- E. Erect temporary protective canopies, as necessary, over walkways and at points of pedestrian and vehicular access that must remain in service during the Work.
- F. Assume responsibility for injury to persons or damage to property due to the Work, and remedy at no cost to Owner.

3.3 JOINTS

- A. Construction Joints: Construct joints true to line with faces perpendicular to the surface plane of the concrete, according to the approved joint layout.
 - 1. Provide sufficient joints so that members or sections can be cast continuously.
 - 2. Do not continue reinforcement through sides of strip placements of floors and slabs.
- B. Isolation Joints: Form isolation joints with preformed filler at walls, columns, drains, and other locations noted on Drawings.
- C. Control/Contraction Joints: Tool or sawcut control/contraction joints per the submitted and approved joint layout. Control/contraction joints to be a depth of $\frac{1}{4}$ of the thickness of the topping slab.

3.4 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C94/C94M, and furnish batch ticket information.
 - 1. Deliver concrete to Site and discharge within 90 minutes or before 300 revolutions of mixer drum, whichever comes first, after introduction of mix water. When air temperature is between 85 and 90 degrees F, reduce mixing and delivery time to 75 minutes; when air temperature is above 90 degrees F, reduce mixing and delivery time to 60 minutes. Concrete that exceeds the specified time limits shall be rejected.
 - 2. Do not add water-reducing or high-range, water-reducing admixture indiscriminately to increase slump.
 - 3. Introduce high-range, water-reducing admixture at the Site with additional mixing per the manufacturer's recommendations.
 - 4. Reject concrete that arrives at the Site with a slump exceeding the maximum specified slump.
- B. Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C94/C94M.
 - 1. Develop batching and mixing operations so that quality control is assured.
 - 2. Designate one or two individuals to batch and mix concrete. Fully instruct these individuals on batching and mixing procedures. No other persons shall batch or mix concrete without prior notification to Architect/Engineer.
 - 3. Maintain accurate mix proportions. Batch materials by weight on the basis of whole bags of cement. Maintain a calibrated scale at the Site during concrete placement operations.

Batching by volume is permitted if the weight-volume relationship for each material is verified on a daily basis, and aggregate moisture content is measured at least once daily and aggregate volume is adjusted for bulking.

4. Incorporate admixtures into the mix in the manner recommended by the manufacturer and approved by Architect/Engineer. Measure with accuracy of +/-3 percent. Add each admixture separately.
5. Combine and mix ingredients to uniform consistency.
6. Mix concrete materials in an appropriate drum-type batch machine mixer.
 - a. For a mixer capacity of 1 cubic yard or smaller, mix at least 1 1/2 minutes, but not more than five minutes after ingredients are in mixer.
 - b. For a mixer capacity larger than 1 cubic yard, increase mixing time by 15 seconds for each additional cubic yard.
 - c. Provide a sufficient number of mixers, including reserve mixers, so that concrete placement operations will proceed uninterrupted and each area is completely cast before concrete achieves initial set.

3.5 CONCRETE PLACEMENT

- A. Do not place concrete adjacent to hardened concrete less than 36 hours old.
- B. Deposit concrete as close as possible to its final position to avoid segregation due to rehandling or flowing. Place at such a rate that at all times concrete shall be plastic and flow readily into corners of forms and into spaces between and around reinforcing bars. Do not place concrete that has partially hardened or has been contaminated by foreign materials.
- C. Once concreting has commenced, it shall be carried on as a continuous operation until the panel or section is completed. Plastic concrete shall not be allowed to fall a vertical distance greater than four feet from point of discharge to point of deposit.
- D. Consolidate all newly placed concrete by vibrating. Overlay concrete shall be placed using a vibratory screed. For isolated patches, vibration shall be accomplished by means of an electric pencil- or spud-type vibrator, depending on the nature of the concrete being consolidated. Spare vibrators shall be kept at the site for use in the event of a vibrator malfunction. Vibrators shall be as narrow as necessary for shallow work.
- E. Manipulate and mechanically strike off concrete slightly above final grade, using a straight-edged wood or metal screed.

3.6 FINISHING SLABS

- A. Surface finish for topping slab:
 1. The top surface shall be finished to true smooth planes by screeding. Final finish profile shall be medium to heavy broom finish.
 2. Sawcut control/contraction joints as soon as possible without damaging concrete to a depth of at least 1/4 of the slab depth. Locate joints per the approved layout plan.
 3. Finished surfaces shall be free of loose particles, ridges, projections, voids and concrete droppings.
- B. Drainage:
 1. Where possible, slope finished exposed surfaces of topping slab sufficiently to avoid ponding of water. New slab concrete shall meet existing construction (e.g. curbs, sidewalk to remain, door thresholds, etc.) in a manner that will avoid trip hazards.

- C. Minimize out-of-plane variation in slab surface. If variations are unacceptable to the Engineer, Engineer may direct the Contractor to grind the concrete to bring the surface within acceptable limits. Patching of low spots shall not be permitted. Grinding shall be done as soon as possible, preferably within three days after placement, but not until concrete is sufficiently strong to prevent dislodging coarse aggregate particles.

3.7 CONCRETE CURING

- A. Do not permit heavy pedestrian, vehicular or construction equipment traffic on any portion of the topping slab until the concrete has been shown by cylinder test to have attained at least 75 percent of the specified 28-day compressive strength.
- B. Maintain concrete at a minimum temperature of 55° F and in a moist condition for at least the first seven days after placing, or until the concrete has achieved 75 percent of the specified 28-day compressive strength as demonstrated by cylinder test.
- C. Moist curing shall be accomplished by burlap covers kept continuously wet, or by continuous waterproof paper or four-mil polyethylene sheeting conforming to ASTM C171 with edges lapped and tightly sealed by sand, wood planks, pressure-sensitive tape, mastic, or glue.
- D. Use of spray-applied curing compounds shall not be permitted.
- E. Provide adequate thermal protection for concrete during freezing or near freezing weather. All concrete materials, reinforcement, forms, filler, and ground with which concrete is to come in contact shall be free of frost, ice, and snow. Throughout heating period, concrete shall be kept moist as specified. Placement and curing of concrete during cold weather shall be in accordance with requirements of ACI 306.
- F. Placement and curing of concrete during hot weather shall be in accordance with the requirements of ACI 305.
- G. If shrinkage cracks greater than 0.01 in. wide, or an excessive number of cracks in the judgment of the Engineer, appear in the concrete during the 7-day curing period, the concrete shall be considered defective, and it shall be removed and replaced by the Contractor at no extra cost to the Owner.
- H. Protect all work against vandalism, graffiti and other similar disturbances. Areas disturbed shall be corrected to their finished appearance as accepted by the owner.

3.8 FIELD QUALITY CONTROL

- A. Routine testing of ready-mixed concrete:

Unless more stringent testing is required by City agencies, the following testing shall be performed:

1. One set of four six-in. diameter by 12-in. long test cylinders shall be made at a frequency of once per day, once for each 20 cubic yards of ready-mixed concrete placed, or once for every 500 square feet of topping slab, whichever results in a larger number of tests.
2. All cylinders shall be made and tested by a qualified approved Testing Laboratory which meets the requirements of ASTM E329, and their reports will be sent to the Engineer and Contractor. Costs for these tests shall be included in the Contractor's bid price and paid by the contractor, except where specifically indicated otherwise in this Section.

3. One cylinder from each set shall be tested at seven days, and an additional two cylinders at 28 days, in accordance with ASTM C31. The fourth cylinder shall be laboratory-cured and held in reserve for strength testing beyond 28 days, if necessary and if directed by Engineer. Additional cylinders may be made and tested at the Contractor's expense where it is desired to demonstrate 75 percent of specified 28-day strength earlier than seven days after placement, and where high early strength is expected. All cylinders to be tested earlier than 7 days shall be field-cured in the part of the structure in which the concrete is placed, and shall be removed from the structure not more than 24 hours before the time of the test.
 4. At the time each set of cylinders is made, the fresh concrete shall be tested for slump and air content in accordance with ASTM C143 and C231, respectively, and the concrete mix temperature and air temperature shall be measured and recorded.
 5. Unless directed otherwise by the Engineer, samples of concrete for test specimens shall be taken from the transport vehicle during discharge.
 6. Test specimens shall be molded promptly after the sample is taken and then placed in site storage provided by the Contractor. Storage shall be in a shed, box or other enclosure maintained at a temperature between 60 and 80° F. Specimens shall be stored for a minimum of 16 hours prior to removal from the sampling location.
 7. Strength of concrete shall be considered satisfactory if:
 - a. The average compressive strength results of two 28-day tests in each set of cylinders equals or exceeds the specified 28-day strength, and neither of the 28-day tests results is 500 psi or more below specified 28-day strength; or
 - b. Compressive strength equals or exceeds the specified 28-day strength for each of two successive cylinder tests made before 28 days. In this case, additional scheduled tests may be waived.
 8. Testing of cylinders shall be in accordance with ASTM C39. Each test report shall contain the following information for each set of cylinders:
 - a. Individual test specimen strength, type of failure
 - b. Slump
 - c. Air content
 - d. Concrete and air temperature
 - e. Specimen number
 - f. Concrete pour location
 - g. Date cast
 - h. Date tested
 - i. Concrete properties specified
 - j. Notice if tests indicate concrete is not in conformance with specifications.
 9. Testing of cylinders shall be performed in accordance with New York City Building Code Requirements and shall be reported and filed with the TR2 "Technical Report: Concrete Pouring, Sampling and Compression Test Cylinders".
- B. Should results of cylinder tests, including testing of reserved cylinders after 28 days if directed by Engineer, not meet preceding strength requirements, the Contractor shall submit revised mix design data for concrete which will conform to the specifications. In the event of failure of test cylinder specimens for any portion of work, the Contractor, at the Contractor's expense, shall have sample cores cut from that portion of structure represented by unsatisfactory test specimens. Three cores shall be taken from each area in question according to ASTM C42. Concrete in the area represented by core tests will be considered structurally adequate if the average of the three cores is equal to at least 85 percent of specified 28-day cylinder strength, and if no single core has a strength less than 75 percent of the 28-day strength. If these strength acceptance criteria are not met by core tests, the Contractor shall remove and replace all questionable areas of concrete at the Contractor's expense.

3.9 CLEANING

- A. After completing the concrete Work:
1. Clean soiling from adjacent surfaces. Exercise care to avoid scratching or damage to surfaces.
 2. Repair surfaces stained, marred, or otherwise damaged during concrete Work.
 3. Clean up debris and surplus materials and remove from Site.

END OF SECTION

SECTION 07 01 50

PREPARATION FOR REROOFING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Surface preparation, supply, and installation of unreinforced and reinforced, hot, fluid-applied, rubberized-asphalt waterproofing system, including primers and flashings. Protection course materials, and drainage boards are also included.
- B. Related Sections:
 - 1. Section 07 62 00 - Sheet Metal Flashing and Trim: Flashings
 - a. D41/D41M: Standard Specification for Asphalt Primer Used in Roofing, Damproofing, and Waterproofing.
- C. Section Includes:
 - 1. Full tear-off of roof systems at areas indicated on Drawings.
- D. Related Requirements:
 - 1. Section 011000 "Summary" for use of premises and for phasing requirements.
 - 2. Section 015000 "Temporary Facilities and Controls" for temporary construction and environmental-protection measures for reroofing preparation.
 - 3. Section 071413 "Hot Fluid-Applied Ruberized Asphalt Waterproofing"
 - 4. Section 075419 "Polyvinyl-Chloride (PVC) Roofing"

1.2 DEFINITIONS

- A. Full Roof Tear-off: Removal of existing roofing system down to existing roof deck.
- B. Roofing Terminology: Definitions in ASTM D1079 and glossary of NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to work of this Section.

1.3 PREINSTALLATION MEETINGS

- A. Preliminary Roofing Conference: Before starting removal Work, conduct conference at the project site.
 - 1. Meet with Owner, Architect/Engineer, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
 - 2. Review methods and procedures related to roofing tear-off, including, but not limited to, the following:
 - a. Reroofing preparation, including roofing system manufacturer's written instructions.
 - b. Temporary protection requirements for existing roofing system components that are to remain.
 - c. Existing roof drains and roof drainage during each stage of reroofing, and roof-drain plugging and plug removal.
 - d. Construction schedule and availability of materials, Installer's personnel, equipment, and facilities needed to avoid delays.
 - e. Existing roof deck conditions requiring Architect notification.

- f. Existing roof deck removal procedures and Owner notifications.
- g. Condition and acceptance of existing roof deck and base flashing substrate for reuse.
- h. Structural loading limitations of roof deck during reroofing.
- i. Base flashings, special roofing details, drainage, penetrations, equipment curbs, and condition of other construction that affect reroofing.
- j. HVAC shutdown and sealing of air intakes.
- k. Shutdown of fire-suppression, -protection, and -alarm and -detection systems.
- l. Asbestos removal and discovery of asbestos-containing materials.
- m. Governing regulations and requirements for insurance and certificates if applicable.
- n. Existing conditions that may require Architect notification before proceeding.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Temporary Roofing Submittal: Product data and description of temporary roofing system.
 - 1. If temporary roof remains in place, include surface preparation requirements needed to receive permanent roof, and submit a letter from roofing manufacturer stating acceptance of the temporary roof and that its inclusion does not adversely affect the new roofing system's resistance to fire and wind or specified special warranty.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
 - 1. Include certificate that Installer is approved by warrantor of existing roofing system.
 - 2. Include certificate that Installer is licensed to perform asbestos abatement.
- B. Field Test Reports:
 - 1. Fastener pull-out test report.
- C. Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including exterior and interior finish surfaces, that might be misconstrued as having been damaged by reroofing operations.
 - 1. Submit before Work begins.
- D. Landfill Records: Indicate receipt and acceptance of demolished roofing materials and hazardous wastes, such as asbestos-containing materials, by a landfill facility licensed to accept them.

1.6 CLOSEOUT SUBMITTALS

- A. Certified statement from the roof membrane manufacturer stating that existing roof warranty has not been affected by Work performed under this Section.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: [Approved by warrantor of existing roofing system to work on existing roofing] [and] [licensed to perform asbestos abatement in the state or jurisdiction where Project is located].
- B. Regulatory Requirements:
 - 1. Comply with governing EPA notification regulations before beginning roofing removal.

2. Comply with hauling and disposal regulations of authorities having jurisdiction.

1.8 FIELD CONDITIONS

- A. Existing Roofing Systems: Built-up asphalt and EPDM
- B. Owner will occupy portions of building immediately below reroofing area.
 1. Conduct reroofing so Owner's operations are not disrupted.
 2. Provide Owner with not less than 72 hours' written notice of activities that may affect Owner's operations.
 3. Coordinate work activities daily with Owner so Owner has adequate advance notice to place protective dust and water-leakage covers over sensitive equipment and furnishings, shut down HVAC and fire-alarm or -detection equipment if needed, and evacuate occupants from below work area.
 4. Before working over structurally impaired areas of deck, notify Owner to evacuate occupants from below affected area.
 - a. Verify that occupants below work area have been evacuated before proceeding with work over impaired deck area.
- C. Protect building to be reroofed, adjacent buildings, walkways, site improvements, exterior plantings, and landscaping from damage or soiling from reroofing operations.
- D. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.
- E. Conditions existing at time of inspection for bidding will be maintained by Owner as far as practical.
 1. A roof moisture survey of existing roofing system is available for Contractor's reference.
 2. The results of an analysis of test cores from existing roofing system are available for Contractor's reference.
 3. Construction Drawings and Project Manual for existing roofing system are provided for Contractor's convenience and information, but they are not a warranty of existing conditions. They are intended to supplement rather than serve in lieu of Contractor's own investigations. Contractor is responsible for conclusions derived from existing documents.
- F. Limit construction loads on existing roof areas to remain, and existing roof areas scheduled to be reroofed as to not overload the structure.
- G. Weather Limitations: Proceed with reroofing preparation only when existing and forecasted weather conditions permit Work to proceed without water entering existing roofing system or building.
 1. Remove only as much roofing in one day as can be made watertight in the same day.
- H. Hazardous Materials: A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
 1. Hazardous material remediation is specified elsewhere in the Contract Documents.
 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except according to procedures specified elsewhere in the Contract Documents.
 3. Coordinate reroofing preparation with hazardous material remediation to prevent water from entering existing roofing system or building.

PART 2 PRODUCTS

2.1 TEMPORARY ROOFING MATERIALS

- A. See Section 07 14 13 and Section 07 54 19

2.2 AUXILIARY REROOFING MATERIALS

- A. General: Use auxiliary reroofing preparation materials recommended by roofing system manufacturer for intended use and compatible with components of new roofing system.

PART 3 EXECUTION

3.1 PREPARATION

- A. Protection of In-Place Conditions:
 - 1. Protect existing roofing system that is not to be reroofed.
 - 2. Loosely lay **1-inch- (25-mm-)** minimum thick, EPS insulation over existing roofing in areas not to be reroofed.
 - a. Loosely lay **15/32-inch (12-mm)** plywood or OSB panels over EPS. Extend EPS past edges of plywood or OSB panels a minimum of **1 inch (25 mm)**.
 - 3. Limit traffic and material storage to areas of existing roofing that have been protected.
 - 4. Maintain temporary protection and leave in place until replacement roofing has been completed. Remove temporary protection on completion of reroofing.
 - 5. Comply with requirements of existing roof system manufacturer's warranty requirements.
- B. Seal or isolate windows that may be exposed to airborne substances created in removal of existing materials.
- C. Shut off rooftop utilities and service piping before beginning the Work.
- D. Test existing roof drains to verify that they are not blocked or restricted.
 - 1. Immediately notify Architect of any blockages or restrictions.
- E. Coordinate with Owner to shut down air-intake equipment in the vicinity of the Work.
 - 1. Cover air-intake louvers before proceeding with reroofing work that could affect indoor air quality or activate smoke detectors in the ductwork.
- F. During removal operations, have sufficient and suitable materials on-site to facilitate rapid installation of temporary protection in the event of unexpected rain.
- G. Maintain roof drains in functioning condition to ensure roof drainage at end of each workday.
 - 1. Prevent debris from entering or blocking roof drains and conductors.
 - a. Use roof-drain plugs specifically designed for this purpose.
 - b. Remove roof-drain plugs at end of each workday, when no work is taking place, or when rain is forecast.
 - 2. If roof drains are temporarily blocked or unserviceable due to roofing system removal or partial installation of new roofing system, provide alternative drainage method to remove water and eliminate ponding.
 - a. Do not permit water to enter into or under existing roofing system components that are to remain.

3.2 ROOF TEAR-OFF

- A. Notify Owner each day of extent of roof tear-off proposed for that day and obtain authorization to proceed.
- B. Lower removed roofing materials to ground and onto lower roof levels, using dust-tight chutes or other acceptable means of removing materials from roof areas.
- C. Remove aggregate ballast from roofing.
- D. Remove pavers and accessories from roofing.
- E. Full Roof Tear-off: Where indicated on Drawings, remove existing roofing and other roofing system components down to the existing roof deck.
 - 1. Remove vapor retarder, roof insulation, and cover board.
 - 2. Remove base flashings and counter flashings.
 - 3. Remove perimeter edge flashing.
 - 4. Remove expansion-joint covers.
 - 5. Remove flashings at pipes, curbs, mechanical equipment, and other penetrations.
 - 6. Remove roof drains indicated on Drawings to be removed.
 - 7. Remove wood blocking, curbs, and nailers.

3.3 DECK PREPARATION

- A. Inspect deck after tear-off of roofing system.
- B. If deck surface is unsuitable for receiving new roofing or if structural integrity of deck is suspect, immediately notify Architect/Engineer.
 - 1. Do not proceed with installation until directed by Architect/Engineer.

3.4 TEMPORARY ROOFING

- A. Install approved temporary roofing over area to be reroofed.
- B. Prepare temporary roof to receive new roofing.
 - 1. Restore temporary roofing to watertight condition.
 - 2. Obtain approval for temporary roof substrate from roofing manufacturer and Architect/Engineer before installing new roof.

3.5 BASE FLASHING REMOVAL

- A. Remove existing base flashings.
 - 1. Clean substrates of contaminants, such as asphalt, sheet materials, dirt, and debris.
- B. Do not damage metal counterflashings that are to remain.
 - 1. Replace metal counterflashings damaged during removal with counterflashings of same metal, weight or thickness, and finish as existing.

3.6 DISPOSAL

- A. Collect demolished materials and place in containers.
 - 1. Promptly dispose of demolished materials.
 - 2. Do not allow demolished materials to accumulate on-site.

3. Storage or sale of demolished items or materials on-site is not permitted.
- B. Transport and legally dispose of demolished materials off Owner's property.

END OF SECTION

SECTION 07 14 13

HOT, FLUID-APPLIED, RUBBERIZED-ASPHALT WATERPROOFING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Surface preparation, supply, and installation of unreinforced and reinforced, hot, fluid-applied, rubberized-asphalt waterproofing system, including primers and flashings. Protection course materials, and drainage boards are also included.
- B. Related Sections:
 - 1. Section 07 62 00 - Sheet Metal Flashing and Trim: Flashings
 - 2. Section 07 92 00 - Joint Sealants: Joint sealant.

1.2 REFERENCES

- A. Definitions:
 - 1. ASTM D1079 for standard terminology.
- B. Reference Standards: Standards latest edition of date of Specification.
 - 1. ASTM International:
 - a. D41/D41M: Standard Specification for Asphalt Primer Used in Roofing, Damproofing, and Waterproofing.
 - b. D92: Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester.
 - c. D412: Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension.
 - d. D624: Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
 - e. D1079: Standard Terminology Relating to Roofing and Waterproofing.
 - f. D4263: Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.
 - g. D4716: Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.
 - h. D5295: Standard Guide for Preparation of Concrete Surfaces for Adhered (Bonded) Membrane Waterproofing Systems.
 - i. D5957: Standard Guide for Flood Testing Horizontal Waterproofing Installations.
 - j. E96: Standard Test Methods for Water Vapor Transmission of Materials.
 - 2. Canadian Government Specification Board (CAN/CGSB):
 - a. 37.50: Hot-Applied, Rubberized Asphalt for Roofing and Waterproofing (withdrawn January 2005).
 - 3. International Concrete Repair Institute (ICRI):
 - a. Guide for Selecting and Specifying Concrete Surface Preparation.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate Work to ensure that adjacent areas are not adversely affected. Coordinate:
 - 1. With Owner's Representative.
 - 2. With other trades:

- a. To ensure that work done by other trades is complete and ready for waterproofing Work.
 - b. To avoid or minimize work on, or in immediate vicinity of, waterproofing Work in progress.
 - c. To ensure that subsequent work will not adversely affect completed waterproofing.
- B. Pre-installation Meeting:
1. Conduct meeting at Site.
 2. Review requirements for waterproofing, including:
 - a. Construction schedule.
 - b. Availability of materials, Waterproofing Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - c. Site use, access, staging, and set-up location limitations.
 - d. Approved mockup procedures.
 - e. Forecast weather conditions.
 - f. Surface preparation and substrate condition and pretreatment.
 - g. Installation procedures.
 - h. Special details and sheet flashings.
 - i. Minimum curing period.
 - j. Testing and inspection requirements.
 - k. Temporary protection and repair of waterproofing.
 - l. Structural loading limitations of deck.
 3. Contractor's Site superintendent, waterproofing manufacturer's technical representative, Waterproofing Installer's foreman, Owner's Representative, and Architect/Engineer shall attend.

1.4 SUBMITTALS

- A. Product Data:
1. Waterproofing manufacturer's literature including written instructions for evaluating, preparing, and treating substrate; technical data including tested physical and performance properties; and application instructions. Include VOC content of components.
 - a. Include Safety Data Sheets (SDS) for information only; safety restrictions are sole responsibility of Contractor.
- B. Shop Drawings: Include roof plans, sections, details, and attachments to other work, including the following:
1. Layout and thickness of insulation.
 2. Base flashings and membrane terminations.
 3. Flashing details at penetrations.
- C. Samples:
1. 12-inch-by-12-inch square of prefabricated drainage composite.
- D. Product Test Reports: From qualified independent testing agency indicating and interpreting test results of waterproofing for compliance with requirements, based on comprehensive testing of current waterproofing formulations.
- E. Field Quality Control: Reports for site visits of waterproofing manufacturer's representative.
- F. Waterproofing Installer Qualifications:

1. Certification signed by waterproofing manufacturer, certifying that Installer complies with manufacturer's requirements to install specified, warranted, waterproofing system.
 2. Evidence that Installer's *existing company* has minimum five years of continuous experience in similar waterproofing work; list of at least five representative, successfully-completed projects of similar scope and size, including:
 - a. Project name.
 - b. Owner's name.
 - c. Owner's Representative name, address, and telephone number.
 - d. Description of work.
 - e. Hot rubberized-asphalt materials used.
 - f. Project supervisor.
 - g. Total cost of waterproofing work and total cost of project.
 - h. Completion date.
- G. Sample Warranties: Copies of waterproofing manufacturer's warranty, Waterproofing Installer's warranty, and Contractor's warranty, all stating obligations, remedies, limitations, and exclusions. Submitted with Bid.
- H. Prior to installation of waterproofing system, letter from waterproofing manufacturer stating approval of use of waterproofing system on Project and eligibility for manufacturer's warranty, based on review of:
1. Manufacturer's Project Registration Form, with information filled out completely and accurately, including deviations from Specification.
 2. Complete set of drawings of waterproofing system installation showing substrate limits, outline, dimensions, transitions, and types and locations of penetrations.
 3. Atypical or special condition details which are to be used.
- I. Following completion of the Work:
1. Waterproofing manufacturer's warranty inspection reports.
 2. Completed joint and several warranty from waterproofing manufacturer and Waterproofing Installer.
 3. Completed warranty from Waterproofing Installer.
 4. Completed warranty from Contractor.

1.5 QUALITY ASSURANCE

- A. Waterproofing Installer Qualifications: Experienced firm that has successfully completed waterproofing work similar in material, design, and extent to that indicated for Project; that is approved, authorized, or licensed by waterproofing manufacturer to install waterproofing; and that is eligible to receive waterproofing manufacturer's warranty. Must have successful installations of specified materials in local area in use for minimum of five years.
1. Employ foreman trained by waterproofing manufacturer and with minimum five years of experience as foreman on similar projects, who is fluent in English, to be on Site at all times during Work. Do not change foremen during course of Project except for reasons beyond control of Installer; inform Architect/Engineer in advance of any changes.
- B. Mockups: Install approximately 10-foot-by-10-foot area of waterproofing to demonstrate surface preparation, crack and joint treatment, corner treatment, and execution quality.
1. If Architect/Engineer determines mockup does not comply with requirements, modify mockup or construct new mockup until mockup is approved.
 2. Approved mockup will be standard for judging completed Work.

3. Approved mockup may become part of completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials according to manufacturer's recommendations and in such a manner as to prevent damage to materials or structure.
- B. Deliver materials to Site in original containers with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, lot number, and directions for storing and mixing with other components.
- C. Keep materials dry and do not allow materials to be exposed to moisture during transportation, storage, handling, and installation. Reject and remove from Site new materials which exhibit evidence of moisture during application, or have been exposed to moisture.
- D. Store materials in original, undamaged containers in clean, dry, protected location on raised platforms with weather-protective coverings, within temperature range required by waterproofing manufacturer. Protect stored materials from direct sunlight. Manufacturer's standard packaging and covering is not considered adequate weather protection.
- E. Limit stored materials on structures to safe loading capacity of structure at time materials are stored, and to avoid permanent deck deflection.
- F. Conspicuously mark damaged or opened containers or containers with contaminated materials, and remove from Site as soon as possible.
- G. Remove and replace materials that cannot be applied within stated shelf life.

1.7 PROJECT CONDITIONS

- A. Verify existing dimensions and details prior to start of waterproofing Work. Notify Architect/Engineer of conditions found to be different than those indicated in the Contract Documents. Architect/Engineer will review situation and inform Contractor and Waterproofing Installer of changes.
- B. Comply with Owner's limitations and restrictions for Site use and accessibility.
- C. Protect completed waterproofing from damage from construction activities. Repair damage to installed waterproofing from construction activities.
- D. Ensure that drains are operational at the end of each workday or if precipitation is forecast.
- E. Environmental Limitations: Apply waterproofing when existing and forecast weather conditions permit waterproofing to be installed according to waterproofing manufacturer's written instructions and warranty requirements.
 1. Apply waterproofing when substrate temperature is falling, and when substrate and ambient temperatures are within range recommended by waterproofing manufacturer.
 2. Do not apply to damp or wet substrate.
- F. Handle and install materials in strict accordance with safety requirements required by waterproofing manufacturer; Safety Data Sheets (SDS); and local, state, and federal rules and

regulations. Maintain Safety Data Sheets (SDS) with materials in storage area and available for ready reference on Site.

- G. Maintain adequate ventilation during application and curing of waterproofing materials.
 - 1. Locate melters away from flammable materials and mechanical air intake systems. Observe fire, safety, and pollution regulations of governing authorities.
 - 2. Adhesives contain petroleum distillates and are extremely flammable. Do not breathe vapors or use near open fire. Do not use in confined areas without adequate ventilation. Consult container and packaging labels and Safety Data Sheets for specific safety information.

1.8 CHANGES IN WORK

- A. During rehabilitation work, existing conditions may be encountered which are not known or are at variance with the Contract Documents. Such conditions may interfere with the Work and may consist of damage or deterioration of the substrate or surrounding materials that could jeopardize the integrity or performance of the Work.
 - 1. Notify Architect/Engineer of conditions that may interfere with the proper execution of the Work or jeopardize the performance of Work prior to proceeding with Work.

1.9 WARRANTY

- A. Manufacturer's Warranty: Written warranty, signed by roofing manufacturer, agreeing to repair or replace roofing and sheet flashings that do not comply with requirements or that do not remain watertight within specified warranty period.
 - 1. Warranty includes removing and reinstalling protection, drainage panels, and concrete wearing slab.
 - 2. Warranty Period: Twenty-five (25) years after date of Substantial Completion.
- B. Waterproofing Installer's Warranty:
 - 1. Completed warranty form at end of Section, signed by Installer, including:
 - a. Repair or replace components of roofing system that do not comply with requirements; that do not remain watertight; that fail in adhesion, cohesion, or general durability; or that deteriorate in manner not clearly specified by submitted roofing-system manufacturer's data as inherent quality of material for application indicated. Warranty includes defects such as blisters, ridging, and excessive surfacing loss.
 - b. Warranty includes removing and reinstalling drainage panels, insulation, filter fabric and pavers.
 - c. The guaranty includes responsibility for removal and replacement of other work which conceals roofing membranes. This guaranty shall include all work installed under this contract including membranes, flashings, drainage systems, metal work, insulation, fasteners and miscellaneous items.
 - d. Labor and materials to perform warranty work.
 - 2. Warranty Period: 2 years from date of completion of roofing system.

PART 2 PRODUCTS

2.1 HOT, FLUID-APPLIED, RUBBERIZED ASPHALT

- A. Source Limitations: Obtain materials through one source from single waterproofing manufacturer, or from sources approved by waterproofing manufacturer.
- B. General: single-component, 100-percent-solids, hot, fluid-applied, rubberized asphalt; with the following properties measured per applicable test methods in CAN/CGSB-37.50 (withdrawn January 2005) or as otherwise noted.
 - 1. Flash Point: ASTM D92 - 500 degrees F.
 - 2. Penetration, 0.1 mm (0.004 inches): 110 mm (4.3 inches) maximum at 25 degrees C (77 degrees F) and 200 mm (7.9 inches) maximum at 50 degrees C (122 degrees F).
 - 3. Flow: 3 mm (0.1 inches) maximum at 60 degrees C (140 degrees F).
 - 4. Toughness: 5.5 Joules (4.1 foot-pounds) minimum.
 - 5. Ratio of Toughness to Peak Load: 0.040 minimum.
 - 6. Adhesion Rating: Pass.
 - 7. Water Vapor Permeability: ASTM E96, Procedure E - 1.7 ng/Pa x second x sq. m (2.4 x 10⁻¹² pounds/ (pounds per square inch) x second x square foot) maximum.
 - 8. Water Absorption: 0.35 g (0.8 pounds) maximum mass gain or 0.18 g (0.4 pounds) maximum mass loss.
 - 9. Pinholing: Not more than one pinhole.
 - 10. Low Temperature Flexibility: No cracking, delamination, or adhesion loss.
 - 11. Crack Bridging Capability: No cracking, splitting, or adhesion loss.
 - 12. Heat Stability: Comply with requirements for penetration, flow, low temperature flexibility, and viscosity when heated for five hours at waterproofing manufacturer's recommended application temperature.
 - 13. Viscosity Test: Two to 15 seconds.
- C. Use one of the following products or approved equal:
 - 1. Monolithic Membrane 6125 manufactured by American Hydrotech, Inc.
 - 2. ram-Tough 250 manufactured by Barrett Company.
 - 3. 790-11 manufactured by Henry Company.
 - 4. CCW-500R manufactured by Carlisle Coatings & Waterproofing Inc.

2.2 AUXILIARY MATERIALS

- A. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with hot, fluid-applied, rubberized asphalt.
 - 1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.
- B. Primer: ASTM D41/D41M, asphaltic primer.
- C. Elastomeric Flashing Sheet: 50 mil minimum, non-staining, uncured sheet neoprene.
 - 1. Properties.
 - a. Tensile Strength: ASTM D412, Die C - 1400 pounds per square inch minimum.
 - b. Elongation: ASTM D412 - 300 percent minimum.
 - c. Tear Resistance: ASTM D 624, Die C - 125 pounds per square inch minimum.
 - d. Brittleness: ASTM D2137 - does not break at minus 30 degrees F.
 - 2. Splicing Cement (used to bond elastomeric flashing sheets together): As recommended by waterproofing manufacturer for type of elastomeric flashing sheet.

3. Lap Sealant (used to seal edges of elastomeric flashing sheet splices): As recommended by waterproofing manufacturer for type of elastomeric flashing sheet.
 4. Bonding Adhesive (used to bond elastomeric flashing sheets to an approved substrate: As recommended by waterproofing manufacturer for type of flashing sheet.
- D. Reinforcing Fabric: Waterproofing manufacturer's recommended spun-bonded polyester fabric.
- E. Protection (Cap) Sheet: Flexible sheets of fiberglass-reinforced rubberized asphalt or non-granular-surfaced, SBS-modified bitumen.
- F. Sealants and Accessories: Waterproofing manufacturer's recommended sealants and accessories.

2.3 PROTECTION BOARD

- A. Semi-rigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners.
1. Nominal Thickness:
 - a. For vertical applications: 1/8 inch.
 2. Protection Course Adhesive: As recommended by waterproofing manufacturer for type of protection course.

2.4 DRAINAGE PANELS

- A. Molded-Sheet Drainage Panel: Prefabricated, composite drainage panels, manufactured with permeable, geotextile facing laminated to molded-plastic-sheet drainage core.
1. Drainage Core: Three-dimensional, non-biodegradable, molded-plastic-sheet material designed to effectively drain water under backfill pressure.
 - a. Hydrodrain 400 by American Hydrotech
 - b. Approved equal

2.5 ACCESSORIES

- A. Drains:
1. Two-Level Plaza Drain: Square-top prom-deck drain with dura-coated cast iron body and square promenade frame and heel-proof grate with combination waterproofing clamping ring. Provide stainless steel perforated extension as necessary with associated extension rods to support promenade frame and grate.
- B. Termination Bars: A666, Type 304 stainless-steel or aluminum; approximately 1-inch wide by 1/8-inch thick; with predrilled holes at 8 inches on center.
- C. Fasteners:
1. For concrete and masonry substrates:
 - a. Made of corrosion-resistant materials.
 - b. Mushroom-head anchors; 1/4-inch diameter, 1-1/4-inch embedment minimum.
 - c. Use Zamac Nailin fasteners manufactured by Power Fastening, Inc., or equal.
 2. For sheet metal substrates:
 - a. Made of corrosion-resistant materials or coated for corrosion resistance.
 - b. Minimum No. 8-18 by 1-1/4-inch long, self-drilling.
 - c. Use TEK 2 Self-Drilling Fasteners manufactured by ITW Buildex; Dril-Flex screws manufactured by Elco Industries, Inc.; or equal.

3. For wood substrate:
 - a. Nails: Corrosion-resistant steel; sufficient length to provide 1-1/2-inch minimum embedment into wood substrate.
 - b. Washers: 1 inch diameter minimum; same corrosion-resistant material as nails.
- D. Draw bands: Stainless steel draw band as recommended by waterproofing manufacturer to terminate around round pipes.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions with Waterproofing Installer and waterproofing manufacturer's representative for compliance with requirements and other conditions affecting installation or performance of waterproofing.
 1. Ensure that work done by other trades is complete and ready for waterproofing Work.
 2. Verify that areas and conditions under which waterproofing Work is to be performed permit proper and timely completion of Work.
 3. Notify Architect/Engineer in writing of conditions which may adversely affect installation or performance waterproofing and recommend corrections.
 4. Do not proceed with waterproofing Work until adverse conditions have been corrected and reviewed by Architect/Engineer.
 5. Commencing waterproofing Work constitutes acceptance of Work surfaces and conditions.

3.2 PROTECTION

- A. Take precautions to ensure safety of people, including building users, passers-by, and workmen, and animals, and protection of property, including adjacent building elements, landscaping, and motor vehicles.
- B. Prevent construction debris and other materials from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
- C. Protect paving and sidewalks, and adjacent building areas from mechanical damage due to scaffolding and other equipment.
- D. Limit access to Work areas.
- E. Erect temporary protective canopies, as necessary, over walkways and at points of pedestrian and vehicular access that must remain in service during Work.
- F. Comply with waterproofing manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products.
- G. Cover adjacent surfaces with materials that are proven to resist waterproofing materials.
- H. Assume responsibility for injury to persons or damage to property due to Work, and remedy at no cost to Owner.

3.3 SURFACE PREPARATION

- A. Remove existing waterproofing and other materials to expose substrate.

1. Remove only as much of existing waterproofing as can be prepared and new waterproofing installed in one workday, unless provisions are implemented to maintain watertightness in interim.
 2. Provide temporary protection as needed if watertightness is compromised.
 3. Do not begin removal of existing waterproofing when weather conditions are not conducive to maintaining watertightness or for application of new waterproofing.
- B. Clean and prepare concrete substrate according to waterproofing manufacturer's written instructions and recommendations in ASTM D5295. Provide clean, dust-free, and dry substrate for waterproofing application.
1. Verify that concrete has cured and aged for minimum time period recommended by waterproofing manufacturer.
 2. Verify that substrate is sound and is visibly dry and free of moisture.
 - a. Test for moisture on new concrete decks by pouring one pint of hot, fluid-applied, rubberized asphalt on deck at start of each day's Work and at start of each roof area or plane. Do not proceed with waterproofing Work if test sample foams or can be easily and cleanly stripped after cooling.
 - b. If necessary, test for moisture vapor emission by plastic sheet method according to ASTM D4263.
 3. Verify that concrete curbs, expansion joints, and transitions from one surface plane to another (inside and outside corners) are cleanly formed and free of broken edges and excess concrete.
 4. Remove concrete fins and projections, concrete splatter, and other irregularities which would prevent monolithic, continuous application of waterproofing.
 5. Properly repair substrate defects (such as voids, form tie holes, honeycombing, and cracks) with latex-modified concrete or another material acceptable to waterproofing manufacturer and Architect/Engineer.
 6. Remove grease, oil, asphalt solids, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
 7. Shotblast or scarify concrete to provide clean surface, free of laitance, dirt, and other loose or foreign material.
 8. Thoroughly sweep substrate and clean with oil-free compressed air.
- C. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
- D. Close off deck drains and other deck penetrations to prevent spillage and migration of waterproofing fluids.
- E. Waterproofing Installer and waterproofing manufacturer's representative shall examine substrate to ensure that it is properly prepared and ready to receive waterproofing. Waterproofing manufacturer's representative shall report in writing to Waterproofing Installer and Architect/Engineer conditions which will adversely affect waterproofing system installation or performance. Do not proceed with waterproofing installation until these conditions have been corrected and reviewed by Architect/Engineer.
- F. Proceed with installation only after unsatisfactory conditions have been corrected. Commencing installation constitutes acceptance of Work surfaces and conditions.

3.4 PRIMER APPLICATION

- A. Apply primer only when weather conditions are conducive to installation of new waterproofing. Do not apply in environmental conditions exceeding recommendations of waterproofing manufacturer.
- B. Apply primer to substrate using hand-held sprayer or short-nap roller, evenly at a rate of 300 to 600 square feet per gallon, depending on surface texture. Primer should "tan" concrete surface, not blacken it.
- C. Allow sufficient time for primer to thoroughly dry prior to waterproofing application. Waterproofing will not bond to primer which has not dried.
- D. Do not spray primer onto previously-installed waterproofing.

3.5 WATERPROOFING PREPARATION

- A. Heat waterproofing material in double-jacketed, oil-bath melter with mechanical agitation, specifically designed for heating of hot, fluid-applied, rubberized-asphalt waterproofing materials.
- B. Heat material until it can be drawn free-flowing at a temperature range between 350 degrees F and 425 degrees F.

3.6 FLASHING INSTALLATION

- A. Prepare and treat substrates to receive waterproofing, including cracks, joints, deck drains, corners, and penetrations according to waterproofing manufacturer's written instructions.
- B. Begin flashing installation only when weather conditions are conducive to installation of materials. Do not apply in environmental conditions exceeding recommendations of waterproofing manufacturer.
- C. Non-moving cracks and joints:
 - 1. Rout and install sealant in joints and cracks in substrate. Remove dust and dirt from surface with blast of oil-free compressed air in general accordance with ASTM D4258.
 - 2. Cracks over 1/16 inch wide but less than 1/4 inch wide: Embed 6-inch-wide strip of reinforcing fabric into 125-mil-thick layer of hot, fluid-applied, rubberized asphalt, centered over sealed crack. Use longest pieces of fabric which are practical based on Site conditions. Cover with waterproofing material.
 - 3. Cracks over 1/4 inch wide: Adhere 6-inch-wide strip of elastomeric flashing sheet to substrate in 125-mil-thick layer of hot, fluid-applied, rubberized asphalt, centered along crack. Use longest pieces of fabric which are practical based on Site conditions. Cover with waterproofing material.
 - 4. Construction and Control Joints: Adhere 6-inch-wide strip of elastomeric flashing sheet to substrate in 125-mil-thick layer of hot, fluid-applied, rubberized asphalt, centered along joint. Use longest pieces of fabric which are practical based on Site conditions. Cover with waterproofing material.
 - 5. Deck-to-Wall Transitions: Center 6-inch-wide strip of elastomeric flashing sheet along transition; adhere to horizontal surface in 125-mil-thick layer of hot, fluid-applied, rubberized asphalt; and adhere to vertical surface with bonding adhesive. Use longest

pieces of fabric which are practical based on Site conditions. Cover with waterproofing material.

- D. Expansion Joints and Discontinuous Deck-to-Wall and Deck-to-Deck Joints (joint with possible movement): Bridge joint with 12-inch-wide strip of elastomeric flashing extended 6 inches minimum on each side of joint; adhered to horizontal surfaces in 125-mil-thick layer of hot, fluid-applied, rubberized asphalt; and adhere to vertical surfaces with bonding adhesive.
- E. Bonding adhesive:
1. Thoroughly mix bonding adhesive before using and frequently while in use.
 2. Apply bonding adhesive evenly, without globs or puddles, with a 9-inch-wide, short-nap, paint roller to both flashing and substrate at rate covering approximately 60 square feet per gallon for both surfaces. Do not apply bonding adhesive to lap area.
 3. Allow bonding adhesive to dry until it is tacky, but will not slide when pushed with finger or string up from dry finger touch.
 4. Roll coated flashing into coated substrate, avoiding wrinkles.
 5. Roll bonded flashing immediately after placing sheet into adhesive with metal roller to ensure maximum contact.
 6. Install adjoining sheets in the same manner, overlapping previous sheet a minimum of 3 inches.
- F. Lap Splices:
1. Fold top sheet of lap back about 12 inches. Remove dirt by wiping both matting surfaces with clean rag. Completely clean splice of dust or other contaminants. Finished surface shall be solid black with no streaks.
 2. Thoroughly mix splicing cement before using and frequently while in use.
 3. Apply splicing cement using 3-to-4-inch-wide, 1/2-inch-thick paint brush in smooth, even coat without globs or puddles. Apply at rate of approximately 240 linear feet per gallon for a 3-inch-wide seam for both sides. Coat both sides of splice at same time to achieve uniform drying time.
 4. Check splicing cement for proper drying. Splicing cement should not slide when pushed with finger or string up from dry finger touch.
 5. When splice cement is properly dried, roll splice in and smooth it into place with hand pressure, being careful not to stretch or wrinkle flashing.
 6. After assembly, immediately roll perpendicular to seam edge.
 7. Apply lap sealant to seam edges in not less than two hours or more than next workday.
- G. Drains: Adhere elastomeric flashing sheet, centered over drain bowl, to substrate in 125-mil-thick layer of hot, fluid-applied, rubberized asphalt.
1. Extend flashing at least 6 inches beyond drain bowl flange onto deck.
 2. If substrate has been cut out and patched to install drain, extend flashing at least 6 inches beyond patch cold joints.
 3. Install clamping ring on drain bowl, making sure that bolts are properly tightened.
 4. Cut out center of flashing in drain bowl.
- H. Penetrations at Pipes, Supports, and Vents: Properly secure penetrations to substrate and flash.
1. Seal flashing directly to penetration. Do not terminate flashing at intermediate element, such as metal flashing, insulation, or surface treatment, which could fail and admit moisture beneath waterproofing.
- I. Exposed Flashings at Curbs and Parapet Walls: Install exposed flashing sheets at locations indicated; waterproofing itself is not intended to be left exposed.

1. Install modified-bituminous flashing sheet and adhere to substrate in 125-mil-thick layer of hot, fluid-applied, rubberized asphalt.
2. Extend flashing sheet up walls or parapets at least 8 inches above plaza deck pavers and 6 inches onto deck to be waterproofed.
3. Install termination bars and mechanically fasten top of flashing sheet to substrate at terminations and perimeter of waterproofing.

3.7 WATERPROOFING APPLICATION

- A. Apply rubberized asphalt according to waterproofing manufacturer's written instructions.
 1. Begin waterproofing installation only when weather conditions are conducive to installation of materials. Do not apply in environmental conditions exceeding recommendations of waterproofing manufacturer.
 2. Install components of waterproofing system in sequence and in such quantities that entire waterproofing system in Work area is completed by the end of the day.
- B. Start application with waterproofing manufacturer's representative present.
- C. Apply surface conditioner and prepare waterproofing as described above.
- D. Reinforced Waterproofing: Apply waterproofing to substrates and adjoining surfaces indicated.
 1. Spread hot, fluid-applied, rubberized-asphalt to a thickness of 90 mils.
 2. Embed reinforcing fabric, overlapping sheets 2 inches.
 3. Spread another 125-mil-thick layer to provide a uniform, reinforced, seamless waterproofing 215 mils thick.
- E. Apply waterproofing over prepared joints and up wall terminations and vertical surfaces to heights indicated or required by waterproofing manufacturer.
- F. Install protection sheet with 1-inch-overlapped joints over waterproofing while waterproofing is still warm, to ensure that good bond is achieved.
- G. Cure waterproofing according to waterproofing manufacturer's written recommendations, taking care to prevent contamination and damage during application stages and curing.
- H. Do not allow any construction activity on waterproofing until water test is complete and protection course has been installed.
- I. Provide water cut-offs where and when danger of moisture getting under new waterproofing exists. Install water cut-offs at the end of each workday and completely remove prior to beginning new waterproofing installation Work on next workday. Use materials and methods in accordance with waterproofing manufacturer's written instructions.
- J. Before installing protection course, flood test waterproofing and repair any leaks.

3.8 INSTALLATION OF PROTECTION COURSE, DRAINAGE PANEL, AND FILTER FABRIC

- A. Install protection course with ends butted tightly together, before starting subsequent construction activities.
- B. Place and secure drainage panels to substrate according to waterproofing manufacturer's written instructions. Use adhesive, or mechanical fasteners that will not penetrate waterproofing. Lap

edges and ends of geotextile to maintain continuity. Protect installed drainage panels during subsequent construction.

1. Splice panels together by peeling back fabric on bottom panel to expose cores, overlapping top panel 4 inches, interlocking and snapping in place, and reattaching fabric.
2. Neatly trim drainage panels to fit closely at base of projections. Cut core around penetrations; cut "X" in filter fabric and tape fabric to sides of penetration.
3. Trim drainage panel edge to ensure that water will flow freely from panel into drain. Extend fabric over drain cover.
4. Cover cut edges of drainage panels with integral fabric flap by tucking fabric over edge of core and adhering to bottom of core.
5. Do not use tape to seal joints between drainage panels or to secure lapping fabric.

3.9 FIELD QUALITY CONTROL

- A. Site Visits by Waterproofing Manufacturer's Representative: Waterproofing manufacturer's representative shall visit Site at the following times.
 1. At beginning of waterproofing installation to establish standard of quality to be used for remainder of waterproofing Work.
 2. Periodically during Work at critical times and as required to meet provisions of waterproofing manufacturer's warranty.
 3. Submit written report with observations, field decisions, and request for design changes to Architect/Engineer for each Site visit.
 4. Coordinate Site visits with Architect/Engineer.
- B. ASTM D 7877 Low-Voltage Integrity Testing:
 1. The Contractor shall retain a qualified testing agency acceptable to the Architect/Engineer, Roofing Manufacturer, and Owner to perform Low-Voltage Integrity Testing at each completed area of roofing installation immediately prior to placing overburden. Testing loops are to remain in place at the membrane level for future testing. Contractor to provide means to perform tests after placement of overburden. Testing agency shall have at least 5 years successful experience in performing Low-Voltage Integrity Testing.
 - a. Loops are to encircle no more than 1,000 sf per loop.
 - b. Wires shall be seven strand stainless steel incorporated within a polypropylene rope.
 - c. Wires shall run to a waterproof junction box with all leads insulated and labeled. Junction boxes shall be clearly marked and be placed in an accessible location for future use. The mapping grids shall remain in place and the Contractor shall provide both initial shop drawings for review and as-built drawings indicating the locations of the grids for future use by the Owner. Clear visible benchmarks are to be provided in visual locations on top of the overburden.
 - d. Perform Low-voltage Integrity Testing: If breaches are found in the membrane, remove overburden, repair roofing. Repeat Low-Voltage Integrity Testing procedure and repairs until no breaches are found.
- C. Flood Testing: Flood test the roofing at each drain location and any other penetration and/or area of the roofing that cannot be tested via the low-voltage integrity testing. The test shall extend a minimum of 3 feet past the drain, other tested penetration, or other area of roofing installation. Test each area for leaks, according to recommendations in ASTM D 5957. Repeat flood testing, repair and re-test as necessary. Install temporary containment assemblies, plug or dam drains, and flood with potable water.

1. Flood to an average depth of 2-1/2 inches with a minimum depth of 1 inch and not exceeding a depth of 4 inches over the roofing membrane. Maintain 2 inches of clearance from top of sheet flashings.
 2. Flood each area for a time period of 48 hours minimum.
 3. If leaks occur, the water must be drained completely, and concrete, insulation, air layer, drainage mat, and/or protection (cap) sheet removed and the membrane repaired. Replace the concrete, insulation, air layer, drainage mat, and/or protection (cap) sheet and retest.
 4. Repeat flood testing process and repairs until no leaks occur.
- D. Notify Architect/Engineer a minimum of 48 hours and Owner a minimum of one week in advance of testing. Architect/Engineer will periodically observe the performance testing.
- E. Provide continuous site presence during the test.
- F. Submit written reports documenting all testing activities.

3.10 CLEANING

- A. At the end of each workday, clean Site and Work areas and place rubbish, empty cans, rags, and other discarded materials in appropriate containers.
- B. After completing waterproofing Work:
1. Clean spillage and soiling from adjacent surfaces using cleaning agents and procedures recommended by manufacturer of affected surface. Exercise care to avoid scratching or damage to surfaces.
 2. Repair surfaces stained, marred, or otherwise damaged during waterproofing Work.
 3. Clean up debris and surplus materials and remove from Site.
- C. Waste Management:
1. Collect surplus waterproofing materials that cannot be reused and deliver to recycling or disposal facility.
 2. Treat materials that cannot be reused as hazardous waste and dispose of in an appropriate manner.

3.11 PROTECTION

- A. Protect waterproofing from damage and wear during remainder of construction period.
1. Do not permit foot or vehicular traffic on unprotected waterproofing.
 2. Do not allow waste products (petroleum, grease, oil, solvents, vegetable oil, mineral oil, animal fat, etc.) to come into contact with waterproofing. Exposure to foreign materials or chemical discharges must be presented to waterproofing manufacturer for evaluation to determine impact on waterproofing performance.
- B. Protect installed drainage panels from damage due to ultraviolet light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where drainage panels will be subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION

INSTALLER'S WARRANTY

WHEREAS <Insert name> of <Insert address>, herein called *Waterproofing Installer*, has performed waterproofing and associated work, designated *Work*, on the following project:

Owner: <Insert name of Owner.>
Address: <Insert address.>
Building Name/Type: <Insert information.>
Address: <Insert address.>
Area of Work: <Insert information.>
Acceptance Date: <Insert date.>
Warranty Period: Two years.
Expiration Date: <Insert date.>

AND WHEREAS Waterproofing Installer has contracted, either directly with Owner or indirectly as subcontractor, to warrant said Work against leaks and faulty or defective materials and workmanship for designated Warranty Period.

NOW THEREFORE Waterproofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period it will, at its own cost and expense, make or cause to be made such repairs to or replacement of said Work as are necessary to correct faulty and defective Work and as are necessary to maintain said Work in watertight condition, and warrants against the following.

1. Components of waterproofing system that do not comply with requirements; that do not remain watertight; that fail in adhesion, cohesion, or general durability; or that deteriorate in a manner not clearly specified by submitted waterproofing manufacturer's data as an inherent quality of the material for the application indicated, regardless of whether the Work was previously accepted by Owner.

Warranty is made subject to the following terms and conditions:

1. Specifically excluded from Warranty is damage to Work due to unusual abuse or neglect. When Work has been damaged by unusual abuse or neglect, Warranty shall be null and void until such damage has been repaired by Waterproofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
2. Waterproofing Installer is responsible for damage to Work covered by Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of Work.
3. Owner will promptly notify Waterproofing Installer of observed, known, or suspected leaks, defects, or deterioration and will afford reasonable opportunity for Waterproofing Installer to inspect Work and to examine evidence of such leaks, defects, or deterioration. Waterproofing Installer shall inspect leak, defect, or deterioration within seven days of notification.
4. If permanent repair or replacement of warranted condition cannot be made immediately, due to weather conditions, availability of appropriate labor or materials, building occupancy, etc., Waterproofing Installer must make, or cause to be made, immediate temporary repairs to prevent any further damage, deterioration, or unsafe conditions. Permanent repair or replacement of warranted condition shall be scheduled as soon thereafter as practical, and with Owner's consent and approval.
5. If Owner notifies Waterproofing Installer of warranted condition that requires immediate attention to prevent potential injury or damage, and Waterproofing Installer cannot or does not promptly inspect and repair same, either permanently or temporarily, then Owner may make, or cause to be made, such temporary repairs as may be essential and Waterproofing Installer will reimburse Owner for cost of such repairs. Such action will not relieve Waterproofing Installer of its obligation

to perform any necessary permanent repairs, and Warranty shall remain in full force and effect for remaining portion of its original term.

- 6. Waterproofing Installer shall provide equipment, labor, and material required to remedy warranted conditions, including repair or replacement of damage to other work resulting there from, and removal and replacement of other work required to access warranted condition. Additional required work will be at Waterproofing Installer's sole expense for full term of Warranty. Warranty includes removal and replacement of protection board, drainage panels, and insulation. Warranty shall also include removing and replacing pedestals and pavers on plaza decks, soil and plantings in planters, and other items that conceal defect, for all components of waterproofing system.
- 7. Warranty is recognized to be only Warranty of Waterproofing Installer on said Work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, Warranty shall not operate to relieve Waterproofing Installer of responsibility for performance of original Work according to requirements of Contract Documents, regardless of whether Contract was directly with Owner or with Owner's General Contractor.

IN WITNESS THEREOF, and intending to be legally bound hereby, Waterproofing Installer has caused this document to be executed by undersigned, duly-authorized officer.

(Waterproofing Installer) Corporate Seal:

By: _____
(Signature)

(Name)

(Date)

[_____ Corporate Seal:
(Contractor)

By: _____
(Signature)

(Name)

(Date)]

Subscribed and sworn to before me this ____ day of ____, 20__

Notary Public
My commission expires _____

SECTION 07 54 19

POLYVINYL-CHLORIDE (PVC) ROOFING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Adhered polyvinyl-chloride (PVC) roofing system. PVC coated sheet metal for flashings (where indicated on the drawings) and gutter compatible with PVC roofing.
- B. Related Sections:
 - 1. Section 07 62 00 - Sheet Metal Flashing and Trim: Flashings and counter flashings.
 - 2. Section 07 92 00 - Joint Sealants; for field-applied joint sealants, joint fillers, and joint preparation.

1.02 References

- A. Definitions:
 - 1. ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" apply to work of this Section.

1.03 Administrative Requirements

- A. Coordinate Work to ensure that adjacent areas are not adversely affected. Coordinate:
 - 1. With Owner's Representative.
 - 2. With other trades:
 - a. To ensure that work done by other trades is complete and ready for roofing Work.
 - b. To avoid or minimize work on, or in immediate vicinity of, roofing Work in progress.
 - c. To ensure that subsequent Work will not adversely affect completed roofing Work.
- B. Preinstallation Roofing Conference: Conduct conference at Project site.
 - 1. Meet with Owner, Engineer, Owner's Rep, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
 - 2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
 - 3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
 - 5. Review structural loading limitations of roof deck during and after roofing.
 - 6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
 - 7. Review governing regulations and requirements for insurance and certificates if applicable.
 - 8. Review temporary protection requirements for roofing system during and after installation.
 - 9. Review roof observation and repair procedures after roofing installation.

1.04 Action SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include roof plans, sections, details, and attachments to other work, including the following:
 - 1. Layout and thickness of insulation.

2. Base flashings and membrane terminations.
3. Flashing details at penetrations.
4. Tapered insulation thickness and slopes.
5. Insulation adhesive spacing for all roof wind uplift zones.
6. PVC coated sheet metal, including:
 - a. Welded sheet metal splice.
 - b. Welded section of PVC sheet to PVC coated sheet metal.
- C. Samples for Verification: For the following products:
 1. Roof membrane and flashing, of color required.
 2. Walkway pads or rolls, of color required.
- D. Wind Uplift Resistance Submittal: For roofing system, indicating compliance with wind uplift performance requirements.

1.05 Informational SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.
- B. Manufacturer Certificates:
 1. Performance Requirement Certificate: Signed by roof membrane manufacturer, certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - a. Submit evidence of compliance with performance requirements.
 2. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.
- C. Product Test Reports: For roof membrane and insulation, tests performed by independent qualified testing agency indicating compliance with specified requirements.
- D. Evaluation Reports: For components of roofing system, from ICC-ES.
- E. Field Test Reports:
 1. Concrete internal relative humidity test reports.
- F. Field quality-control reports.
- G. Sample Warranties: For manufacturer's special warranties.

1.06 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roofing system to include in maintenance manuals.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is UL listed for roofing system similar to that used for this Project.
- B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
 1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.09 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.10 WARRANTY

- A. Manufacturer's Warranty
 - 1. Written warranty signed by roofing-system manufacturer, including
 - a. Repair or replace components of roofing system that do not comply with requirements; that do not remain watertight; that fail in adhesion, cohesion, or general durability; or that deteriorate in manner not clearly specified by submitted roofing-system manufacturer's data as an inherent quality of material for application indicated. Warranty includes defects such as blisters, ridging, and excessive surfacing loss.
 - b. Warranty shall cover damage due to wind up to project design windspeed.
 - c. Removal and replacement of membrane roofing sheets, polymeric coated sheet metal, base flashings, roof insulation, fasteners, cover boards, substrate boards, roofing accessories, walkway products, and other components of roofing system.
 - d. Labor and materials to perform warranty work.
 - 2. Warranty Period: 20 years from date of completion of roofing system.
- B. Roofing Installer's Warranty
 - 1. Written warranty, signed by Roofing Installer, including
 - a. Repair or replace components of roofing system that do not comply with requirements; that do not remain watertight; that fail in adhesion, cohesion, or general durability; or that deteriorate in manner not clearly specified by submitted roofing-system manufacturer's data as inherent quality of material for application indicated.
 - b. Removal and replacement of membrane roofing sheets, polymeric coated sheet metal, base flashings, roof insulation, fasteners, cover boards, substrate boards, roofing accessories, walkway products, and other components of roofing system.
 - c. Labor and materials to perform warranty work.
 - 2. Warranty Period: 5 years from date of completion of roofing system.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Approved Manufacturers:
 - 1. G410 Feltback Adhered System by Sika Sarnafil
 - 2. FleeceBACK PVC by Carlisle Syntec Systems
 - 3. Sentinel P150 HFB by Soprema
- B. Source Limitations: Obtain components including roof insulation fasteners for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer.

2.02 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing and base flashings shall remain watertight.
 - 1. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
 - 2. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.
- B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.
- C. Exterior Fire-Test Exposure: ASTM E 108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- D. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.03 PVC ROOFING

- A. PVC Sheet: ASTM D 6754/D 6754M, fabric reinforced and fabric backed.
 - 1. Thickness: 60 mils, nominal.
 - 2. Exposed Face Color: White.

2.04 PVC COATED SHEET METAL

- A. Pre-Coated (Galvanized) Steel Sheet: ASTM A653/A653M, G90 coating designation; structural quality, 0.0276 inches thick.
 - 1. Coating Thickness: 20 mils minimum.
 - 2. Exposed Face Color: White.

2.05 AUXILIARY ROOFING MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing.
 - 1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
- B. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as PVC sheet.
- C. Sheet Metal Flashing: Manufacturer's PVC coated sheet metal.
- D. Bonding Adhesive: Manufacturer's standard.
- E. Slip Sheet: Manufacturer's standard, of thickness required for application.
- F. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.
- G. Fasteners, General: Factory-coated steel fasteners and metal or plastic plates acceptable to roofing-system manufacturer.
 - 1. Designed for fastening roofing-system components to substrate and tested by roofing-system manufacturer for required pullout strength.
- H. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.
- I. Insulation:

1. General: Provide preformed insulation boards that comply with requirements and referenced standards, selected from insulation manufacturer's standard sizes and of thicknesses indicated on Drawings.
2. Polyisocyanurate Boards: ASTM C1289, Type II, felt or glass-fiber mat facer on both major surfaces; 25-pounds-per-square-inch-minimum compressive strength.
3. Insulation Accessories:
 - a. General: Insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.
 - b. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.
- J. Cover Boards: ASTM C1177/C1177M; glass-mat, water-resistant, gypsum substrate, 1/2 inch thick. DensDeck Prime Roof Board manufactured by Georgia-Pacific Gypsum LLC, or approved equal.
- K. New Roof Drains:
 1. Model 1010 by Jay R. Smith Mfg. Co. of Montgomery, Alabama.
- L. Adhesive for insulation and cover boards: Two-component, polyurethane foam insulation adhesive, applied in ribbons from cartridges or two-component bulk packaging with pump-driven delivery system.
 1. Adhesive recommended by the roofing manufacturer to meet wind up-lift requirements.

2.062.06

- M. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16 inch thick and acceptable to roofing system manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work:
 1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
 2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

3.03 ROOFING INSTALLATION, GENERAL

- A. Install roofing system according to roofing system manufacturer's written instructions.
- B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.04 INSULATION INSTALLATION

- A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.
- C. Install tapered insulation under area of roofing to conform to slopes indicated.
- D. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.
- E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
- F. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.
 - 1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
- G. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows:
 - 1. Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
 - 2. Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.
 - 3. Set each subsequent layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.
- H. Mechanically-Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type insulation to deck type.
 - a. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.
 - 2.
- I. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction.
 - 1. Adhered Cover Boards: Adhere cover boards over insulation in a uniform coverage of full-spread adhesive to resist uplift pressure at corners, perimeter, and field of roof.
 - 2. Mechanically-Fastened Cover Boards: Secure cover boards to substrate using mechanical fasteners specifically designed and sized for fastening specified cover boards to substrate. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.

3.05 ADHERED MEMBRANE ROOFING INSTALLATION

- A. Adhere roofing over area to receive roofing according to roofing system manufacturer's written instructions. Unroll roofing and allow to relax before installing.
- B. Start installation of roofing in presence of roofing system manufacturer's technical personnel.
- C. Accurately align roofing, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- D. Bonding Adhesive: Apply to substrate and underside of roofing at rate required by manufacturer, and allow to partially dry before installing roofing. Do not apply to splice area of roofing.

- E. In addition to adhering, mechanically fasten roofing securely at terminations, penetrations, and perimeter of roofing.
- F. Apply roofing with side laps shingled with slope of roof deck where possible.
- G. Seams: Clean seam areas, overlap roofing, and hot-air weld side and end laps of roofing and sheet flashings according to manufacturer's written instructions, to ensure a watertight seam installation.
 - 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet.
 - 2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
 - 3. Repair tears, voids, and lapped seams in roofing that do not comply with requirements.
 - 4. Welding equipment shall be provided by or approved by the roofing manufacturer.
- H. Spread sealant bed over deck-drain flange at roof drains, and securely seal roofing in place with clamping ring.

3.06 BASE FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.
- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.
- E. Terminate and seal top of sheet flashings.

3.07 WALKWAY INSTALLATION

- A. Flexible Walkways: Install walkway products according to manufacturer's written instructions.
 - 1. Install flexible walkways at the following locations:
 - a. On one of the entire long side of each rooftop heating and A/C unit.
 - b. Top and bottom of each roof access ladder.
 - c. At locations indicated on Drawings.
 - d. As required by roof membrane manufacturer's warranty requirements.
 - 2. Provide 6-inch clearance between adjoining pads.
 - 3. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.08 FIELD QUALITY CONTROL

- A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion, in presence of Architect, and to prepare inspection report.
- B. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.
- C. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.09 PROTECTING AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

- B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

3.10 Roofing Installer's Warranty

- A. WHEREAS _____ of _____, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:
 - 1. Owner: <Insert name of Owner>.
 - 2. Address: <Insert address>.
 - 3. Building Name/Type: <Insert information>.
 - 4. Address: <Insert address>.
 - 5. Area of Work: <Insert information>.
 - 6. Acceptance Date: _____.
 - 7. Warranty Period: <Insert time>.
 - 8. Expiration Date: _____.
- B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,
- C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period Roofing Installer will, at Roofing Installer's own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.
- D. This Warranty is made subject to the following terms and conditions:
 - 1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
 - a. lightning;
 - b. peak gust wind speed exceeding 72 mph;
 - c. fire;
 - d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
 - e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
 - f. vapor condensation on bottom of roofing; and
 - g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
 - 2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
 - 3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
 - 4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work

covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.

5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____,

1. Authorized Signature: _____.
2. Name: _____.
3. Title: _____.

END OF SECTION

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Supply, fabrication, and installation of roof, plaza, and wall flashings and counterflashings.
- B. Related Sections:
 - 1. Section 07 14 13 - Hot, Fluid-Applied, Rubberized-Asphalt Waterproofing: Flashings and counterflashings.
 - 2. Section 07 54 19 - Polyvinyl-Chloride Roof: Flashings, counterflashings, copings, gutters and downspouts

1.2 REFERENCES

- A. Reference Standards: Latest edition as of Specification date.
 - 1. ASTM International:
 - a. A240/A240M: Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - b. B32: Standard Specification for Solder Metal.
 - c. C920: Standard Specification for Elastomeric Joint Sealants.
 - 2. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).
 - a. Architectural Sheet Metal Manual.
 - 3. SSPC: The Society for Protective Coatings:

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate Work to ensure that adjacent areas are not adversely affected. Coordinate:
 - 1. With Owner's Representative.
 - 2. With other trades:
 - a. To ensure that work done by other trades is complete and ready for sheet-metal Work.
 - b. To avoid or minimize work on, or in immediate vicinity of, sheet-metal Work in progress.
 - c. To ensure that subsequent work will not adversely affect completed sheet-metal Work.
 - 3. With interfacing and adjoining construction to provide leakproof, secure, and non-corrosive installation. Coordinate:
 - a. Installation of roof drainage system with installation of roof perimeter flashing.
 - b. Counterflashing installation with base flashing installation.
 - c. Installation of roof-penetration flashing with installation of roofing and other items penetrating roof.
 - d. Installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Pre-installation Meeting:
 - 1. Conduct meeting at Site.
 - 2. Review requirements for sheet-metal Work, including:

- a. Construction schedule.
 - b. Availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - c. Site use, access, staging, and set-up location limitations.
 - d. Approved mockup procedures.
 - e. Forecast weather conditions.
 - f. Surface preparation and substrate condition and pretreatment.
 - g. Installation procedures.
 - h. Special details.
 - i. Testing and inspection requirements.
 - j. Site protection measures.
 - k. Governing regulations.
3. Contractor's Site superintendent, waterproofing manufacturer's technical representative, waterproofing Installer, sheet-metal fabricator, sheet-metal Installer, Owner's Representative, and Architect/Engineer shall attend.

1.4 SUBMITTALS

- A. Product Data: For each product specified.
 1. Include Safety Data Sheets (SDS) for information only; safety restrictions are sole responsibility of Contractor.
- B. Shop Drawings: Show layouts, profiles, shapes, seams, dimensions, and details for fastening, joining, supporting, interface conditions with other materials, and anchoring sheet-metal flashing and trim.
- C. Samples: For each type of sheet-metal flashing and trim. Construct typical lap splice or seam for mechanically-jointed systems, and solder lap or seam for field-solderable systems.
- D. Installer Qualifications: Evidence that Installer's *existing company* has minimum five years of continuous experience in similar sheet-metal Work; list of at least five representative, successfully-completed projects of similar scope and size, including:
 1. Project name.
 2. Owner's name.
 3. Owner's Representative name, address, and telephone number.
 4. Description of work.
 5. Sheet-metal members installed.
 6. Project supervisor.
 7. Total cost of sheet-metal work and total cost of project.
 8. Completion date.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Experienced firm that has successfully completed sheet-metal work similar in material, design, and extent to that indicated for Project. Must have successful installations of specified materials in local area in use for minimum of five years.
 1. Employ foreman with minimum five years of experience as foreman on similar projects, who is fluent in English, to be on Site at all times during Work. Do not change foremen during the course of the Project except for reasons beyond the control of the Installer; inform Architect/Engineer in advance of any changes.

- B. Mockups: Build mockups to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockup of typical counter flashing, approximately 48 inches long, including supporting construction cleats, seams, attachments, and accessories.
 - 2. Approved mockups may become part of completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Sheet-Metal Members: Deliver, store, and handle materials in such a manner as to prevent damage to materials or structure.
- B. Sealants, Coatings, and Miscellaneous Materials:
 - 1. Deliver materials to Site in original containers and packaging with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, lot number, and directions for storing.
 - 2. Keep materials dry and do not allow materials to be exposed to moisture during transportation, storage, handling, and installation. Reject and remove from Site new materials which exhibit evidence of moisture during application, or have been exposed to moisture.
 - 3. Store materials in original, undamaged containers in clean, dry, protected location on raised platforms with weather-protective coverings, within temperature range required by manufacturer. Protect stored materials from direct sunlight. Manufacturer's standard packaging and covering is not considered adequate weather protection.
 - 4. Handle materials to avoid damage.
 - 5. Conspicuously mark damaged or opened containers or containers with contaminated materials, and remove from Site as soon as possible.
 - 6. Remove and replace materials that cannot be applied within stated shelf life.
- C. Limit stored materials on structures to safe loading capacity of structure at time materials are stored, and to avoid permanent deck deflection.

1.7 PROJECT CONDITIONS

- A. Verify existing dimensions and details prior to start of sheet-metal Work. Notify Architect/Engineer of conditions found to be different than those indicated in the Contract Documents. Architect/Engineer will review situation and inform Contractor and Installer of changes.
- B. Comply with Owner's limitations and restrictions for Site use and accessibility.
- C. Environmental Limitations: Install sheet-metal members when existing and forecast weather conditions permit sealants, coatings, and miscellaneous materials to be installed according to sealant, coating, or miscellaneous material manufacturer's written instructions and warranty requirements.
- D. Handle and install materials in strict accordance with safety requirements required by sheet-metal manufacturer; Safety Data Sheets (SDS); and local, state, and federal rules and regulations. Maintain Safety Data Sheets (SDS) with materials in storage area and available for ready reference on Site.

1.8 CHANGES IN WORK

- A. During rehabilitation work, existing conditions may be encountered which are not known or are at variance with the Contract Documents. Such conditions may interfere with the Work and may consist of damage or deterioration of the substrate or surrounding materials that could jeopardize the integrity or performance of the Work.
 - 1. Notify Architect/Engineer of conditions that may interfere with the proper execution of the Work or jeopardize the performance of the Work prior to proceeding with the Work.

1.9 WARRANTY

- A. Contractor's Warranty:
 - 1. Written warranty, signed by Contractor, including:
 - a. Replace sheet-metal Work that does not comply with requirements; that has corroded surface, coating that fails cohesively or adhesively, or other surface defects or imperfections; or that deteriorates in a manner not clearly specified by material supplier's data as an inherent quality of the material for the application indicated.
 - b. Remove and replace sealant that has failed cohesively or adhesively; or that deteriorates in a manner not clearly specified by sealant manufacturer's data as an inherent quality of the material for the application indicated.
 - c. Repair or replacement, to satisfaction of Owner, of other work or items which may have been displaced or damaged as consequence of defective Work.
 - d. Warranty does not include deterioration or damage from changes in sheet-metal environment from that reasonably anticipated at Substantial Completion, or physical damage from adjacent activities.
 - 2. Warranty Period: Two years after Substantial Completion date.
- B. Manufacturer's Warranty:
 - 1. Written warranty, signed by sheet-metal manufacturer, including:
 - a. Replace sheet-metal Work that does not comply with requirements; that has corroded surface, coating that fails cohesively or adhesively, or other surface defects or imperfections; or that deteriorates in a manner not clearly specified by material supplier's data as an inherent quality of the material for the application indicated.
 - b. Warranty does not include deterioration or damage from changes in sheet-metal environment from that reasonably anticipated at Substantial Completion, or physical damage from adjacent activities.
 - 2. Written warranty, signed by manufacturer against defects to the metal panels including color, fade, chalking, and film integrity.
 - 3. Warranty Period: 20 years after Substantial Completion date.

PART 2 PRODUCTS

2.1 SHEET METAL

- A. Where indicated on the drawings:
 - 1. Stainless-Steel Sheet: ASTM A240/A240M, Type 304; No. 2B finish; 20 and 24 gage as indicated on the drawings.

2.2 AUXILIARY MATERIALS

- A. Miscellaneous Materials:

1. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items required for installation.
2. Fasteners: Wood screws, annular-threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads indicated on drawings. Size fasteners to provide penetration into substrate of at least 1 1/4 inches for nails and 3/4 inches for wood screws.
 - a. Use stainless-steel fasteners
 - b. Exposed Fasteners: Heads match color of sheet metal
3. Sealing Tape: Pressure-sensitive, 100-percent solids, polyisobutylene-compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, non-staining tape.
4. Elastomeric Sealant: ASTM C920, elastomeric silicone sealant; of type, grade, class, and use classifications required to seal joints in sheet-metal flashing and trim and remain watertight.
5. Butyl Sealant: ASTM C1311, single-component, solvent-release, butyl-rubber sealant; polyisobutylene-plasticized; heavy-bodied for hooked-type expansion joints with limited movement.
6. Solder: ASTM B32.

2.3 FABRICATION

- A. Custom fabricate to comply with recommendations in SMACNA's Architectural Sheet Metal Manual, that apply to design, dimensions, metal, and other characteristics of item indicated. Conform to dimensions and profiles shown in SMACNA's Architectural Sheet Metal Manual, unless requirements that are more stringent are indicated.
 1. Obtain field measurements for accurate fit before fabrication.
 2. Shop fabricate items where practicable.
- B. Fabricate without excessive oil canning, buckling, or tool marks that are visually objectionable in opinion of Architect/Engineer, and true to line and levels indicated, with exposed edges folded back to form hems.
 1. Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- C. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant and in compliance with recommendations in SMACNA's Architectural Sheet Metal Manual.
- D. Expansion Provisions: Use lapped or bayonet-type expansion provisions where possible; otherwise, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
- E. Conceal fasteners and expansion provisions, where possible, on exposed-to-view sheet-metal flashing and trim, unless otherwise indicated.
- F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, non-corrosive metal, and in thickness not less than that of metal being secured.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions with Installer for compliance with requirements and other conditions affecting performance of sheet-metal flashings and trim.
 - 1. Ensure that work done by other trades is complete and ready for sheet-metal Work.
 - 2. Verify that areas and conditions under which sheet-metal Work is to be performed permit proper and timely completion of Work.
 - 3. Notify Architect/Engineer in writing of conditions which may adversely affect installation or performance of sheet-metal Work and recommend corrections.
 - 4. Do not proceed with installation of sheet-metal flashings and trim until adverse conditions have been corrected and reviewed by Architect/Engineer.
 - 5. Commencing sheet-metal Work constitutes acceptance of Work surfaces and conditions.

3.2 PROTECTION

- A. Take precautions to ensure safety of people, including building users, passers-by, and workmen, and animals, and protection of property, including adjacent building elements, landscaping, and motor vehicles.
- B. Prevent construction debris and other materials from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
- C. Protect paving and sidewalks, and adjacent building areas from mechanical damage due to scaffolding and other equipment.
- D. Limit access to Work areas.
- E. Erect temporary protective canopies, as necessary, over walkways and at points of pedestrian and vehicular access that must remain in service during Work.
- F. Assume responsibility for injury to persons or damage to property due to Work, and remedy at no cost to Owner.

3.3 INSTALLATION

- A. General: Install sheet-metal flashings and trim according to recommendations in SMACNA's Architectural Sheet Metal Manual and as indicated.
- B. Install sheet-metal flashing and trim to fit substrates and to result in watertight performance.
 - 1. Install true to line and levels indicated.
 - 2. Where exposed, install without excessive oil canning, buckling, or tool marks.
 - 3. Provide uniform, neat seams with minimum exposure of solder, welds, or sealant.
 - 4. Do not torch cut sheet metal.
- C. Provide for thermal expansion of exposed flashing and trim.
 - 1. Space movement joints no more than 10 feet apart, with no joint within 24 inches of corner or intersection.
 - 2. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.

- D. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.
- E. Anchor sheet-metal flashing and trim and other components of Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required.
 - 1. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners
- F. Install double sided butyl tape behind counterflashing where shown on the drawings. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to width of 1 1/2 inches except where pre-tinned surface would show in finished Work.
- G. Roof Flashing Installation:
 - 1. General:
 - a. Set units true to line and level as indicated.
 - b. Provide concealed fasteners where possible.
 - c. Install Work with laps, joints, and seams that will be permanently watertight.
 - 2. Counterflashing: Insert counterflashing in reglets or receivers and fit tightly to base flashing.
 - a. Extend counterflashing 4 inches over base flashing.
 - b. Secure in waterproof manner.
 - c. Lap counterflashing joints at least 4 inches and bed with butyl sealant.

3.4 CLEANING

- A. At the end of each workday, clean Site and Work areas and place rubbish, empty cans, rags, and other discarded materials in appropriate containers.
- B. After completing sheet-metal Work:
 - 1. Clean spillage and soiling from adjacent surfaces using cleaning agents and procedures recommended by manufacturer of affected surface. Exercise care to avoid scratching or damage to surfaces.
 - 2. Repair surfaces stained, marred, or otherwise damaged during roofing Work.
 - 3. Clean up debris and surplus materials and remove from Site.

3.5 PROTECTION

- A. Protect sheet-metal flashings and trim from damage and wear during remainder of construction period.

END OF SECTION

SECTION 07 92 00

JOINT SEALANTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Surface preparation and installation of:
 - 1. Primary sealant and weather sealant at windows.
 - 2. Sealant and building joints and other penetrations.

- B. Related Sections:
 - 1. Section 07 62 00 - Sheet Metal Flashing and Trim
 - 2. Section 08 01 51.82 - Replacement of Aluminum Windows: Sealing joints around windows.

1.2 REFERENCES

- A. Reference Standards: Latest edition as of Specification date.
 - 1. ASTM International:
 - a. C920: Standard Specification for Elastomeric Joint Sealants.
 - b. C1193: Standard Guide for Use of Joint Sealants
 - c. C1248: Standard Test Method for Staining of Porous Substrate by Joint Sealants.
 - d. C1521: Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate Work to ensure that adjacent areas are not adversely affected; that new materials and building interior are kept continuously dry; and that continuous, watertight, new sealant installation is provided. Coordinate:
 - 1. With Owner's Representative.
 - 2. With other trades:
 - a. To ensure that work done by other trades is complete and ready for sealant Work.
 - b. To avoid or minimize work on, or in immediate vicinity of, sealant Work in progress.
 - c. To ensure that subsequent work will not adversely affect completed sealant Work.

1.4 SUBMITTALS

- A. Product Data: Sealant manufacturer's literature including written instructions for evaluating, preparing, and treating substrate; technical data including tested physical and performance properties; and installation instructions.
 - 1. Include temperature ranges for storage and application of materials, and special cold-weather application requirements or limitations.
 - 2. SpecData sheet for substrate cleaner and substrate primer recommended by sealant manufacturer for specific substrate surface and conditions.
 - 3. Include Safety Data Sheets (SDS) for information only; safety restrictions are sole responsibility of Contractor.

- B. Samples: Sealant manufacturer's color sample card, either printed or with thin sealant beads, showing range of colors available for each product exposed to view.
- C. Manufacturer's Reports and Certifications:
 - 1. Prior to sealant installation, report from sealant manufacturer with results of sealant compatibility, sealant and substrate staining, and mockup adhesion tests. Report shall:
 - a. State that materials which come into contact with or in close proximity to sealant have been tested.
 - b. Include sealant manufacturer's interpretation of test results relative to material performance, potential staining of sealant and substrates, dirt accumulation of sealant, and dirt runoff from sealant.
 - c. Include sealant manufacturer's recommendations for substrate preparation and primer needed to obtain durable adhesion and installation procedures successfully used in mockups and field tests.
 - 2. Product Certificates: For each sealant product, accessory, related products, joint type, and substrate, sealant manufacturers' written approval of their products' use for specified conditions; based on mockups and field tests.
- D. Installer Qualifications:
 - 1. Certificate signed by sealant manufacturer, certifying that Installer complies with requirements.
 - 2. Evidence that Installer's *existing company* has minimum five years of continuous experience in similar sealant work; list of at least five representative, successfully-completed projects of similar scope and size, including:
 - a. Project name.
 - b. Owner's name.
 - c. Owner's Representative name, address, and telephone number.
 - d. Description of work.
 - e. Sealant used.
 - f. Project supervisor.
 - g. Total cost of sealant work and total cost of project.
 - h. Completion date.
- E. Sample Warranty: Copy of sealant manufacturer's warranty, stating obligations, remedies, limitations, and exclusions. Submitted with bid.
- F. Following completion of the Work:
 - 1. Sealant manufacturer's inspection report of completed sealant installation.
 - 2. Completed warranty from sealant manufacturer.
 - 3. Completed warranty from Installer.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Experienced firm that has successfully completed sealant work similar in material, design, and extent to that indicated for Project; that is approved, authorized, or licensed by sealant manufacturer to install sealant; and that is eligible to receive sealant manufacturer's warranty. Must have successful installations of specified materials in local area in use for minimum of five years.
 - 1. Employ foreman with minimum five years of experience as foreman on similar projects, to be on Site at all times during Work. Do not change foremen during the course of the Project except for reasons beyond the control of the Installer; inform Architect/Engineer in advance of any changes.

- B. Stain Testing: Conduct stain tests according to ASTM C1248 or actual in situ testing, on actual substrate materials with orientation and exposure that replicates finished joint conditions, to verify that sealants will not stain joint substrates.
- C. Mockups: Install ten feet of sealant in each type of joint to verify and set quality standards for materials and installation procedures, and to demonstrate aesthetic effects.
 - 1. Include each type of backing material, sealant, primer and other related products.
 - 2. Mockups shall be accessible or located as indicated by Owner's Representative.
 - 3. Notify Owner's Representative and Architect/Engineer seven days in advance of date when mockups will be constructed.
 - 4. Field-Adhesion Testing: After sealants have cured, perform field-adhesion tests according to ASTM C1521.
 - a. Conduct tests for each type of sealant and joint substrate, with and without primer.
 - b. Arrange for tests to take place with sealant manufacturer's technical representative present.
 - c. Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Use alternate materials or modify installation procedure, or both, for sealants that fail to adhere to substrates.
 - 5. If Architect/Engineer determines mockup does not comply with requirements, modify mockup or construct new mockup until mockup is approved.
 - 6. Mockups, when approved by Owner's Representative and Architect/Engineer, will become standard for Work.
 - 7. Approved mockups may become part of completed Work if undisturbed at time of Substantial Completion.
 - 8. Do not begin joint sealant Work until mockup is accepted by Owner's Representative and Architect/Engineer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials according to manufacturer's recommendations and in such a manner as to prevent damage to materials or structure.
- B. Deliver materials to Site in original packages with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, lot number, and directions for storing and mixing with other components.
- C. Keep materials dry and do not allow materials to be exposed to moisture during transportation, storage, handling, or installation. Reject and remove from Site new materials which exhibit evidence of moisture during application or which have been exposed to moisture.
- D. Store materials in original, undamaged containers and packaging in clean, dry, protected location on raised platforms with weather-protective coverings, within temperature range required by manufacturer. Protect stored materials from direct sunlight. Manufacturer's standard packaging and covering is *not* considered adequate weather protection.
- E. Limit stored materials on structures to safe loading capacity of structure at time materials are stored, and to avoid permanent deck deflection.
- F. Conspicuously mark wet or damaged materials and remove from Site as soon as possible.
- G. Remove and replace materials that cannot be applied within stated shelf life.

1.7 PROJECT CONDITIONS

- A. Verify existing dimensions and details prior to start of sealant Work. Notify Architect/Engineer of conditions found to be different than those indicated in the Contract Documents. Architect/Engineer will review situation and inform Contractor and Installer of changes.
- B. Comply with Owner's limitations and restrictions for Site use and accessibility.
- C. Environmental Limitations: Install sealant when existing and forecast weather conditions permit sealant to be installed according to sealant manufacturer's written instructions and warranty requirements.
 - 1. Do not install sealant when ambient or substrate temperatures are below 40 degrees F or are expected to fall below 40 degrees F in next 12 hours.
 - 2. Do not proceed with installation during inclement weather except for temporary work necessary to protect building interior and installed materials. Remove temporary work and Work that becomes moisture damaged.
- D. Handle and install materials in strict accordance with safety requirements required by sealant manufacturer; Safety Data Sheets (SDS); and local, state, and federal rules and regulations. Maintain Safety Data Sheets (SDS) with materials in storage area and available for ready reference on Site.

1.8 CHANGES IN WORK

- A. During rehabilitation work, existing conditions may be encountered which are not known or are at variance with the Contract Documents. Such conditions may interfere with the Work and may consist of damage or deterioration of the substrate or surrounding materials that could jeopardize the integrity or performance of the Work.
 - 1. Notify Architect/Engineer of conditions that may interfere with the proper execution of the Work or jeopardize the performance of the Work prior to proceeding with the Work.

1.9 WARRANTY

- A. Manufacturer's Warranty:
 - 1. Written warranty, signed by sealant manufacturer, including:
 - a. Repair or replace sealant that does not comply with requirements; that does not remain watertight; that fails in adhesion, cohesion, or general durability; or that deteriorates in a manner not clearly specified by submitted sealant manufacturer's data as an inherent quality of the material for the application indicated.
 - b. Removal and replacement with new bond breaker materials.
 - c. Labor and materials to perform warranty Work.
 - d. Warranty does not include sealant deterioration or failure due to the following.
 - 1) Excessive joint movement caused by structural settlement or errors attributable to design or construction, resulting in stresses in sealant exceeding sealant manufacturer's written specifications for sealant elongation or compression.
 - 2) Deterioration or failure of sealant due to failure of substrate prepared according to requirements.
 - 3) Mechanical damage caused by individuals, tools, or other outside agents.
 - 4) Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.
 - 2. Warranty Period: Ten (10) years from date of Substantial Completion.

- B. Installer's Warranty:
1. Completed warranty form at the end of the Section, signed by sealant Installer, including:
 - a. Repair or replace sealant that does not comply with requirements; that does not remain watertight; that fails in adhesion, cohesion, or general durability; or that deteriorates in a manner not clearly specified by submitted sealant manufacturer's data as an inherent quality of the material for the application indicated.
 - b. Removal and replacement with new bond breaker materials.
 - c. Labor and materials to perform warranty Work.
 - d. Warranty does not include sealant deterioration or failure due to the following.
 - 1) Excessive joint movement caused by structural settlement or errors attributable to design or construction, resulting in stresses in sealant exceeding sealant manufacturer's written specifications for sealant elongation or compression.
 - 2) Deterioration or failure of sealant due to failure of substrate prepared according to requirements.
 - 3) Mechanical damage caused by individuals, tools, or other outside agents.
 - 4) Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.
 2. Warranty Period: Ten (10) years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 ELASTOMERIC JOINT SEALANTS

- A. General:
1. Comply with ASTM C920 and other requirements indicated.
 2. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing on similar projects, mockups and preconstruction testing for Project, and field experience.
 3. Select products based on mockups, preconstruction testing, and sealant manufacturer's previous testing and experience.
 4. Source Limitations: Obtain each type of joint sealant through one source from single manufacturer.
 5. Colors of Exposed Joint Sealants: Selected and approved in writing by Owner's Representative, from sealant manufacturer's full range.
- B. Single-component, Non-sag, Silicone Sealants:
1. 756 Silicone Building Sealant (Non-Staining) manufactured by Dow Corning Corporation or approved equal.
- C. Sealant for sheet metal flashing and lap splices: One part "Butyl" rubber sealant by Tremco, or approved equal.

2.2 AUXILIARY MATERIALS

- A. General: Sealant-backer materials, primers, surface cleaners, masking tape, and other materials recommended by sealant manufacturer, that are non-staining and compatible with substrates; based on mockups, preconstruction testing, and sealant manufacturer's previous testing and experience.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions with Installer and sealant manufacturer's representative for compliance with requirements and for other conditions affecting installation or performance of sealant.
 - 1. Verify dimensions of sealant joints at Site by field measurement so that proper sealant profiles will be accurately maintained.
 - 2. Ensure that work done by other trades is complete and ready for sealant Work.
 - 3. Verify that areas and conditions under which sealant Work is to be performed permit proper and timely completion of Work.
 - 4. Notify Architect/Engineer in writing of conditions which may adversely affect installation or performance of sealant, including joints with widths less than those allowed by sealant manufacturer for applications indicated, and recommend corrections.
 - 5. Do not proceed with sealant Work until adverse conditions have been corrected and reviewed by Architect/Engineer.
 - 6. Commencing sealant Work constitutes acceptance of Work surfaces and conditions.

3.2 PROTECTION

- A. Take precautions to ensure safety of people, including building users, passers-by, and workmen, and animals, and protection of property, including adjacent building elements, landscaping, and motor vehicles.
- B. Prevent construction debris and other materials from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
- C. Protect paving and sidewalks, and adjacent building areas from mechanical damage due to scaffolding and other equipment.
- D. Limit access to Work areas.
- E. Erect temporary protective canopies, as necessary, over walkways and at points of pedestrian and vehicular access that must remain in service during Work.
- F. Comply with sealant manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products.
- G. Cover adjacent surfaces with materials that are proven to resist sealant.
- H. Assume responsibility for injury to persons or damage to property due to Work, and remedy at no cost to Owner.

3.3 SURFACE PREPARATION

- A. Remove existing sealant and other foreign material from joints.
- B. Repair damaged or deteriorated substrate surfaces according to sealant manufacturer's written instructions and as approved by Architect/Engineer.
- C. Clean joint substrates immediately before installing sealant, to comply with sealant manufacturer's written instructions based on mockups and preconstruction testing.

1. Remove from substrate foreign material that could interfere with adhesion of sealant, including dirt, dust, existing sealant, oil, grease, and surface coatings.
 2. Provide dry substrate; prevent wetting of substrate prior to sealant installation.
 3. Clean porous substrates, such as concrete, masonry, stone, wood, by brushing, grinding, blast-cleaning, mechanical-abrading, or combination of methods to produce clean, sound substrate capable of developing optimum bond with sealant. Remove laitance and form-release agents from concrete. Remove loose particles remaining after cleaning operations by vacuuming or blowing out joints with oil-free, compressed air.
 4. Clean nonporous surfaces, such as metal, with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of sealant.
 5. Joints with silicone sealant and preformed sealant seals should generally be masked as subsequent cleanup of spillage and smears may be very difficult.
- D. Install masking tape on adjacent surfaces to prevent permanent staining or damage due to contact with sealant or cleaning methods to remove sealant smears. Remove tape immediately after tooling sealant, without disturbing sealant.

3.4 INSTALLATION OF SEALANT

- A. General: Comply with sealant manufacturer's written installation instructions for products and applications indicated, based on mockups and preconstruction testing.
- B. Joint Priming: Prime joint substrates where recommended in writing by sealant manufacturer, based on mockups and preconstruction testing. Apply primer to comply with sealant manufacturer's written instructions.
1. Confine primer to areas of sealant bond; do not allow spillage or migration onto adjoining surfaces.
 2. Limit priming to areas that will be covered with sealant in same day. Unless recommended otherwise by sealant manufacturer, reprime areas exposed for more than 24 hours.
- C. Install sealant backer and position to produce cross-sectional shape and proper depth of installed sealant.
1. Use properly-sized backer. Do not use multiple-backer units or braided-backer units to accommodate wide joints.
 2. Install backer with device that will provide consistent depth between substrate surface and outer surface of backer.
 3. Do not leave gaps between ends of sealant backers.
 4. Do not stretch, twist, puncture, or tear sealant backers.
 5. Remove wet backers and replace with dry materials.
- D. Install bond-breaker tape at back of designated joints.
- E. Install sealant immediately after installing backer material; to produce uniform, cross-sectional shape and depth; to directly contact and fully wet joint sides and backer material; and to completely fill recesses in joint configuration.
1. Install sealant flush with surface.
 2. Immediately after sealant application and before skinning or curing begins, tool joint with slightly concave surface, compressing sealant into joint to form smooth, uniform sealant bead; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint. Do not use tooling agent.

3.5 FIELD QUALITY CONTROL

- A. At completion of Project, observe installed sealant for damage or deterioration. If damage or deterioration occurs, neatly cut out and remove damaged or deteriorated sealant, prepare and prime surfaces, and install new sealant. Replace sealant immediately so new sealant is indistinguishable from original Work.
- B. Field-Adhesion Testing: Architect/Engineer will perform non-destructive and destructive field adhesion tests on sealant in accordance with ASTM C1521.
 - 1. Non-destructive testing:
 - a. Depress center of sealant bead with probing tool to depth of 50 percent of bead width, or depress sealant bead near substrate bond-line until it appears visually that sealant is about to fail in cohesion.
 - b. Record if sealant failed and, if so, if failure was adhesive or cohesive and maximum surface depression as percent of joint width.
 - c. Perform test every 12 inches for first 10 linear feet of joint; if no test failure is observed, test every 24 inches thereafter.
 - 2. Destructive testing:
 - a. Cut 6-inch-long tail of sealant loose from substrate.
 - b. Mark tail 1 inch from adhesive bond.
 - c. Grasp tail 1 inch from adhesive bond and pull until tail extends to 2x the published movement capability of sealant. If sealant has not failed, continue pulling to failure.
 - d. Record elongation at failure and if failure was adhesive or cohesive.
 - e. Observe sealant for complete filling of joint with absence of voids, and for joint configuration in compliance with requirements. Record observations and sealant dimensions
 - f. Perform test every 100 feet for first 1,000 linear feet of joint; if no test failure at 2x the movement capability occurs, test every 1,000 feet thereafter or approximately once per floor per elevation, whichever is more frequent.
 - 3. Test reports shall include date when sealant was installed, name of person who installed sealant, test date, test location, and whether primer was used.
 - 4. Immediately after testing, Contractor shall replace failed sealant in test areas. Neatly cut out and remove failed sealant, prepare and prime surfaces, and install new sealant. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.
 - 5. Sealant not evidencing adhesive failure from testing or noncompliance with requirements will be considered satisfactory.
 - 6. Where Architect/Engineer determines that sealant has failed adhesively from testing or does not comply with requirements, additional testing will be performed to determine extent of non-conforming sealant. Neatly cut out and remove non-conforming sealant, prepare and prime surfaces, and install new sealant. Perform field adhesion tests on new sealant. Additional testing and replacement of non-conforming sealant shall be at Contractor's expense.

3.6 CLEANING

- A. As sealant Work progresses, clean off excess sealant or sealant smears by methods and with cleaning materials approved in writing by sealant manufacturer and manufacturers of products in which joints occur. Exercise care to avoid scratching or damage to surfaces.
- B. At the end of each workday, clean Site and Work areas and place rubbish, empty cans, rags, and other discarded materials in appropriate containers.

- C. After completing sealant Work:
 - 1. Repair surfaces stained, marred, or otherwise damaged during sealant Work.
 - 2. Clean up debris and surplus materials and remove from Site.

3.7 PROTECTION

- A. Protect sealant during and after curing period from contact with contaminating substances and from damage, so sealants are without deterioration or damage at time of Substantial Completion.

END OF SECTION

SEALANT INSTALLER'S WARRANTY

Delete or retain this warranty, or include another sealant Installer's warranty form if required.

WHEREAS <Insert name> of <Insert address>, herein called *Sealant Installer*, has performed sealant and associated work, designated *Work*, on the following project:

Owner: <Insert name of Owner.>

Address: <Insert address.>

Building Name/Type: <Insert information.>

Address: <Insert address.>

Area of Work: <Insert information.>

Acceptance Date: <Insert date.>

Warranty Period: <Insert warranty period.>

Expiration Date: <Insert date.>

AND WHEREAS Sealant Installer has contracted, either directly with Owner or indirectly as subcontractor, to warrant said Work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

NOW THEREFORE Sealant Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period it will, at its own cost and expense, make or cause to be made such repairs to or replacement of said Work as are necessary to correct faulty and defective Work and as are necessary to maintain said Work in watertight condition, and warrants against the following.

1. Components of sealant system that do not comply with requirements; that do not remain watertight; that fail in adhesion, cohesion, or general durability; or that deteriorate in a manner not clearly specified by submitted sealant manufacturer's data as an inherent quality of the material for the application indicated, regardless of whether the Work was previously accepted by Owner.
2. Damage by exposure to foreseeable weather; and damage by intrusion of foreseeable wind-borne moisture.

Warranty is made subject to the following terms and conditions:

1. Specifically excluded from Warranty are damages to Work and other parts of the building, and to building contents, caused by:
 - a. lightning;

Insert required wind speed below.

- b. peak gust wind speed exceeding <Insert wind speed> miles per hour;
 - c. fire;
 - d. failure of sealant substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
 - e. activity adjacent to sealant Work by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner's Representative.
2. When Work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Sealant Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Sealant Installer is responsible for damage to Work covered by Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of Work.
4. During Warranty Period, if Owner allows alteration of Work by anyone other than Sealant Installer, including cutting, patching, and maintenance, Warranty shall become null and void on date of said

alterations, but only to extent said alterations affect Work covered by Warranty. If Owner engages Sealant Installer to perform said alterations, Warranty shall not become null and void unless Sealant Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate Work, thereby reasonably justifying limitation or termination of Warranty.

5. Owner will promptly notify Sealant Installer of observed, known, or suspected leaks, defects, or deterioration and will afford reasonable opportunity for Sealant Installer to inspect Work and to examine evidence of such leaks, defects, or deterioration. Sealant Installer shall inspect leak, defect, or deterioration within 24 hours of notification.
6. If permanent repair or replacement of warranted condition cannot be made immediately, due to weather conditions, availability of appropriate labor or materials, building occupancy, etc., Sealant Installer must make, or cause to be made, immediate temporary repairs to prevent any further damage, deterioration, or unsafe conditions. Permanent repair or replacement of warranted condition shall be scheduled as soon thereafter as practical, and with Owner's consent and approval.
7. If Owner notifies Sealant Installer of warranted condition that requires immediate attention to prevent potential injury or damage, and Sealant Installer cannot or does not promptly inspect and repair same, either permanently or temporarily, then Owner may make, or cause to be made, such temporary repairs as may be essential and Sealant Installer will reimburse Owner for cost of such repairs. Such action will not relieve Sealant Installer of its obligation to perform any necessary permanent repairs, and Warranty shall remain in full force and effect for remaining portion of its original term.
9. Sealant Installer shall provide equipment, labor, and material required to remedy warranted conditions, including repair or replacement of damage to other work resulting therefrom, and removal and replacement of other work required to access warranted condition. Additional required work will be at Sealant Installer's sole expense for full term of Warranty. Warranty includes removal and replacement of sealant-backer material and sealant.
10. Warranty is recognized to be only Warranty of Sealant Installer on said Work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of sealant failure. Specifically, Warranty shall not operate to relieve Sealant Installer of responsibility for performance of original Work according to requirements of Contract Documents, regardless of whether Contract was directly with Owner or with Owner's General Contractor.

IN WITNESS THEREOF, and intending to be legally bound hereby, Sealant Installer has caused this document to be executed by undersigned, duly-authorized officer.

(Sealant Installer) Corporate Seal:

By: _____
(Signature)

(Name)

(Date)

Subscribed and sworn to before me this ____ day of ____, 20__

Notary Public
My commission expires _____

SECTION 08 45 23

FIBERGLASS SANDWICH-PANEL ASSEMBLIES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Kalwall replacement where indicated on the drawings.
- B. Related Sections
 - 1. Section 02 41 20 - Selective Demolition
 - 2. Section 07 62 00 - Sheet Metal Flashing and Trim
 - 3. Section 07 92 00 - Joint Sealants

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for aluminum components of panel assemblies.
- B. Shop Drawings: For panel assemblies. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Include details of provisions for assembly expansion and contraction and for draining moisture within the assembly to the exterior.
 - 2. Shop drawings are to be coordinated with adjacent construction to accurately show interface details.
- C. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes. Samples of each hardware product for the operable units are also to be submitted.
- D. Fabrication Samples: Of each framing system intersection and adjacent panels, made from 12-inch lengths of full-size framing members and showing details of the following:
 - 1. Joinery.
 - 2. Anchorage.
 - 3. Expansion provisions.
 - 4. Fiberglass-sandwich panels.
 - 5. Flashing and drainage.
- E. Delegated-Design Submittal: For panel assemblies indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for panel assemblies.
- G. Warranties: Sample of special warranties.

1.3 QUALITY ASSURANCE

- A. **Manufacturer Qualifications:** For fiberglass-sandwich panels, a qualified manufacturer whose facilities, processes, and products are monitored by an independent, accredited quality-control agency for compliance with applicable requirements in ICC-ES AC04, "Sandwich Panels," or ICC-ES AC177, "Translucent Fiberglass Reinforced Plastic (FRP) Faced Panel Wall, Roof and Skylight Systems."
- B. **Installer Qualifications:** Manufacturer's authorized representative who is trained and approved for installation of panel assemblies required for this Project.
- C. **Testing Agency Qualifications:** Qualified according to ASTM E 699 for testing indicated.
- D. **Product Options:** Information on Drawings and in Specifications establishes requirements for panel assemblies' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including testing conducted by an independent testing agency and in-service performance.
 - 1. Do not modify intended aesthetic effects, as judged solely by Architect/Engineer, except with Architect/Engineer's approval. If modifications are proposed, submit comprehensive explanatory data to Architect/Engineer for review.
- E. **Preinstallation Conference:** Conduct conference at Project site.

1.4 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.

1.5 CHANGES IN WORK

- A. During rehabilitation work, existing conditions may be encountered which are not known or are at a variance with drawings and specifications. Such conditions may interfere with Work and may consist of damage or deterioration of substrate or surrounding materials or components that could jeopardize integrity or performance of new fiberglass sandwich-panel assemblies.
- B. Notify Architect/Engineer/Engineer of conditions that may interfere with proper execution of Work or jeopardize integrity of new fiberglass sandwich-panel assemblies prior to proceeding with Work.

1.6 WARRANTY

- A. **Special Warranty:** Manufacturer's standard form in which manufacturer agrees to repair or replace components of panel assemblies that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - c. Water leakage.

2. Warranty Period: Five years from date of Substantial Completion.
- B. Special Fiberglass-Sandwich-Panel Warranty: Manufacturer's standard form in which manufacturer agrees to replace panels that exhibit defects in materials or workmanship.
1. Defects include, but are not limited to, the following:
 - a. Fiber bloom.
 - b. Delamination of coating, if any, from exterior face sheet.
 - c. Color change exceeding requirements.
 - d. Delamination of panel face sheets from panel cores.
 2. Warranty Period: 10 years from date of Substantial Completion.
- C. Special Aluminum-Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.
1. Failures include, but are not limited to, checking, crazing, peeling, chalking, and fading of finishes.
 2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide translucent wall system panels and framing by Kalwall Corporation. Operable units to be "E-Series" by Kalwall Corporation.

2.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Fiberglass-sandwich-panel assemblies shall withstand the effects of the following forces without failure due to defective manufacture, fabrication, installation, or other defects in construction:
1. Structural loads.
 2. Thermal movements.
 3. Movements of supporting structure.
 4. Dimensional tolerances of building frame and other adjacent construction.
 5. Failure includes, but is not limited to, the following:
 - a. Deflection exceeding specified limits.
 - b. Water leakage.
 - c. Thermal stresses transferred to building structure.
 - d. Noise or vibration created by wind, thermal, or structural movements.
 - e. Loosening or weakening of fasteners, attachments, and other components.
- B. Structural Loads as indicated in drawings:
1. Zone 4: 49psf positive; 53psf inward
 2. Zone 5: 49psf outward; 65psf inward
- C. Deflection Limits: Limited to 1/270 of clear span for each assembly component.
- D. Structural-Test Performance: Provide panel assemblies tested according to ASTM E 330, as follows:

1. When tested at positive and negative wind-load design pressures, assemblies do not show evidence of deflection exceeding specified limits.
 2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not show evidence of material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
 3. Test Durations: As required by design wind velocity, but not less than 10 seconds.
- E. Water Penetration under Static Pressure: Provide panel assemblies that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 15 psf.
1. Provide for concealed drainage of exterior water penetrating through wall system to interior or condensation occurring within wall construction. This drainage shall direct the water to the exterior face of the wall at each horizontal joint in the glazing system. Provide weepholes, gutters with dams and sealed terminations as necessary for continuity of drainage control.
 2. "Uncontrolled" water leakage in this specification is defined as water or condensation that appear on any visible interior portion of the glazing system that is not collected and demonstrably drained to the exterior without damaging adjacent material surfaces of furnishings.
- F. Thermal Movements: Allow for thermal movements from ambient- and surface-temperature changes. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Range: (minus) 10 degrees F to (plus) 180 degrees F, without causing buckling of panels, failure of joint seals, undue stress on structural elements, damaging loads on fasteners, reduction of performance or other detrimental effects.
- G. Energy Performance: Provide panel assemblies with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below and certified and labeled according to NFRC:
1. Thermal Transmittance (U-Factor): Fixed glazing and framing areas shall have U-factor of not more than 0.65 Btu/sq. ft. x h x deg F as determined according to NFRC 100.
 2. Solar-Heat-Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.6 as determined according to NFRC 200.
 3. Air Infiltration: Maximum air leakage through fixed glazing and framing areas of 0.30 cfm/sq. ft. of fixed wall area as determined according to ASTM E 283 at a minimum static-air-pressure differential of 6.24 lbf/sq. ft.

2.3 ALUMINUM FRAMING SYSTEMS

- A. Components: Manufacturer's standard extruded-aluminum members of thickness required and reinforced as required to support imposed loads.
1. Construction: Thermally broken, extruded aluminum.
- B. Aluminum: Alloy and temper recommended in writing by manufacturer for type of use and finish indicated.
1. Sheet and Plate: ASTM B 209.
 2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
 3. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
 4. Structural Profiles: ASTM B 308/B 308M.

- C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning glazing system components.
- D. Fasteners and Accessories: ASTM A 193/A 193M, 300 series stainless-steel fasteners and accessories; compatible with adjacent materials.
 - 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 - 2. At movement joints, use slip-joint linings, spacers, and sleeves of material and type recommended in writing by manufacturer.
- E. Dissimilar Metals: Provide adequate separation between dissimilar metals to prevent galvanic corrosion. Provide separation by suitable high density rigid plastics or similar materials and not by paint coatings.
- F. Concealed Flashing: Corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.
- G. Exposed Flashing and Closures: Aluminum sheet not less than 0.040 inch thick, finished to match framing.
- H. Framing Gaskets: Manufacturer's standard.
- I. Frame-System Sealants: As recommended in writing by manufacturer.
- J. Corrosion-Resistant Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.4 FIBERGLASS-SANDWICH PANELS

- A. Description: Assembly of uniformly colored, translucent, thermoset, fiberglass-reinforced-polymer face sheets bonded to both sides of a grid core.
 - 1. Self-Ignition Temperature: 650 deg F or more per ASTM D 1929.
 - 2. Smoke-Developed Index: 450 or less per ASTM E 84, or 75 or less per ASTM D 2843.
 - 3. Flame-Spread Index: Not more than 25 per ASTM E 84.
- B. Panel Thickness: 2-3/4 inches.
- C. Panel Strength Characteristics:
 - 1. Maximum Panel Deflection: Not more than 1.9 inch at 30 lbf/sq. ft. in 10' 0" span without a supporting frame by ASTM E 72.
 - 2. Panel Support Strength: Capable of supporting, without failure, a 300-lbf concentrated load when applied to a 3-inch- diameter disk according to ASTM E 661.
- D. Grid Core: Mechanically interlocked, extruded-aluminum I-beams, with a minimum flange width of 7/16 inch.
 - 1. Extruded Aluminum: ASTM B 221, in alloy and temper recommended in writing by manufacturer.
 - 2. I-Beam Construction: Thermally broken, extruded aluminum.
 - 3. Grid Pattern: Inline rectangle, nominal 12 by 24 inches.
- E. Exterior Face Sheet:

1. Thickness: 0.070 inches.
 2. Color: White.
 3. Color Change: Not more than 3.0 units Delta E when measured according to ASTM D 2244, after outdoor weathering in southern Florida compliant with procedures in ASTM D 1435, with panels mounted facing south and as follows:
 - a. Panel Mounting Angle: Not more than 5 degrees from horizontal.
 - b. Exposure Period: 60 months.
 4. Erosion Protection: Manufacturer's standard integral, embedded-glass erosion barrier.
- F. Interior Face Sheet:
1. Thickness: 0.060 inch.
 2. Color: White.
- G. Fiberglass-Sandwich-Panel Adhesive: ASTM D 2559.
1. Compatible with facing and core materials.
 2. Tensile and shear bond strength of aged adhesive ensures permanent adhesion of facings to cores, as evidenced by testing tensile strength according to ASTM C 297 and shear bond strength according ASTM D 1002. Use accelerated aging procedures that comply with aging requirements for adhesives with high resistance to moisture in ICC-ES AC05, "Sandwich Panel Adhesives."

2.5 FABRICATION

- A. Frame System Fabrication:
1. Fabricate components before finishing.
 2. Fabricate components that, when assembled, have the following characteristics:
 - a. Profiles that are sharp, straight, and free of defects or deformations.
 - b. Accurately fitted joints with ends coped or mitered.
 - c. Internal guttering systems or other means to drain water passing through joints, condensation occurring within components, and moisture migrating within assembly to exterior.
 3. Fabricate sill closures with weep holes and for installation as continuous component.
 4. Reinforce components as required to receive fastener threads.
- B. Panel Fabrication: Factory assemble and seal panels.
1. Laminate face sheets to grid core under a controlled process using heat and pressure to produce straight adhesive bonding lines that cover width of core members and that have sharp edges.
 - a. White spots indicating lack of bond at intersections of grid-core members are limited in number to four for every 40 sq. ft. of panel and limited in diameter to 3/64 inch.
 2. Fabricate with grid pattern that is symmetrical about centerlines of each panel.
 3. Fabricate panel to allow condensation within panel to escape.
 4. Reinforce panel corners.

2.6 ALUMINUM FINISHES

- A. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
1. Color: Selected from manufacturers standard range.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General:
 - 1. Comply with manufacturer's written instructions.
 - 2. Do not install damaged components.
 - 3. Fit joints between aluminum components to produce hairline joints free of burrs and distortion.
 - 4. Rigidly secure nonmovement joints.
 - 5. Install anchors with separators and isolators to prevent metal corrosion, electrolytic deterioration, and immobilization of moving joints.
 - 6. Seal joints watertight unless otherwise indicated.
- B. Metal Protection: Where aluminum components will contact dissimilar materials, protect against galvanic action by painting contact surfaces with corrosion-resistant coating or by installing nonconductive spacers as recommended in writing by manufacturer for this purpose.
- C. Install continuous aluminum sill closures with weatherproof expansion joints and locked and sealed corners. Locate weep holes at rafters.
- D. Install components to drain water passing through joints, condensation occurring within aluminum members and panels, and moisture migrating within assembly to exterior.
- E. Install components plumb and true in alignment with established lines and elevations.
- F. Erection Tolerances: Install panel assemblies to comply with the following maximum tolerances:
 - 1. Alignment: Limit offset from true alignment to 1/32 inch where surfaces abut in line, edge to edge, at corners, or where a reveal or protruding element separates aligned surfaces by less than 3 inches; otherwise, limit offset to 1/8 inch.
 - 2. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet, but no greater than 1/2 inch over total length.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Water-Spray Test: Conduct water-spray test of metal panel assembly, testing for water penetration according to AAMA 501.2.
 - 1. The extent and location of water testing shall be selected by Architect/Engineer or Owner.
 - 2. At a minimum, water testing shall be performed at no less than two (2) typical wall panels, one (1) panel each on the south and west facade, or approximately 64 linear feet of panel to frame joinery and include a typical head, jamb, and sill.

3. The perimeter weather seal between the frame and rough opening shall not be masked from the influence of water spray.
- C. Repair or remove work where test results and inspections indicate that it does not comply with specified requirements.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- E. Prepare test and inspection reports.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Supply and placement of cast-in-place concrete including concrete materials, mix design, batching procedures, placement procedures, finishes, and curing for the plaza topping slab.

1.2 REFERENCES

- A. Definitions:
1. Cementitious Materials: Portland cement alone or in combination with one or more of fly ash, silica fume, and other pozzolans, or slag cement.
- B. Reference Standards: Latest edition as of Specification date.
1. American Concrete Institute (ACI):
 - a. 117: Specification for Tolerances for Concrete Construction and Materials and Commentary.
 - b. 301: Specifications for Structural Concrete.
 - c. 305R: Guide to Hot Weather Concreting.
 - d. 306R: Guide to Cold Weather Concreting.
 - e. 347: Guide to Formwork for Concrete.
 2. ASTM International:
 - a. C31/C31M: Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 - b. C33/C33M: Standard Specification for Concrete Aggregates.
 - c. C39/C39M: Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - d. C42/C42M: Standard Test Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
 - e. C94/C94M: Standard Specification for Ready-Mixed Concrete.
 - f. C143/C143M: Standard Test Method for Slump of Hydraulic-Cement Concrete.
 - g. C150/C150M: Standard Specification for Portland Cement.
 - h. C171: Standard Specification for Sheet Materials for Curing Concrete.
 - i. C172: Standard Practice for Sampling Freshly Mixed Concrete.
 - j. C231/C231M: Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
 - k. C260/C260M: Standard Specification for Air-Entraining Admixtures for Concrete.
 - l. C309: Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - m. C494/C494M: Standard Specification for Chemical Admixtures for Concrete.
 - n. C618: Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
 - o. C856: Standard Practice for Petrographic Examination of Hardened Concrete.

- p. C1064/C1064M: Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
- q. C1152/C1152M: Standard Test Method for Acid-Soluble Chloride in Mortar and Concrete.
- r. C1218/C1218M: Standard Test Method for Water-Soluble Chloride in Mortar and Cement.
- s. C1260: Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method).
- t. C1524: Standard Test Method for Water-Extractable Chloride in Aggregate (Soxhlet Method).

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate Work to ensure that adjacent areas are not adversely affected. Coordinate:
 - 1. With Owner's Representative.
 - 2. With other trades:
 - a. To ensure that work done by other trades is complete and ready to for concrete Work.
 - b. To avoid or minimize work on, or in immediate vicinity of, concrete Work in progress.
 - c. To ensure that subsequent work will not adversely affect installed concrete.
- B. Pre-placement Meeting:
 - 1. Conduct meeting at Site.
 - 2. Review requirements for concrete Work, including:
 - a. Construction schedule
 - b. Availability of materials, personnel, equipment, and facilities needed to make progress and avoid delays.
 - c. Site use, access, staging, and set-up location limitations.
 - d. Forecast weather conditions.
 - e. Surface preparation and substrate condition.
 - f. Placement procedures.
 - g. Special details.
 - h. Minimum cure period.
 - i. Testing and inspection requirements.
 - j. Temporary protection and repair of damaged concrete.
 - k. Structural loading limitations of deck.
 - l. Government regulations.
 - 3. Contractor's Site superintendent, Owner's Representative, and Architect/Engineer shall attend.

1.4 SUBMITTALS

- A. Product Data: Manufacturer's literature and technical data, including VOC contents, for admixtures, curing compounds, and other products.
 - 1. Include Safety Data Sheets (SDS) for information only; safety restrictions are sole responsibility of Contractor.
- B. Shop Drawings: For formwork, finished slopes (to drains), phasing, and location of control joints.
- C. Mockup: Provide a mockup 10 square feet in size that shows the color and finishing, including control joints, which will be used for the project for Owner review and approval. The mockup is

to remain onsite and will serve as the standard for coloring and finishing.

- D. Design Mixes: For each concrete mixture, include:
1. Proportions of materials.
 2. Mill tests and certification for cement, fly ash, and slag cement. Certification for silica fume.
 3. Sieve analysis for fine and coarse aggregate.
 4. Test results for deleterious substances in aggregates and potential aggregate reactivity.
 5. Slump during laboratory tests.
 6. Shrinkage during laboratory tests.
 7. Air content during laboratory tests.
 8. Three-, seven-, and 28-day laboratory compression test results. Minimum three cylinders at each test age.
 9. Indicate:
 - a. Amount of mix water to be withheld for later addition at Site.
 - b. Range of high-range, water-reducing admixture dosage that may be added at Site without adversely affecting hardened concrete.
- E. Field Quality Control: Batch tickets for ready-mix concrete.
- F. Joint Layout: Proposed construction, control, and isolation joint layout required to construct structure, subject to approval by Architect/Engineer.
- G. Contractor Qualifications: Evidence that Contractor's *existing company* has minimum five years of continuous experience in similar concrete work; list of at least five representative, successfully-completed projects of similar scope and size, including:
1. Project name.
 2. Owner's name.
 3. Owner's Representative name, address, and telephone number.
 4. Description of work.
 5. Types of concrete work.
 6. Project supervisor.
 7. Total cost of concrete work and total cost of project.
 8. Completion date.

1.5 QUALITY ASSURANCE

- A. Contractor Qualifications: Experienced firm that has successfully completed concrete work similar in material, design, and extent to that indicated for the Project. Must have successful construction with specified materials in local area in use for a minimum of five years.
1. Employ foreman with minimum five years of experience as foreman on similar projects, who is fluent in English, to be on Site at all times during the Work. Do not change foremen during the course of the Project except for reasons beyond the control of Contractor; inform Architect/Engineer in advance of any changes.
 2. Provide at least one individual who is certified by ACI as Finisher/Technician for type of work being performed, during concrete pours.
- B. Ready-Mix Supplier Qualifications: ASTM C94/C94M; Certification of Production Facilities and Delivery Vehicles by National Ready Mixed Concrete Association.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. If concrete is to be site-batched:
1. Deliver, store, and handle materials according to manufacturer's recommendations and in such manner as to prevent damage to materials or structure.
 2. Deliver materials to Site in original bags and containers with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, lot number, and directions for storing.
 3. Keep materials dry and do not allow materials to be exposed to moisture during transportation, storage, handling, or installation. Reject and remove from Site new materials which exhibit evidence of moisture during application, or have been exposed to moisture.
 4. Store materials in original, undamaged bags or containers in clean, dry, protected location on raised platforms with weather-protective coverings, within temperature range required by manufacturer. Manufacturer's standard packaging and covering is not considered adequate weather protection.
 - a. Store cement bags on pallets.
 - b. Store fine and coarse aggregates away from normal drainage paths and cover with canvas or plastic if necessary to keep dry.
 - c. Protect materials from dirt, dust, and other contaminants.
 5. Limit stored materials on structures to safe loading capacity of structure at time materials are stored, and to avoid permanent deck deflection.
 6. Conspicuously mark damaged or opened bags or containers or bags or containers with contaminated materials, and remove from Site as soon as possible.

1.7 PROJECT CONDITIONS

- A. Comply with Owner's limitations and restrictions for Site use and accessibility.
- B. Handle materials in strict accordance with safety requirements required by material manufacturers; Safety Data Sheets (SDS); and local, state, and federal rules and regulations. Maintain Safety Data Sheets (SDS) with materials in storage area and available for ready reference on Site.

PART 2 PRODUCTS

2.1 FORM MATERIALS

- A. Forms: Plywood, lumber, metal, plastic, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
1. Do not use rust-stained, steel, form-facing material.
- B. Accessories:
1. Form-Release Agent: Commercially-formulated form-release agent that will not bond with, stain, or adversely affect the concrete surface and will not impair subsequent treatments of concrete surface.
 - a. Formulate form-release agent with rust inhibitor for steel form-facing materials.

2.2 CONCRETE MATERIALS

- A. Source Limitations: Obtain each type or class of cementitious material of same brand from same

manufacturer's plant, each aggregate from one source, and admixtures through one source from single manufacturer.

- B. Portland cement shall conform to ASTM C150, Type I.
- C. Fly Ash: ASTM C618, Class F or C
- D. Ground-Granulated Blast-Furnace Slag (GGBFS): ASTM C595.
- E. Silica Fume: ASTM C1240, amorphous silica.
- F. The following types of admixtures may be used when approved by the Engineer.
 - 1. Air-entraining Admixtures ASTM C260
 - 2. Chemical Admixtures ASTM C494
 - 3. CHROMIX Admixture for Color Conditioned Concrete ASTM C979 for topping slab, as requested by the Owner
- G. Calcium chloride shall not be permitted in the concrete as an intentional additive.
- H. Coarse aggregate: C33, Class 4S. Aggregates for the topping slab shall be normal-weight crushed stone or gravel. Fine aggregate shall be natural or manufactured sand. Aggregate particles shall be clean, hard, and angular, of uniform quality, and free from soft, thin elongated pieces, disintegrated stone, dirt, organic, or other injurious materials occurring either free or as a coating. Aggregates shall be supplied from a source acceptable to the Engineer, and shall be free of chert and other aggregates susceptible to volume instability under freezing conditions. Aggregates shall conform to ASTM C33, Class 4S with the following limitations:
 - 1. Minimum percentage of coarse aggregate by weight of total aggregate shall be 60 to 68 percent.
 - 2. Maximum coarse aggregate size shall be 3/4 in. for the topping slab.
- I. Mixing water shall be potable and free of injurious quantities of substances known to be harmful to portland cement.
- J. Water: Potable.

2.3 CURING MATERIALS

- A. Moisture-Retaining Cover: ASTM C171, white burlap-polyethylene sheet.
- B. 3M Waterproof Tape
- C. Water: Potable.

2.4 AUXILIARY MATERIALS

- A. Joint Filler: Semi-rigid, 100-percent-solids, epoxy; Shore A hardness of at least 85.
 - 1. Use MM-80 Semi-Rigid Epoxy Joint Filler, manufactured by Metzger/McGuire, www.metzgermcguire.com, 800-223-MM80, or approved equal."

2.5 CONCRETE MIXES

- A. Prepare design mixes for each type and strength of concrete determined by either laboratory trial mixes or field-test data, according to ACI 301.

1. Use qualified independent testing agency for preparing and reporting proposed mix designs for laboratory trial mix basis.
- B. Proportion normal-weight concrete mix as follows:
1. 28-day Compressive Strength: 4,000 pounds per square inch.
 2. Maximum Water-Cementitious Materials Ratio, by weight: 0.45.
 3. Fly Ash: Include 20 to 30 percent by mass of total cementitious materials, as cement replacement, unless otherwise approved.
 4. Shrinkage: 700 micro-strain maximum at 90 days when tested according to ASTM C157, modified as follows:
 - a. Wet cure for seven days after casting, then store specimens in drying room.
 5. Slump: 4 inches maximum.
 - a. With High-Range, Water-Reducing Admixture:
 - 1) 2- to 4-inch slump prior to adding admixture.
 - 2) 8 inches maximum slump after admixture is added.
 6. Air Content: Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having air content of 4.5 to 7.5 percent, unless otherwise indicated.
 7. Admixtures: Use admixtures according to manufacturer's written instructions.
 - a. Use water-reducing admixture. Alternately use high-range, water-reducing admixture (superplasticizer), as required, for placement and workability.
 - b. Use retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 8. No chlorides shall be intentionally introduced into concrete mix.
 - a. In hardened concrete, limit acid-soluble chloride ion content to 0.10 percent by weight of cement when tested according to ASTM C1152/C1152M, or water-soluble chloride ion content to 0.08 percent by weight of cement when tested according to ASTM C1218/C1218M.
 - b. If hardened concrete exceeds chloride ion limits above, limit water-extractable chloride ion content to 0.08 percent by weight of cement when tested according to ASTM C1524.
 - c. Provide test results necessary to demonstrate concrete and aggregates do not exceed chloride ion limits, unless waived by Architect/Engineer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements and other conditions affecting the installation or performance of the concrete Work.
1. Ensure that work done by other trades is complete and ready for concrete Work.
 2. Verify that areas and conditions under which concrete Work is to be performed permit proper and timely completion of Work.
 3. Notify Architect/Engineer in writing of conditions which may adversely affect the installation or performance of the concrete Work and recommend corrections.
 4. Do not proceed with concrete Work until adverse conditions have been corrected and reviewed by Architect/Engineer.
 5. Commencing concrete Work constitutes acceptance of Work surfaces and conditions.

3.2 PROTECTION

- A. Take precautions to ensure the safety of people, including building users, passers-by, and workmen, and animals, and protection of property, including adjacent building elements, landscaping, and motor vehicles.
- B. Prevent construction debris and other materials from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
- C. Protect paving and sidewalks, and adjacent building areas from mechanical damage due to scaffolding and other equipment.
- D. Limit access to Work areas.
- E. Erect temporary protective canopies, as necessary, over walkways and at points of pedestrian and vehicular access that must remain in service during the Work.
- F. Assume responsibility for injury to persons or damage to property due to the Work, and remedy at no cost to Owner.

3.3 JOINTS

- A. Construction Joints: Construct joints true to line with faces perpendicular to the surface plane of the concrete, according to the approved joint layout.
 - 1. Provide sufficient joints so that members or sections can be cast continuously.
 - 2. Do not continue reinforcement through sides of strip placements of floors and slabs.
- B. Isolation Joints: Form isolation joints with preformed filler at walls, columns, drains, and other locations noted on Drawings.
- C. Control/Contraction Joints: Tool or sawcut control/contraction joints per the submitted and approved joint layout. Control/contraction joints to be a depth of $\frac{1}{4}$ of the thickness of the topping slab.

3.4 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C94/C94M, and furnish batch ticket information.
 - 1. Deliver concrete to Site and discharge within 90 minutes or before 300 revolutions of mixer drum, whichever comes first, after introduction of mix water. When air temperature is between 85 and 90 degrees F, reduce mixing and delivery time to 75 minutes; when air temperature is above 90 degrees F, reduce mixing and delivery time to 60 minutes. Concrete that exceeds the specified time limits shall be rejected.
 - 2. Do not add water-reducing or high-range, water-reducing admixture indiscriminately to increase slump.
 - 3. Introduce high-range, water-reducing admixture at the Site with additional mixing per the manufacturer's recommendations.
 - 4. Reject concrete that arrives at the Site with a slump exceeding the maximum specified slump.
- B. Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C94/C94M.

1. Develop batching and mixing operations so that quality control is assured.
2. Designate one or two individuals to batch and mix concrete. Fully instruct these individuals on batching and mixing procedures. No other persons shall batch or mix concrete without prior notification to Architect/Engineer.
3. Maintain accurate mix proportions. Batch materials by weight on the basis of whole bags of cement. Maintain a calibrated scale at the Site during concrete placement operations.

Batching by volume is permitted if the weight-volume relationship for each material is verified on a daily basis, and aggregate moisture content is measured at least once daily and aggregate volume is adjusted for bulking.
4. Incorporate admixtures into the mix in the manner recommended by the manufacturer and approved by Architect/Engineer. Measure with accuracy of +/-3 percent. Add each admixture separately.
5. Combine and mix ingredients to uniform consistency.
6. Mix concrete materials in an appropriate drum-type batch machine mixer.
 - a. For a mixer capacity of 1 cubic yard or smaller, mix at least 1 1/2 minutes, but not more than five minutes after ingredients are in mixer.
 - b. For a mixer capacity larger than 1 cubic yard, increase mixing time by 15 seconds for each additional cubic yard.
 - c. Provide a sufficient number of mixers, including reserve mixers, so that concrete placement operations will proceed uninterrupted and each area is completely cast before concrete achieves initial set.

3.5 CONCRETE PLACEMENT

- A. Do not place concrete adjacent to hardened concrete less than 36 hours old.
- B. Deposit concrete as close as possible to its final position to avoid segregation due to rehandling or flowing. Place at such a rate that at all times concrete shall be plastic and flow readily into corners of forms and into spaces between and around reinforcing bars. Do not place concrete that has partially hardened or has been contaminated by foreign materials.
- C. Once concreting has commenced, it shall be carried on as a continuous operation until the panel or section is completed. Plastic concrete shall not be allowed to fall a vertical distance greater than four feet from point of discharge to point of deposit.
- D. Consolidate all newly placed concrete by vibrating. Overlay concrete shall be placed using a vibratory screed. For isolated patches, vibration shall be accomplished by means of an electric pencil- or spud-type vibrator, depending on the nature of the concrete being consolidated. Spare vibrators shall be kept at the site for use in the event of a vibrator malfunction. Vibrators shall be as narrow as necessary for shallow work.
- E. Manipulate and mechanically strike off concrete slightly above final grade, using a straight-edged wood or metal screed.

3.6 FINISHING SLABS

- A. Surface finish for topping slab:
 1. The top surface shall be finished to true smooth planes by screeding. Final finish profile shall be medium to heavy broom finish.
 2. Sawcut control/contraction joints as soon as possible without damaging concrete to a depth

- of at least $\frac{1}{4}$ of the slab depth. Locate joints per the approved layout plan.
3. Finished surfaces shall be free of loose particles, ridges, projections, voids and concrete droppings.
- B. Drainage:
1. Where possible, slope finished exposed surfaces of topping slab sufficiently to avoid ponding of water. New slab concrete shall meet existing construction (e.g. curbs, sidewalk to remain, door thresholds, etc.) in a manner that will avoid trip hazards.
- C. Minimize out-of-plane variation in slab surface. If variations are unacceptable to the Engineer, Engineer may direct the Contractor to grind the concrete to bring the surface within acceptable limits. Patching of low spots shall not be permitted. Grinding shall be done as soon as possible, preferably within three days after placement, but not until concrete is sufficiently strong to prevent dislodging coarse aggregate particles.

3.7 CONCRETE CURING

- A. Do not permit heavy pedestrian, vehicular or construction equipment traffic on any portion of the topping slab until the concrete has been shown by cylinder test to have attained at least 75 percent of the specified 28-day compressive strength.
- B. Maintain concrete at a minimum temperature of 55° F and in a moist condition for at least the first seven days after placing, or until the concrete has achieved 75 percent of the specified 28-day compressive strength as demonstrated by cylinder test.
- C. Moist curing shall be accomplished by burlap covers kept continuously wet, or by continuous waterproof paper or four-mil polyethylene sheeting conforming to ASTM C171 with edges lapped and tightly sealed by sand, wood planks, pressure-sensitive tape, mastic, or glue.
- D. Use of spray-applied curing compounds shall not be permitted.
- E. Provide adequate thermal protection for concrete during freezing or near freezing weather. All concrete materials, reinforcement, forms, filler, and ground with which concrete is to come in contact shall be free of frost, ice, and snow. Throughout heating period, concrete shall be kept moist as specified. Placement and curing of concrete during cold weather shall be in accordance with requirements of ACI 306.
- F. Placement and curing of concrete during hot weather shall be in accordance with the requirements of ACI 305.
- G. If shrinkage cracks greater than 0.01 in. wide, or an excessive number of cracks in the judgment of the Engineer, appear in the concrete during the 7-day curing period, the concrete shall be considered defective, and it shall be removed and replaced by the Contractor at no extra cost to the Owner.
- H. Protect all work against vandalism, graffiti and other similar disturbances. Areas disturbed shall be corrected to their finished appearance as accepted by the owner.

3.8 FIELD QUALITY CONTROL

- A. Routine testing of ready-mixed concrete:

Unless more stringent testing is required by City agencies, the following testing shall be performed:

1. One set of four six-in. diameter by 12-in. long test cylinders shall be made at a frequency of once per day, once for each 20 cubic yards of ready-mixed concrete placed, or once for every 500 square feet of topping slab, whichever results in a larger number of tests.
2. All cylinders shall be made and tested by a qualified approved Testing Laboratory which meets the requirements of ASTM E329, and their reports will be sent to the Engineer and Contractor. Costs for these tests shall be included in the Contractor's bid price and paid by the contractor, except where specifically indicated otherwise in this Section.
3. One cylinder from each set shall be tested at seven days, and an additional two cylinders at 28 days, in accordance with ASTM C31. The fourth cylinder shall be laboratory-cured and held in reserve for strength testing beyond 28 days, if necessary and if directed by Engineer. Additional cylinders may be made and tested at the Contractor's expense where it is desired to demonstrate 75 percent of specified 28-day strength earlier than seven days after placement, and where high early strength is expected. All cylinders to be tested earlier than 7 days shall be field-cured in the part of the structure in which the concrete is placed, and shall be removed from the structure not more than 24 hours before the time of the test.
4. At the time each set of cylinders is made, the fresh concrete shall be tested for slump and air content in accordance with ASTM C143 and C231, respectively, and the concrete mix temperature and air temperature shall be measured and recorded.
5. Unless directed otherwise by the Engineer, samples of concrete for test specimens shall be taken from the transport vehicle during discharge.
6. Test specimens shall be molded promptly after the sample is taken and then placed in site storage provided by the Contractor. Storage shall be in a shed, box or other enclosure maintained at a temperature between 60 and 80° F. Specimens shall be stored for a minimum of 16 hours prior to removal from the sampling location.
7. Strength of concrete shall be considered satisfactory if:
 - a. The average compressive strength results of two 28-day tests in each set of cylinders equals or exceeds the specified 28-day strength, and neither of the 28-day tests results is 500 psi or more below specified 28-day strength; or
 - b. Compressive strength equals or exceeds the specified 28-day strength for each of two successive cylinder tests made before 28 days. In this case, additional scheduled tests may be waived.
8. Testing of cylinders shall be in accordance with ASTM C39. Each test report shall contain the following information for each set of cylinders:
 - a. Individual test specimen strength, type of failure
 - b. Slump
 - c. Air content
 - d. Concrete and air temperature
 - e. Specimen number
 - f. Concrete pour location
 - g. Date cast
 - h. Date tested
 - i. Concrete properties specified
 - j. Notice if tests indicate concrete is not in conformance with specifications.
9. Testing of cylinders shall be performed in accordance with New York City Building Code Requirements and shall be reported and filed with the TR2 "Technical Report: Concrete Pouring, Sampling and Compression Test Cylinders".

- B. Should results of cylinder tests, including testing of reserved cylinders after 28 days if directed by Engineer, not meet preceding strength requirements, the Contractor shall submit revised mix design data for concrete which will conform to the specifications. In the event of failure of test cylinder specimens for any portion of work, the Contractor, at the Contractor's expense, shall have sample cores cut from that portion of structure represented by unsatisfactory test specimens. Three cores shall be taken from each area in question according to ASTM C42. Concrete in the area represented by core tests will be considered structurally adequate if the average of the three cores is equal to at least 85 percent of specified 28-day cylinder strength, and if no single core has a strength less than 75 percent of the 28-day strength. If these strength acceptance criteria are not met by core tests, the Contractor shall remove and replace all questionable areas of concrete at the Contractor's expense.

3.9 CLEANING

- A. After completing the concrete Work:
1. Clean soiling from adjacent surfaces. Exercise care to avoid scratching or damage to surfaces.
 2. Repair surfaces stained, marred, or otherwise damaged during concrete Work.
 3. Clean up debris and surplus materials and remove from Site.

END OF SECTION

SECTION 04 01 04 – MINOR MASONRY RENOVATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Related Documents: All Contract Documents, including Drawings, General and Supplementary Conditions and Division 1 General Requirements apply to this Section.
- B. Section includes, without limitation, providing
 1. Miscellaneous interior masonry repairs and renovations.
- C. Extent: Work on interior masonry, including
 1. Cutting, patching, toothing-in, infill and miscellaneous work with existing masonry walls.
 2. In the event of conflict between drawings and this section, carry the greater quantity or quality.

1.2 QUALITY ASSURANCE

- A. Comply with the following:
 1. Employ mechanics and subs with extensive masonry renovation background and not less than 5 years experience in comparable work.

1.3 SUBMITTALS

- A. Product Data: Submit manufacturers' technical data for each product indicated including recommendations for their application and use. Include test reports and certifications substantiating that products comply with requirements of these specifications.
- B. If alternative methods and materials to those indicated are proposed for any phase of work, provide a written description and evidence of successful use on other, comparable projects, and description of proposed testing to demonstrate quality for use on this project.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Comply with requirements of Division 01 and product manufacturers.

1.5 PROJECT CONDITIONS

- A. Protect persons, motor vehicles, surrounding surfaces of building whose masonry surfaces are being restored, building site, and surrounding buildings from injury resulting from masonry restoration work.
- B. Do not repoint mortar joints or repair masonry unless air temperatures are between 40° F (4° C) and 80° F (27° C) and will remain so for at least 48 hours after completion of work. Cold weather work may be performed in accordance with requirements of ACI, applicable provisions.
- C. Protect sills, ledges and projections from mortar droppings.
- D. Repair, restore, and repoint joints before performing wet or chemical cleaning.

PART 2 - PRODUCTS

2.1 UNIT MASONRY MATERIALS

- A. Re-use existing sound materials or match existing with new materials.
- B. Concrete Masonry Units:
 1. Match existing or comply with the following:
 2. Manufacturers: Basalite Concrete Products; BASF Construction Chemicals; Clayton Block; or approved equal.
 3. Application: Concrete masonry non-bearing partitions, shafts and miscellaneous walls.
 4. Concrete Masonry Units: ASTM C 90, 1500 f'm compressive strength, Normal weight, unless otherwise shown.
 5. Prefaced Concrete Block: ASTM C 90, 1500 f'm compressive strength: Normal weight
 6. Size: Face dimension of 7-5/8 inches high by 15-5/8 inches long by width required for application.
 7. Concrete Building Brick: ASTM C 55.
 8. Special Finish: As shown, if not: Match existing.
 9. Special Shapes: As required by building configuration.

10. Bond Pattern: As shown, if not, running Bond.

2.2 MORTAR MATERIALS

- A. Binders: Provide American Portland Cement, ASTM C 150, Type I, and plastic hydrated lime conforming to ASTM C207 Type S only; do not use type SA.
- B. Sand: Clean washed, uniformly well graded masonry sand conforming to ASTM C 144. Sand shall also match color, size, texture and gradation of existing aggregate in surrounding mortar as closely as possible.
- C. Sand for pointing mortar: Conforming to above and having rounded edges.
- D. Colored Mortar Pigment: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with record of satisfactory performance in masonry mortars.
- E. Water: Clean, free of oils, acids, alkalis and organic matter.

PART 3 - EXECUTION

3.1 PREPARATION & EXAMINATION

- A. Prior to starting the work, examine existing areas of masonry units to determine scope of work and quantities of materials required to perform the repointing work.
- B. Protect surfaces and work to remain.

3.2 MORTAR MIXING AND PROPORTIONS

- A. Mortars required for replacing masonry units under the restoration operation, shall be mixed in which the quantity of water can be accurately and uniformly controlled. Where hydrated limes are used for mortars requiring a lime content, use the dry mix method. Where the dry mix method is employed, the materials for each batch shall be well raked and turned over together before the water is added until the even color of the mixed materials indicates that the cementitious materials have been thoroughly distributed throughout the mass, after which the water shall be gradually added until a thoroughly mixed mortar of the required plasticity is obtained. Same mortar mixture shall be used throughout.
- B. Mortar which has begun to set or is not used within 2-1/2 hours after initial mixing shall be discarded. Mortar which has stiffened due to evaporation within the 2-1/2 hour period shall be retempered to restore its workability. Retempering mortar which has partially hardened, without additional cement aggregate or water, will not be permitted.
- C. Mortars proportions shall be as follows:
Face Pointing: Mixed in accordance with manufacturer's specification to match existing.

3.3 WORKMANSHIP FOR REPLACEMENT OF MASONRY

- A. Masonry work to be replaced shall be laid by skilled workmen under adequate supervision, shall be laid plumb, true to lines and levels with joints of uniform thickness, all surfaces true, and corners straight and plumb, and as follows:
 - 1. Unfinished work shall be stepped back for joining with new work. Before new work is started, remove loose mortar and exposed joint thoroughly wetted not less than twelve hours before laying new work.
 - 2. Where adjustments must be made after the mortar has started to set, remove masonry unit and mortar in joint replaced with fresh mortar.
 - 3. All work shall be kept as clean as possible so that cleaning down may be accomplished easily; protect all masonry from stain at all times to guard from discoloration. Splashing at staging levels shall be avoided, either by covering the courses at these levels, or by cleaning the brick and units so splattered while the mortar is still fresh.
 - 4. Produce exposed edges of masonry in true, smooth, even planes. Do not cut make irregular cuts.

3.10 FINAL CLEANING

- A. Keep work clean so final cleaning down may be accomplished easily; protect masonry from stains at all times. Splashing at staging levels shall be avoided, either by covering the courses at these levels, or by cleaning the masonry so splattered while the mortar is still fresh. At concrete block units, lightly stone down joints and units to remove excess mortar and aggregate projections.

END OF SECTION

SECTION 06 08 00 - WOOD PRESERVATIVE & FIRE RETARDANT TREATMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section Includes, without limitation:
 - 1. Preservative wood treatments.
 - 2. Fire retardant wood treatments.
- C. Related sections, without limitation, include:
 - 1. Section 06 10 50 - Wood blocking.
 - 2. Section 06 45 00 - Interior Wood Trim.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
 - 3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
 - 4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 - 5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.3 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:
 - 1. Wood-preservative-treated wood.
 - 2. Fire-retardant-treated wood.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with specifications, provide Fire retardant treatment products equal or superior to
 - 1. Arch Chemicals Inc. "Dricon"
 - 2. Hoover "Pyro-guard 3rd Generation Fire Retardent Treatment" - for dry interiors
 - 3. Hoover "ExteriorFireX" for plywood only for damp interior and exterior applications.
 - 4. Products shall be certified paintable or stainable.

2.2 PRESERVATIVE & FIRE RETARDANT TREATMENTS

- A. Pressure Applied Preservative Treatment [PT]:

1. Material: ACQ – Alkaline Copper Quat, AWPA Standards P26, 27, 28, & 29.
 2. Treatment Standard: AWPA C2 for lumber and C22 for panels.
 3. Retention level: 0.25 lbs. per cubic foot; or
 4. Moisture content: Kiln dried to 19% before delivery to job site.
 5. Treated products shall conform to American Wood Preservers Bureau Standard LP-2 and be so stamped on each piece delivered.
 6. Coordinate preservative treatment with roofing materials to ensure compatibility.
 7. Fasteners used with PT: Hot dipped galvanized or stainless steel.
 8. Use of electroplated fasteners: Not permitted.
 9. Usage: Where shown and all plywood and lumber, exterior and interior, having direct contact with concrete or masonry and all blocking, nailing strips, curbs, wood battens and other wood embedded in or in contact with roofing.
 10. Coatings: Coat concealed blocking to intended to abut sheet metal other than stainless steel with application of bituminous paint.
- B. Fire Retardant Treatment [FRT]:
1. Standard: AWPA P17, formulations FR-1.
 2. UL listed treatment adequate to achieve Class I rating with flame spread equal to 0-25 when tested in accordance with ASTM E84 and show no evidence of significant progressive combustion when test is continued for an additional 20 minutes. Provide treatments compatible with locations - interior or exterior.
 3. Provide fire retardant treated wood products as shown or required by code.
 4. I-2 Occupancies: Fire retardant treat all wood products.
- C. Fire Retardant Plywood:
1. Class A material conforming to ASTM E-84, NFPA 255, UL 723.
 2. Provide certification by manufacturer of conformity to standards.
 3. Provide fasteners meeting manufacturers approval and requirements.
 4. Acceptable manufacturer: Arch Chemicals Inc., "Dricon FRT"
- D. Water-Repellent Preservative: NWWDA tested and accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chlorpyrifos as its active ingredient.

2.3 APPLICATIONS

- A. Pressure preservative treatments; provide as shown and including:
1. Treat above-ground wood exposed to deterioration by moisture
 2. Wood in contact with the ground or fresh water.
 3. Wood in contact with concrete or masonry.
- B. Fire retardant treatments; provide as shown and including:
1. Where shown.
 2. Where required by code.

2.4 FIRE-RETARDANT-TREATED MATERIAL GENERAL REQUIREMENTS

- A. Comply with the following:
1. Use treatment that does not promote corrosion of metal fasteners.
 2. Exterior Type: Comply with requirements specified for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
 3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
 4. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
 5. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
 6. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by testing agency].
 7. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.

PART 3 - EXECUTION

3.1 GENERAL

- A. Comply with the provisions of Section 01 70 00 - especially requirements related to:
 - 1. Inspection and examination.
 - 2. Tolerances and measurement.
 - 3. Approvals, inspections and filed quality control.
 - 4. Protection.
- B. Apply two coats of same preservative used in original treatment to all sawed or cut surfaces of treated lumber, in accordance with AWPA M4.

3.2 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION

SECTION 06 10 50 - WOOD BLOCKING

PART 1 - GENERAL

1.1 SUMMARY

- A. All of Contract Documents, including Drawings, the General and Supplementary Conditions and Division 1 General Requirements apply to this Section.
- B. Section includes, without limitation, providing:
 - 1. Dimension lumber wood blocking.
 - 2. Wood panel blocking.
 - 3. Wood nailers, furring, sleepers and cants.
 - 4. Strapping.
 - 5. Priming, back-painting, and treating of field cuts.
 - 6. Rough hardware.
 - 7. Backerboards for electrical and telephone equipment.
- C. Scope/extent includes, without limitation:
 - 1. Roof blocking.
 - 2. MEP, telephone, cable, and low voltage backer panels.
 - 3. Blocking for fixtures, grab bars, trim, and the like.
 - 4. Treated plywood and dimension lumber blocking to meet universal design or installation requirements.
 - 5. Wood fire stopping not provided by wood framing.
 - 6. Wood curbs/timbers for roof-top components
- D. Related Work includes, without limitation:
 - 1. Section 06 08 00 - Wood preservative & fire retardant treatments.

1.2 SUBMITTALS

- A. Product Data: Submit treatment manufacturers' and suppliers information on at least the following items and giving species, grades, actual sizes and moisture contents, finishes, and treatments as applicable
 - 1. List of project wood and blocking products provided under this section.
 - 2. List of fasteners and rough hardware by type, size, finish and typical applications for same

1.3 QUALITY STANDARDS

- A. Comply with the following:
 - 1. Lumber Standards and Grade Stamps: PS 2/16, American Softwood Lumber Standard and inspection agency grade stamps.
 - 2. Construction Panel Standards: PS 1, U.S. Product Standard for Construction and Industrial Plywood; APA PRP-108.
 - 3. Fasteners and Nailing: Comply with Appendix C requirements of Massachusetts State Building Code, and as specified.
 - 4. APA Design/Construction Guidelines.
- B. Provide the following:
 - 1. Official grade mark on lumber.
 - 2. Mark of treating company certifying type of treatment applied on fire retardant treated and pressure preservative treated lumber and plywood.
 - 3. American Plywood Association trade mark indicating type, grade and class of plywood panel.

1.4 PRODUCT DELIVERY AND STORAGE

- A. Keep materials dry at all times. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber and plywood, and provide air circulation within stacks.

PART 2 - PRODUCTS

2.1 LUMBER & PLYWOOD

- A. Moisture content: 15% max. for 2" or less nominal thickness, except as noted .
- B. Surfacing: Use S4S material (surfaced four sides) free of warp, waness and defects, unless specified otherwise.
- C. Blocking species: No. 2 or better Douglas or Hem-Fir, or #2 Spruce Pine Fir, or, where plywood is indicated, use CDX waterproof glue APA exterior plywood.
- D. 12 gage electrogalvanized sheet metal may be substituted for blocking at metal stud walls if sufficient strength is developed to support actual and code-mandated loads. Refer to other sections for requirements.
- E. Blocking layout and size: Continuous and solid, fire retardant 3/4 inch plywood or fire retardant 2x4 or larger where additional support is required.
- F. Provide blocking in addition to any indications on the drawings as follows:
 - 1. Millwork attached to walls or ceilings.
 - 2. Equipment attached to walls or ceilings.
 - 3. At grab bars.
 - 4. Handrail brackets.
 - 5. Wall hung lavatories.
 - 6. At cabinets.
 - 7. At shelving and drapery track.
 - 8. Mid points of all walls.
 - 9. Between joists at all points requiring support.
 - 10. At exterior items mounted or attached where insulating sheathing, or cement, vinyl, or wood lapped board siding is used.
- G. Wood fire stopping: Equal or better than blocking material. Do not use sheet metal for firestopping.
- H. Provide firestopping as follows:
 - 1. At ceiling lines and at 8'-0" height if ceiling is higher.
 - 2. To close of all framing spaces connecting floors.
 - 3. As required by code.
- I. Provide fire retardant treated lumber where indicated, meeting the requirements for such plywood as given below. Provide fire retardant treated wood products as shown or required by code .
- J. Furring: Solid wood sized to match the condition.
- K. Strapping shall be 1" x 3.00" nom. solid wood stock, not less than 0.75 inch thick.
- L. Bridging shall be 1" x 3" or approved galvanized steel cross bridging at intervals not to exceed 8'-0". Do not nail bottoms of bridging until subflooring is installed.

2.2 PLYWOOD

- A. General: Provide only APA grade stamped softwood plywood meeting requirements of U.S. Dept. of Commerce PS-1 in thickness shown and in grades and strengths recommended by APA for specific locations and uses. Where indicated, provide preservative or fire retardant treatment.
- B. Exposure: Exposure 1 or better.
- C. Plywood backer panels:
 - 1. Material: APA C-D Plugged Exposure 1 with exterior glue
 - 2. Pressure treatment: Fire retardant.
 - 3. Coatings: Fire retardant paint, 6 sides, applied before installation.
 - 4. Coating color: As shown or directed, if not, black.
 - 5. Thickness: As indicated, if not, 0.75 inches.

2.3 ROUGH HARDWARE

- A. Furnish and install all bolts, nuts, expansion shields, lag screws, toggle bolts, wood screws, nails, flat cap metal nailing discs, staples, power driven anchors and other rough hardware as required.
- B. Rough hardware items shall be of appropriate type and proper capacity and size as required for each specific application.
- C. Concrete and masonry anchors: Where anchors are not included in concrete or masonry construction, anchors shall be galvanized machine screws or bolts with standard expansion-shield type concrete anchors, Phillips "Red Head" Masonry Anchors as manufactured by Weg-It Expansion Products, Inc., or approved equal, of sizes and types noted on Drawings or as required. Do not use expansion bolts or anchors where other type anchors are shown or noted on Drawings.
- D. Power-driven fasteners: "Drive-It" system of Powder Power Tool Corporation, "Ramset" system of Ramset Fasteners, Inc., or equivalent system of Remington-DuPont may be used where approved by construction manager and Architect. Use washers with all inserts.
- E. Fasteners used at treated wood:
 - 1. Fasteners meeting manufacturers approval and requirements.
 - 2. Where manufacturer specific recommendations are not available: Use stainless steel.

2.4 FIRE & PRESERVATIVE TREATMENT OF LUMBER & PLYWOOD

- A. Wood treatment: Comply with requirements of Section 06 0800.
- B. Extent for wood to be preservative treated: As shown and as follows:
 - 1. Treat above-ground wood exposed to deterioration by moisture
 - 2. Wood in contact with the ground or fresh water.
 - 3. Wood in contact with concrete or masonry
- C. Extent for wood to be fire retardant treated: As shown and as follows.
 - 1. Exposed or semi-exposed wood in fire rated assemblies and in spaces having limited flame spreads for exposed combustibles.
 - 2. Blocking concealed in fire rated assemblies
 - 3. Where required by code.

PART 3 - EXECUTION

3.1 GENERAL

- A. Comply with the provisions of Section 01 70 00 - especially requirements related to:
 - 1. Inspection and examination.
 - 2. Tolerances and measurement.
 - 3. Approvals, inspections and filed quality control.

3.2 MISCELLANEOUS CARPENTRY INSTALLATION - GENERAL REQUIREMENTS

- A. Construct work plumb, level, and true, with tight, close fitting joints, securely attached and braced to surrounding construction all in a first-class workmanlike manner. Counter-bore for bolt heads, nuts, and washers where required to avoid interference with other materials.
- B. Unless otherwise indicated, wood nailers, furring, strapping, etc., less than 2 in. nominal thickness shall be secured to back-up material by use of appropriate fasteners located 4 in. from ends and spaced not greater than 16 in. o.c. along lengths of members. Type and length of fastening devices shall develop sufficient anchorage to back-up material.
- C. Where nailing or power-driving into concrete or masonry, avoid puncturing conduits, pipes, ducts, etc. embedded in such work.

- D. Where anchorage to steel structural members is indicated, steel members will be prepared to receive anchor bolts, etc., as indicated, by structural steel trade.
- E. Apply two coats of same preservative used in original treatment to all sawed or cut surfaces of treated lumber, in accordance with AWWPA M4.
- F. Power-driven fasteners used on concrete surfaces or at rough window and door openings shall be used in accordance with manufacturer's recommendations, especially in regard to edge distance, curbs or at rough window and door openings.
- G. Do not space fasteners more than recommended or approved distances apart spacing and comply with applicable building codes, APA guide lines and best practices of the trade.

3.3 INSTALLATION OF BLOCKING AND NAILERS

- A. Blocking: Locate blocking to facilitate installations of finish materials, fixtures and specialty items.
- B. Attach Blocking as follows:
 - 1. In metal stud partitions: Screw attach through stud flanges.
 - 2. At masonry: With oval head toggle bolts and washers or with epoxy tube and sleeve systems.
 - 3. At concrete: With expansion shield bolts.
 - 4. At steel: With flat head bolts/nuts or approved power actuated fasteners.
- C. Blocking shall be approved material capable of supporting items such as grab bars with a load of 250 lbs. for 5 minutes or more if so required by code. Provide fire retardant treated materials where indicated.
- D. Blocking members shall be of the sizes indicated on the drawings not less than 3/4" plywood or lumber 3-1/2" wide unless otherwise noted on the drawings. Blocking members shall be secured with minimum of 5/16" galvanized steel bolts of sufficient length to provide a minimum of 3" of embedment in concrete or as required when bolting into steel members and as shown.
- E. Bolts shall be located not over 2'-0" on centers and within 4" of end joints. End joints and intermediate joints shall be in alignment. Intermediate joints shall be spliced. Counterbore wood so that washer and nut, and end of bolt are recessed below the top surface of curbs and blocking. In no case shall there be less than two bolts per length in any member.
- F. Nailers for wood trim and finish shall be provided and secured to the masonry, concrete, wood framing or other receiving surfaces as the work progresses. Nailers shall be not less than 1" nominal thickness and of such other dimensions and profiles as are required or shown.
- G. Universal and barrier free design: Whether or not shown on the drawings, provide blocking for grab bars and other barrier free assemblies. Include the following:
 - 1. Future grab bars for so-called group 1 and group 2 bathrooms:
 - a. Water closets: Blocking adjacent to and behind water closets installed from 32 to 38 inches above finish floor; and 6 inches beyond water closet each side or to corner.
 - b. Tubs: Blocking from 6 to 48 inches above tub rim, length and width of tub @ Group 1, to 60" above tub rim @ Group 2..
 - c. Showers: Blocking from 6 to 48 inches above finish floor, full width, length of stall @ Group 1, to 60" above floor @ Group 2.
 - 2. Indicated grab bars: As shown, if not, as above.

3.4 INSTALLATION OF FURRING AND STRAPPING

- A. Furring and strapping at masonry walls to receive drywall shall be 16" o.c. unless otherwise shown. All furring and strapping shall be double nailed, secured to masonry or concrete with masonry nails.
- B. All furring and strapping shall be shimmed and blocked to assure plumb and level furred wall surfaces.
- C. Exterior wall strapping: Use non-corrosives screws, embedded in wood studs not less than 1 inch or wood sheathing not less than 0.75 inch.

3.5 INSTALLATION OF BACKER / UTILITY PANEL MOUNTS

- A. Provide and install fire retardant plywood backings for surface mounted electric panel boards, meter mounts, protection cabinets, motor control panels and the like. Boards shall be rigidly built and securely fastened to wood-furred strapping at walls in approved manner. See Electrical Drawings for locations of devices which require mounting on backerboards. Provide plywood backings for Telephone and Protection (Security) panels.

3.6 CLEAN UP & PROTECTION

- A. Clean up work areas daily, remove packaging, debris, sawdust and scraps, and dispose of properly.
- B. Repair or replace work of other trades damaged or soiled as a result of work of this Section.
- C. Protect substrates, underlayments, finishes and other work subject to damage until installation of work by the next trade.

END OF SECTION

SECTION 07 00 01 - WATERPROOFING, DAMPPROOFING & CAULKING
(Filed Sub Bid Required)

PART 1 - GENERAL

1.1 GENERAL & FILED SUB BID PROVISIONS

- A. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Payment and Performance Bonds: Filed Subcontractors shall:
1. Provide Payment and Performance Bonds for the full value of their Subcontract.
 2. Include the full cost of the required bond in their Bid.
- C. Eligibility: Bids will be accepted only from Filed Subcontractors with certificates of eligibility from the authorities having jurisdiction.
- D. Submitting Filed Sub Bids: Comply with directions of Awarding Authority and the State Statutes and the following:
1. Comply with the Instructions to Bidders.
 2. Bid forms: Use only identified bid forms, acceptable to Awarding Authority.
 3. Bid bonds: Provide bid bonds as directed in the Instructions to Bidders in the form and manner indicated for 5% the total value of the Bid.
 4. Submit bid in sealed envelope in the manner and before the time and date indicated. On outside of envelope, Include name of Sub Bidder, Project name and number and identified as follows:
FILED SUBCONTRACTOR'S BID FOR SECTION:
07 00 01 – WATERPROOFING, DAMPPROOFING & CAULKING
- E. Sub-Bid Requirements: Filed Subcontractors shall perform all work of the Sub Bid Contract with employees on the Filed Subcontractor's payroll except, if the Filed Subcontractors proposes to subcontract any work, then the Filed Subcontractors shall identify on the bid form:
1. All subcontractors to the Filed Subcontractor, whose work is:
 - a. Subject to the provisions of MGL Chap. 149, §§ 44A-J.
 - b. Valued at \$10,000 or mor.
 2. The contract sum for each subcontractor required to be listed.
 - a. An affidavit that all subcontractors named on the Filed Subcontractors's bid form have been qualified or certified by the Filed Subcontractors using criteria similar to the criteria for the qualification or certification of Filed Subcontractors.
 3. Any sub-subcontracts listed below under Sub-sub Bid Requirements.
 4. Comply with the applicable Mass. General Laws and the following:
 - a. Sub bidder's attention is directed to Massachusetts G.L. Chapter 149 Section 44F, as amended, which provides in part as follows.
 - b. Each sub-bidder shall list in Paragraph E of the "Form for Sub-bids" the name and bid price of each person, firm or corporation performing each class of work or part thereof for which the Section of the Specifications for that sub trade requires such listing, provided that, in the absence of a contrary provision in the Specifications, any sub-bidder may, without listing any bid price, list his own name or part thereof and perform that work with persons on his own payroll, if such sub-bidders, after sub-bid openings, shows to the satisfaction of the Awarding Authority that he does customarily perform such class of work with persons on his own payroll and is qualified to do so. This Section of the Specifications requires that the following classes of work shall be listed in Paragraph E under the conditions indicated herein.
 5. Sub-sub Bid Requirements: This Filed Subcontractors Sub-Bid requires the following classes of work be listed in the Bid Form:

| Class of Work | Specification section number and name |
|---------------|---------------------------------------|
| a. None. | None. |
- F. Reference Drawings: The Work of this Trade Bid is shown on the following Contract Drawings:
1. **G-001 General Notes**
 2. **A-101 Area Plan**
 3. **A-104 Administration Low Roof Plan**
 4. **A-105 Rocket Arena High Roof Plan**

5. ***A-107 Plaza Plan – Repair***
6. ***A-201 Clerestory Elevations***
7. ***A-501 Administration Roof Details***
8. ***A-502 Administration Roof Details***
9. ***A-503 Rocket Arena Roof Details***
10. ***A-504 Clerestory (Kalwall) Details***
11. ***A-505 Concrete Details (Sheet I)***
12. ***A-506 Concrete Details (Sheet I)***
13. ***A-507 Plaza Waterproofing Details***

1.2 SUMMARY OF SUB BID CONTRACT

- A. Work Includes providing labor, materials and equipment necessary to complete the work of this Section, including but not limited to, all work of the following sections:
1. **Section 07 01 26 – WATERPROOFING REPAIRS.**
 2. **Section 07 14 14 – HOT APPLIED ASPHALT WATERPROOFING.**
 3. **Section 07 92 00 – JOINT SEALANTS.**
- B. Alternates: **Not applicable.**

END OF SECTION

SECTION 07 00 02 – ROOFING & FLASHING
(Filed Sub Bid Required)

PART 1 - GENERAL

1.1 GENERAL & FILED SUB BID PROVISIONS

- A. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Eligibility: Bids will be accepted only from Filed Subcontractors with certificates of eligibility from the authorities having jurisdiction.
- C. Submitting Filed Sub Bids: Comply with directions of Awarding Authority and the State Statutes and the following:
1. Comply with the Instructions to Bidders.
 2. Bid forms: Use only identified bid forms, acceptable to Awarding Authority.
 3. Bid bonds: Provide bid bonds as directed in the Instructions to Bidders in the form and manner indicated for 5% the total value of the Bid.
 4. Submit bid in sealed envelope in the manner and before the time and date indicated. On outside of envelope, Include name of Sub Bidder, Project name and number and identified as follows:
FILED SUBCONTRACTOR'S BID FOR SECTION:
07 00 02 –ROOFING & FLASHING
- D. Sub-Bid Requirements: Filed Subcontractors shall perform all work of the Sub Bid Contract with employees on the Filed Subcontractor's payroll except, if the Filed Subcontractors proposes to subcontract any work, then the Filed Subcontractors shall identify on the bid form:
1. All subcontractors to the Filed Subcontractor, whose work is:
 - a. Subject to the provisions of MGL Chap. 149, §§ 44A-J.
 - b. Valued at \$10,000 or more.
 2. The contract sum for each subcontractor required to be listed.
 - a. An affidavit that all subcontractors named on the Filed Subcontractors's bid form have been qualified or certified by the Filed Subcontractors using criteria similar to the criteria for the qualification or certification of Filed Subcontractors.
 3. Any sub-subcontracts listed below under Sub-sub Bid Requirements.
 4. Comply with the applicable Mass. General Laws and the following:
 - a. Sub bidder's attention is directed to Massachusetts G.L. Chapter 149 Section 44F, as amended, which provides in part as follows.
 - b. Each sub-bidder shall list in Paragraph E of the "Form for Sub-bids" the name and bid price of each person, firm or corporation performing each class of work or part thereof for which the Section of the Specifications for that sub trade requires such listing, provided that, in the absence of a contrary provision in the Specifications, any sub-bidder may, without listing any bid price, list his own name or part thereof and perform that work with persons on his own payroll, if such sub-bidders, after sub-bid openings, shows to the satisfaction of the Awarding Authority that he does customarily perform such class of work with persons on his own payroll and is qualified to do so. This Section of the Specifications requires that the following classes of work shall be listed in Paragraph E under the conditions indicated herein.
 5. Sub-sub Bid Requirements: This Filed Subcontractors Sub-Bid requires the following classes of work be listed in the Bid Form:

| | |
|---------------|---------------------------------------|
| Class of Work | Specification section number and name |
| a. None. | None. |
- E. Reference Drawings: The Work of this Trade Bid is shown on the following Contract Drawings:
1. **G-000 Cover Sheet.**
 2. **G-001 General Notes**
 3. **G-002 Pedestrian & Entry Protection Plan**
 4. **A-101 Area Plan**
 5. **A-102 Administration Low Roof Plan – Demolition**
 6. **A-103 Rocket Arena High Roof Plan – Demolition**
 7. **A-104 Administration Low Roof Plan**

8. **A-105 Rocket Arena High Roof Plan**
9. **A-106 Plaza Plan – Demolition**
10. **A-107 Plaza Plan – Repair**
11. **A-108 Wind Zone Plan**
12. **A-201 Clerestory Elevations**
13. **A-501 Administration Roof Details**
14. **A-502 Administration Roof Details**
15. **A-503 Rocket Arena Roof Details**
16. **A-504 Clerestory (Kalwall) Details**
17. **A-505 Concrete Details (Sheet I)**
18. **A-506 Concrete Details (Sheet I)**
19. **A-507 Plaza Waterproofing Details**
20. **E-2.0 Heat Trace Roof Plan**

1.2 SUMMARY OF SUB BID CONTRACT

- A. Work Includes providing labor, materials and equipment necessary to complete the work of this Section, including but not limited to, all work of the following sections:
1. **SECTION 07 01 50 PREPARATION FOR RE-ROOFING**
 2. **SECTION 07 54 19 ADHERED PVC MEMBRANE ROOFING**
 3. **SECTION 07 62 00 SHEET METAL FLASHING & TRIM**
- B. Alternates: **Not applicable.**

END OF SECTION

SECTION 07 01 26 – WATERPROOFING REPAIRS
PART OF THE WORK OF SECTION 07 00 01 WATERPROOFING, DAMPROOFING & CAULKING
[Filed Sub Bid Required]

PART 1 GENERAL

1.1 SUMMARY

- A. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section includes, without limitation, providing:
 - 1. Repairing or replacing damaged waterproofing using materials to match existing.
 - 2. Repairing or replacing damaged waterproofing using materials as directed.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Warranty: Submit manufacturer's standard warranty. Include labor and materials to repair or replace defective materials.
 - 1. Warranty Period: 5 years.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Testing: Flood testing of horizontal applications.
- C. Environmental limitations: Comply with manufacturer recommendations.

PART 2 PRODUCTS

2.1 EXISTING MATERIALS

- A. Use materials new materials to patch or repair existing work to match systems and conditions unless otherwise shown or directed..

2.2 NEW MATERIALS

- B. Use materials as shown or as directed. If none, as follows below.
- C. Modified Bituminous Sheet: Not less than 60-mil thick, self-adhering sheet consisting of 56 mils of rubberized asphalt laminated to a 4-mil thick, polyethylene film with release liner on adhesive side
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. American Hydrotech, Inc.; VM 75.
 - b. Carlisle Coatings & Waterproofing Inc.; CCW MiraDRI 860/861.
 - c. Grace, W. R. & Co.; Bituthene 3000 or 4000, as required..
 - d. Henry Company; Blueskin WP 200.
 - e. Meadows, W. R., Inc.; SealTight Mel-Rol.
 - 2. VOC: Where required, formulate product for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction. Where regulations are not clear, provide Low VOC products.
 - g. American Permaquik Inc.; PQ 7100.
 - 3. Physical Properties:

- a. Tensile Strength: 250 psi minimum; ASTM D 412, Die C, modified.
 - b. Ultimate Elongation: 300 percent minimum; ASTM D 412, Die C, modified.
 - c. Low-Temperature Flexibility: Pass at minus 20 deg F; ASTM D 1970.
 - d. Crack Cycling: Unaffected after 100 cycles of 1/8-inch) movement; ASTM C 836.
 - e. Puncture Resistance: 40 lbf minimum; ASTM E 154.
 - f. Hydrostatic-Head Resistance: 150 feet minimum; ASTM D 5385.
 - g. Water Absorption: 0.15 percent weight-gain maximum after 48-hour immersion at 70 deg F; ASTM D 570.
 - h. Vapor Permeance: 0.05 perms; ASTM E 96, Water Method.
1. Accessories: Primers, surface conditioners, termination bars, and protection board.

B. Geotextile-Faced Drainage Panels: Match existing if any.

2.3 AUXILIARY MATERIALS

- A. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
 1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.
- B. Primer: Liquid primer recommended for substrate by manufacturer of sheet waterproofing material. Use water borne type where required.
- C. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by manufacturer of sheet waterproofing material.
- D. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, trowel grade or low viscosity.
- E. Substrate Patching Membrane: Low-viscosity, two-component, asphalt-modified coating.
- F. Sheet Strips: Self-adhering, rubberized-asphalt sheet strips of same material and thickness as sheet waterproofing.
- G. Mastic, Adhesives, and Tape: Liquid mastic and adhesives, and adhesive tapes recommended by waterproofing manufacturer.
- H. Metal Termination Bars: Aluminum bars, approximately 1 by 1/8 inch thick, predrilled at 9-inch centers.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction. Coordinate with other work.
- B. Restore damaged components and test waterproofing for leaks. Clean and protect work from damage.

END OF SECTION

SECTION 07 01 50 - PREPARATION FOR RE-ROOFING
PART OF SECTION 07 00 02 ROOFING & FLASHING
[Filed Sub Bid Required]

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. Partial tear-off of roof areas indicated.
 - 2. Removal of base flashings.
 - 3. Temporary roofing.
- B. Related Requirements:
 - 1. Section 07 54 26 - Adhered TPO membrane roofing.

1.3 DEFINITIONS

- A. Roofing Terminology: Definitions in ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" apply to work of this Section.
- B. Roof Re-Cover Preparation: Existing roofing system is to remain and be prepared for new roof installed over it.
- C. Full Roof Tear-Off: Removal of existing roofing system from [deck] [concrete fill].
- D. Partial Roof Tear-Off: Removal of selected components and accessories from existing roofing system.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include plans, sections, and details.
- C. Temporary Roofing Submittal: Product data and description of temporary roofing system. If temporary roof remains in place, include surface preparation requirements needed to receive permanent roof, and submit a letter from roofing manufacturer, stating acceptance of the temporary roof and that its inclusion does not adversely affect the roofing system's resistance to fire and wind[or its FM Global rating].

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
 - 1. Include certificate that Installer is approved by warrantor of existing roofing system.
 - 2. Include certificate that Installer is licensed to perform asbestos abatement.
- B. Fastener pull-out test report.
- C. Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including exterior and interior finish surfaces, that might be misconstrued as having been damaged by reroofing operations. Submit before Work begins.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: [Approved by warrantor of existing roofing system to work on existing roofing] [and] [licensed to perform asbestos abatement in the state or jurisdiction where Project is located].
- B. Reroofing Conference: Conduct conference at Project site .

1. Meet with Owner; Architect; Owner's insurer if applicable; testing and inspecting agency representative; roofing system manufacturer's representative; roofing Installer, including project manager, superintendent, and foreman; and installers whose work interfaces with or affects reroofing, including installers of roof deck, roof accessories, and roof-mounted equipment.
2. Review methods and procedures related to roofing system tear-off and replacement, including, but not limited to, the following:
 - a. Reroofing preparation, including roofing system manufacturer's written instructions.
 - b. Temporary protection requirements for existing roofing system components that are to remain.
 - c. Existing roof drains and roof drainage during each stage of reroofing, and roof-drain plugging and plug removal.
 - d. Construction schedule and availability of materials, Installer's personnel, equipment, and facilities needed to avoid delays.
 - e. Existing roof deck conditions requiring notification of Architect.
 - f. Existing roof deck removal procedures and Owner notifications.
 - g. Condition and acceptance of existing roof deck and base flashing substrate for reuse.
 - h. Structural loading limitations of roof deck during reroofing.
 - i. Base flashings, special roofing details, drainage, penetrations, equipment curbs, and condition of other construction that affect reroofing.
 - j. HVAC shutdown and sealing of air intakes.
 - k. Shutdown of fire-suppression, -protection, and -alarm and -detection systems.
 - l. Asbestos removal and discovery of asbestos-containing materials.
 - m. Governing regulations and requirements for insurance and certificates if applicable.
 - n. Existing conditions that may require notification of Architect before proceeding.

1.7 FIELD CONDITIONS

- A. Existing Roofing System: EPDM.
- B. Owner will occupy portions of building immediately below reroofing area. Conduct reroofing so Owner's operations are not disrupted. Provide Owner with not less than 72 hours' notice of activities that may affect Owner's operations.
 1. Coordinate work activities daily with Owner so Owner can place protective dust and water-leakage covers over sensitive equipment and furnishings, shut down HVAC and fire-alarm or -detection equipment if needed, and evacuate occupants from below work area.
 2. Before working over structurally impaired areas of deck, notify Owner to evacuate occupants from below affected area. Verify that occupants below work area have been evacuated before proceeding with work over impaired deck area.
- C. Protect building to be reroofed, adjacent buildings, walkways, site improvements, exterior plantings, and landscaping from damage or soiling from reroofing operations.
- D. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.
- E. Conditions existing at time of inspection for bidding are maintained by Owner as far as practical.
- F. Weather Limitations: Proceed with reroofing preparation only when existing and forecasted weather conditions permit Work to proceed without water entering existing roofing system or building.
 1. Remove only as much roofing in one day as can be made watertight in the same day.
- G. Hazardous Materials: It is not expected that hazardous materials, such as asbestos-containing materials, will be encountered in the Work.
 1. Hazardous materials will be removed by Owner before start of the Work. Existing roof will be left no less watertight than before removal.
 2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

1.8 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during reroofing, by methods and with materials so as not to void existing roofing system warranty. Notify warrantor before proceeding.

1. Notify warrantor of existing roofing system on completion of reroofing, and obtain documentation verifying that existing roofing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

PART 2 - PRODUCTS

2.1 TEMPORARY PROTECTION MATERIALS

- A. Expanded Polystyrene (EPS) Insulation: ASTM C 578.
- B. Plywood: DOC PS1, Grade CD Exposure 1.
- C. OSB: DOC PS2, Exposure 1.

2.2 TEMPORARY ROOFING MATERIALS

- A. Design and selection of materials for temporary roofing are Contractor's responsibilities.

2.3 AUXILIARY REROOFING MATERIALS

- A. General: Use auxiliary reroofing preparation materials recommended by roofing system manufacturer for intended use and compatible with components of existing and new roofing system.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Shut off rooftop utilities and service piping before beginning the Work.
- B. Test existing roof drains to verify that they are not blocked or restricted. Immediately notify Architect of any blockages or restrictions.
- C. Protect existing roofing system that is not to be reroofed.
 1. Loosely lay 1-inch- (25-mm-) minimum thick, expanded polystyrene (EPS) insulation over existing roofing in areas indicated. Loosely lay 15/32-inch (12-mm) plywood or OSB panels over EPS. Extend EPS past edges of plywood or OSB panels a minimum of 1 inch (25 mm).
 2. Limit traffic and material storage to areas of existing roofing that have been protected.
 3. Maintain temporary protection and leave in place until replacement roofing has been completed. Remove temporary protection on completion of reroofing.
- D. Coordinate with Owner to shut down air-intake equipment in the vicinity of the Work. Cover air-intake louvers before proceeding with reroofing work that could affect indoor air quality or activate smoke detectors in the ductwork.
- E. During removal operations, have sufficient and suitable materials on-site to facilitate rapid installation of temporary protection in the event of unexpected rain.
- F. Maintain roof drains in functioning condition to ensure roof drainage at end of each workday. Prevent debris from entering or blocking roof drains and conductors. Use roof-drain plugs specifically designed for this purpose. Remove roof-drain plugs at end of each workday, when no work is taking place, or when rain is forecast.
 1. If roof drains are temporarily blocked or unserviceable due to roofing system removal or partial installation of new roofing system, provide alternative drainage method to remove water and eliminate ponding. Do not permit water to enter into or under existing roofing system components that are to remain.

3.2 ROOF TEAR-OFF

- A. General: Notify Owner each day of extent of roof tear-off proposed for that day and obtain authorization to proceed.
- B. Remove materials as required or indicated.
- C. Partial Roof Tear-Off: Where indicated, remove existing roofing and immediately check for presence of moisture by visually observing substrate that is to remain.
 1. Coordinate with Owner's inspector to schedule times for tests and inspections immediately after removal.

2. With an electrical capacitance moisture-detection meter, spot check substrate that is to remain.
3. Remove wet or damp materials below existing roofing and above deck.[Removal is paid for by adjusting the Contract Sum according to unit prices included in the Contract Documents.]
4. Inspect wood blocking, curbs, and nailers for deterioration and damage. If wood blocking, curbs, or nailers have deteriorated, immediately notify Architect.

3.3 DECK PREPARATION

- A. Inspect deck after tear-off of roofing system.
- B. If broken or loose fasteners that secure deck panels to one another or to structure are observed, or if deck appears or feels inadequately attached, immediately notify Architect. Do not proceed with installation until directed by Architect.
- C. If deck surface is unsuitable for receiving new roofing or if structural integrity of deck is suspect, immediately notify Architect. Do not proceed with installation until directed by Architect.
- D. Provide additional deck securement as indicated on Drawings.

3.4 INFILL MATERIALS INSTALLATION

- A. Immediately after roof tear-off, and inspection and repair, if needed, of deck, fill in tear-off areas to match existing roofing system construction.
- B. Install new roofing patch over roof infill area. If new roofing is installed the same day tear-off is made, roofing patch is not required.

3.5 TEMPORARY ROOFING

- A. Install approved temporary roofing over area to be reroofed.
- B. Install temporary roofing over area to be reroofed if and when required.
- C. Remove temporary roofing before installing new roofing.
- D. Prepare temporary roof to receive new roofing.

3.7 FASTENER PULL-OUT TESTING

- A. Perform fastener pull-out tests according to SPRI FX-1, and submit test report to Architect before installing new roofing system.

3.8 DISPOSAL

- A. Collect demolished materials and place in containers. Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.
 1. Storage or sale of demolished items or materials on-site is not permitted.
- B. Transport and legally dispose of demolished materials off Owner's property.

END OF SECTION

SECTION 07 14 14 - HOT APPLIED ASPHALT WATERPROOFING
PART OF THE WORK OF SECTION 07 00 01 WATERPROOFING, DAMPROOFING & CAULKING
[Filed Sub Bid Required]

PART 1 - GENERAL

1.1 SUMMARY

- A. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section includes, without limitation, providing:
 - 1. Reinforced waterproofing membrane.
 - 2. Molded drainage panels.
 - 3. Insulation.
 - 4. Accessories.
- C. Extent:
 - 1. Where shown.
- D. Related requirements:
 - 1. Section 07 76 20 – Roof & plaza deck pavers.
 - 2. Section 07 92 00 - Joint Sealants, for joint-sealant materials and installation.
 - 3. Division 32 – Soil media specified under landscape work.
 - 8. cover, interception and surface storage.

1.2 SYSTEM DESCRIPTION

- A. Roof assembly includes:
 - 1. Roof substrate board,
 - 2. Surface conditioner where required.
 - 3. Membrane equal to Monolithic Membrane 6125EV®-FR and flashings.
 - 4. Protection Course.
 - 5. Rigid Insulation.
 - 6. Molded sheet drainage panels.
 - 7. Filter Fabric.

1.3 PERFORMANCE REQUIREMENTS

- A. Provide waterproofing that prevents the passage of water and complies with physical requirements in CAN/CGSB-37.50, "Hot Applied, Rubberized Asphalt for Roofing and Waterproofing." This shall include applicable ASTM procedures.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties.
- B. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.
 - 1. Include Setting Drawings showing layout, sizes, sections, profiles, and joint details of concrete pavers with paver support assemblies, whether or not provided under this section.
- C. Samples: For the following products:
 - 1. 12-by-12-inch square of flashing sheet.
 - 2. 12-by-12-inch square of insulation.
 - 3. 4-by-4-inch square of drainage panel.

1.5 INFORMATIONAL SUBMITTALS

- A. Certificates:
 - 1. Installer: Signed by manufacturers certifying that installers comply with requirements.
 - 2. Performance: Certification of compliance with specifications and standards.
- B. Product Test Reports: From a qualified independent testing agency indicating and interpreting test results of waterproofing for compliance with requirements, based on comprehensive testing of current waterproofing formulations.
- C. Sample Warranty: Copy of special waterproofing manufacturer's warranty stating obligations, remedies, limitations, and exclusions before starting waterproofing.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of Division 01 and manufacturer.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that is acceptable to waterproofing manufacturer for installation of waterproofing required for this Project and who is eligible to receive waterproofing warranty specified..
- B. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and flashings, installation procedures, testing and inspection procedures, and protection and repairs.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate, when relative humidity exceeds 85 percent, or when temperatures are less than 5 deg F (3 deg C) above dew point nor when temperature is below 0 deg F.

1.9 WARRANTY

- A. Special Manufacturer's Warranty: Manufacturer's standard form in which waterproofing manufacturer and Installer agree to repair or replace waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.
 - 1. Warranty Period: 10 years from date of Substantial Completion.
 - 2. Warranty does not include failure of waterproofing due to failure of substrate prepared and treated according to requirements or formation of new joints and cracks in substrate that exceed 1/8 inch in width.
 - 3. Warranty insulation will retain 80 percent of original published thermal value.
 - 4. Warranty includes removing and reinstalling protection board, drainage panels, insulation, pedestals, and pavers on plaza decks.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. American Hydrotech, Inc.; Monolithic Membrane 6125.
 - 2. Carlisle Corporation, Carlisle Coatings & Waterproofing Div.; CCW-500.
 - 3. T. C. Miradri; Miraseal 9100.
 - 4. Henry Company 790-11.
 - 5. Tremco Inc.; Tremproof 6100.

2.2 MEMBRANE

- A. Single-component; 100 percent solids; hot fluid-applied, rubberized asphalt with the following properties measured per applicable test methods in CAN/CGSB-37.50:
1. Flash Point: Not less than 260 deg C or not less than 25 deg C above manufacturer's maximum recommended application temperature.
 2. Cone Penetration: 110 maximum at 25 deg C, and 200 maximum at 50 deg C.
 3. Flow: 3 mm maximum at 60 deg C.
 4. Toughness: Not less than 5.5 J
 5. Ratio of Toughness to Peak Load: Not less than 0.040.
 6. Adhesion Rating: Pass.
 7. Water-Vapor Permeance: 1.7 ng/Pa x s x sq. m.
 8. Water Absorption: 0.35-g maximum mass gain, or 0.18-g maximum mass loss.
 9. Pinholing: Not more than one pinhole.
 10. Low-Temperature Flexibility: No cracking.
 11. Crack Bridging Capability: No cracking, splitting, or loss of adhesion.
 12. Heat Stability: Comply with requirements for penetration, flow, low-temperature flexibility, and viscosity when heated for five hours at manufacturer's recommended application temperature.
 13. Viscosity Test: 2 to 15 seconds.

2.3 AUXILIARY MATERIALS

- A. Roof substrate board: Provide the following if shown:
1. Impact resistant, nonstructural, fiber-reinforced, gypsum panels, UL rated Type "X".
 2. Fasteners & plates: 3 inch metal plates, spaced and complying with Factory Mutual requirements and approvals.
 3. Vapor barrier: Where shown, provide product complying with Section 07 26 10.
 4. Acceptable board product: Securock Gypsum-Fiber Roof Board by USG.
- B. Surface conditioner: For use on concrete substrates, type recommended by membrane manufacturer.
- C. Primer: ASTM D 41, asphaltic primer.
- D. Elastomeric Flashing Sheet: 50-mil-minimum, nonstaining, uncured sheet neoprene with manufacturer's recommended contact adhesives and predrilled metal termination bars and anchors, with the following physical properties as measured per standard test methods referenced:
1. Tensile Strength: 1400 psi minimum; ASTM D 412, Die C.
 2. Elongation: 300 percent minimum; ASTM D 412.
 3. Tear Resistance: 125 psi minimum; ASTM D 624, Die C.
 4. Brittleness: Does not break at minus 30 deg F; ASTM D 2137.
- E. Hot-applied Flashing Sheet: 150-mil-minimum, torch-grade, modified asphalt, reinforced flashing membrane. Basis of design:
1. American Hydrotech, Inc., Flex-Flash® MB
- F. Sealants and Accessories: Waterproofing manufacturer's recommended sealants and accessories.
- G. Reinforcing Fabric: Manufacturer's recommended spun-bonded polyester fabric.
- H. Separation / Roof Barrier Protection Sheet: Provide one or more of the following as recommended by manufacturer for the application:
1. Where composite products assemblies are required use a combination of a fiberglass reinforced rubberized asphalt protection sheet and polyethylene root barrier. Acceptable products:
 - a. American Hydrotech, Inc., Hydroflex® 30/Root Stop HD, or
 - b. American Hydrotech, Inc., Hydroflex® 30/Root Stop Bamboo
 2. ASTM D 4397, polyethylene sheet, minimum 4 mils thick.
- I. Protection Course: Semi-rigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners and as follows:
1. Thickness: 1/8 inch, nominal, for vertical applications; 1/4 inch, nominal, elsewhere.

2. Adhesive: Rubber-based solvent type recommended by waterproofing manufacturer for type of protection course.

2.4 INSULATION

- A. Board Insulation: Extruded-polystyrene board insulation complying with ASTM C 578, square or, if shown on drawings, shiplap edged.
 1. For vertical applications, Type IV, 1.6-lb/cu. ft. minimum density and 25-psi minimum compressive strength.
 2. For horizontal applications, pedestrian traffic, Type VII, 2.2-lb/cu. ft. minimum density and 60-psi minimum compressive strength.
 3. For horizontal applications, vehicular traffic, Type V, 3-lb/cu. ft. minimum density and 100-psi minimum compressive strength.
 4. For horizontal and vertical applications, planted green roofs, Type V, 3-lb/cu. ft. minimum density and 100-psi minimum compressive strength.

2.5 MOLDED-SHEET DRAINAGE PANELS

- A. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel: Manufactured composite subsurface drainage panels consisting of a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 sieve laminated to 1 side and a polymeric film bonded to the other side of a 3-dimensional, nonbiodegradable, molded-plastic-sheet drainage core, with a vertical flow rate of 9 to 15 gpm per ft.
 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Carlisle Sure-Drain V.
 - b. W. R. Grace Hydroduct 2 or HZ
 - c. Miradri Miradrain 6200 or 6200XL
 - d. Tremco Inc.; Tremdrain 1000 PF

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
 1. Verify that concrete has cured and aged for minimum time period recommended by waterproofing manufacturer.
 2. Verify that substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
 3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

- A. Clean and prepare substrate according to manufacturer's written recommendations. Provide clean, dust-free, and dry substrate for waterproofing application.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage or overspray affecting other construction.
- C. Close off deck drains and other deck penetrations to prevent spillage and migration of waterproofing fluids.
- D. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, acid residues, and other penetrating contaminants or film-forming coatings from concrete.
 1. Abrasive blast clean concrete surfaces uniformly to expose top surface of fine aggregate according to ASTM D 4259 with a self-contained, recirculating, blast-cleaning apparatus. Remove material to provide a sound surface free of laitance, glaze, efflorescence, curing compounds, concrete hardeners, or form-release agents. Remove remaining loose material and clean surfaces according to ASTM D 4258.
- E. Remove fins, ridges, and other projections and fill honeycomb, aggregate pockets, and other voids.
- F. Prepare vertical and horizontal surfaces at terminations and penetrations through waterproofing and at expansion joints, drains, and sleeves according to ASTM C 898 and manufacturer's written instructions.

1. Apply waterproofing in two separate applications, and embed a joint reinforcing strip in the first preparation coat when recommended by waterproofing manufacturer.
- G. Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C 898 and waterproofing manufacturer's written instructions. Remove dust and dirt from joints and cracks, complying with ASTM D 4258, before coating surfaces.
- H. Install sheet flashing and bond to deck and wall substrates where indicated or required according to waterproofing manufacturer's written instructions.
1. Extend sheet flashings onto perpendicular surfaces and other work penetrating substrate according to ASTM C 898.
- 3.3 JOINTS, CRACKS, AND TERMINATIONS
- A. Prepare and treat substrates to receive waterproofing membrane, including joints and cracks, deck drains, corners, and penetrations according to CAN/CGSB-37.51, "Application of Rubberized Asphalt, Hot-Applied, for Roofing and Waterproofing," and waterproofing system manufacturer's written instructions.
1. Rout and fill joints and cracks in substrate. Before filling, remove dust and dirt according to ASTM D 4258.
 2. Embed reinforcing fabric into a layer of hot, rubberized asphalt. Extend reinforcing fabric a minimum of 6 inches on each side of joints and cracks and beyond deck drains, corners, and penetrations.
- B. At expansion joints and discontinuous deck-to-wall or deck-to-deck joints, bridge joints with elastomeric flashing sheet extended a minimum of 6 inches on each side of joints and adhere to substrates in a layer of hot, rubberized asphalt.
- 3.4 FLASHING INSTALLATION
- A. Install flashing sheets at terminations of waterproofing membrane according to CAN/CGSB-37.51, "Application of Rubberized Asphalt, Hot-Applied, for Roofing and Waterproofing," and waterproofing system manufacturer's written instructions.
- B. Prime substrate with asphalt primer.
- C. Install elastomeric flashing sheet and adhere to deck and wall substrates in a layer of hot, rubberized asphalt.
- D. Extend flashing sheet up walls or parapets a minimum of 8 inches above plaza deck pavers and 6 inches onto deck to be waterproofed.
- E. Install termination bars and mechanically fasten to top of flashing sheet at terminations and perimeter of roofing.
- 3.5 MEMBRANE APPLICATION
- A. Apply rubberized asphalt according to CAN/CGSB-37.51, "Application of Rubberized Asphalt, Hot-Applied, for Roofing and Waterproofing," and manufacturer's written instructions.
- B. Heat rubberized asphalt in an oil- or air-jacketed melter with mechanical agitator specifically designed for heating rubberized-asphalt waterproofing.
- C. Start application with manufacturer's technical representative present.
- D. Apply primer, at manufacturer's recommended rate, over prepared substrate and allow to dry.
- E. Reinforced Membrane: Apply waterproofing to substrates and adjoining surfaces indicated. Spread hot fluid-applied, rubberized asphalt to a thickness of 90 mils; embed reinforcing fabric, overlapping sheets 2 inches ; and spread another 125-mil-thick layer to provide a uniform, reinforced, seamless membrane 215 mils thick.
- F. Apply waterproofing over prepared joints and up wall terminations and vertical surfaces to heights indicated or required by manufacturer.
- G. Cover waterproofing with separator sheet or root barrier with overlapped joints while rubberized asphalt is still hot and before membrane is subject to traffic.
1. Install protection course with overlapped joints over separator sheet.
 2. Install separation course / root barrier before and if flood testing is performed.

3.6 MOLDED-SHEET DRAINAGE PANEL INSTALLATION

- A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall or deck substrate, according to manufacturer's written instructions. Use adhesives that do not penetrate or damage waterproofing. Lap edges and ends of geotextile fabric to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.
 - 1. Install protection course between drainage panel installation and waterproofed surface if required by manufacturer for warranty.

3.7 INSULATION INSTALLATION

- A. Install one or more layers of board insulation to achieve required thickness over waterproofed surfaces. Cut and fit to within 3/4 inch (19 mm) of projections and penetrations.
- B. On vertical surfaces, set insulation units into hot fluid-applied rubberized asphalt according to manufacturer's written instructions.
- C. On horizontal surfaces, loose lay insulation units unadhered according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

3.8 FIELD QUALITY CONTROL

- A. Flood Testing: Flood test each deck area for leaks, according to recommendations in ASTM D 5957, after completing waterproofing but before overlying construction is placed. Install temporary containment assemblies, plug or dam drains, and flood with potable water.
 - 1. Flood to an average depth of 2-1/2 inches with a minimum depth of 1 inch and not exceeding a depth of 4 inches. Maintain 2 inches of clearance from top of sheet flashings.
 - 2. Flood each area for 24 hours.
 - 3. After flood testing, repair leaks, repeat flood tests, and make further repairs until waterproofing installation is watertight.
- B. Engage an independent testing agency to observe flood testing and examine underside of decks and terminations for evidence of leaks during flood testing.

3.9 CURING, PROTECTION, AND CLEANING

- A. Cure waterproofing according to manufacturer's written recommendations, taking care to prevent contamination and damage during application stages and curing.
 - 1. Do not permit foot or vehicular traffic on unprotected membrane.
- B. Protect waterproofing from damage and wear during remainder of construction period.
- C. Protect installed insulation from damage due to ultraviolet light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation will be subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.
- D. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

SECTION 07 54 19 - ADHERED PVC MEMBRANE ROOFING
PART OF SECTION 07 00 02 ROOFING & FLASHING
[Filed Sub Bid Required]

PART 1 - GENERAL

1.1 SUMMARY

- A. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section includes, without limitation, providing:
 - 1. Adhered PVC membrane roofing system.
 - 2. Cover board, conventional and high density.
 - 3. Roof insulation, flashings and accessories.
 - 4. Vapor retarder.
 - 5. Flashing for equipment mounted on roofing and roofing penetrations.
- C. Related Work:
 - 1. Section 06 10 50 – Wood blocking: wood nailers, curbs, and the like.
 - 2. Section 07 01 50 – Preparation for Re-roofing.
 - 3. Section 07 62 00 – Sheet Metal Flashings & Trim.
 - 4. Section 07 92 00 - Joint Sealants.

1.2 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Provide installed roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience. Roofing System Design: Comply with the more stringent of the following:
 - 1. Code required loads and wind speeds.
 - 2. FM Wind load performance as required by Data Sheet 1-28 and as shown on drawings.
 - 3. Partially enclosed design ratings: As shown on drawings.
- D. Flashings: Provide base flashings, perimeter flashings, detail flashings and component materials that comply with requirements and recommendations in FMG 1-49 Loss Prevention Data Sheet for Perimeter Flashings; FMG 1-29 Loss Prevention Data Sheet for Above Deck Roof Components; NRCA Roofing and Waterproofing Manual (Fourth Edition) for Construction Details and SMACNA Architectural Sheet Metal Manual (Fifth Edition) for Construction Details, as applicable.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other Work.
 - 1. Base flashings and membrane terminations.
 - 2. Tapered insulation, including slopes.
 - 3. Insulation fastening patterns.

- C. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system.
- D. Qualification Data: For Installer and manufacturer.
- E. Maintenance Data: For roofing system to include in maintenance manuals.
- F. Inspection Report: Copy of roofing system manufacturer's inspection report of completed roofing installation.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain components for roofing system from or approved by roofing system manufacturer.
- B. Preinstallation Conference: Conduct conference at Project site. Comply with requirements in Division 01. Review methods and procedures related to roofing system including, but not limited to, the following:
 - 1. Meet with the Architect and insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment.
 - 2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
 - 3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
 - 5. Review structural loading limitations of roof deck during and after roofing.
 - 6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
 - 7. Review governing regulations and requirements for insurance and certificates if applicable.
 - 8. Review temporary protection requirements for roofing system during and after installation.
 - 9. Review roof observation and repair procedures after roofing installation.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
 - 1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.7 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.8 WARRANTY

- A. Roofing Contractor's Warranty: The roofing subcontractor shall supply a minimum two-year workmanship warranty for each roof. In the event any work related to the roofing, flashing, or metalwork is found to be defective within two years of substantial completion, the roofing contractor shall remove and replace such at no additional cost to the

Owner. The roofing subcontractor's warranty obligation shall run directly to the building owner, and a copy the roofing signed warranty shall be sent to the roofing system's manufacturer.

1. The duration of the Roofing Contractor's two-year warranty shall run concurrent with the roofing system's manufacturer's warranty.

- B. Roofing Systems Manufacturer's Warranty: The roofing manufacturer shall guarantee roof areas to be in a watertight condition, for a period of 30 years, from the date of final acceptance of the roofing system. The warranty shall be a 30-year no dollar limit, non-prorated total system labor and material warranty, for wind speeds up to 120 miles per hour. Total system warranty shall include all roofing materials, related components and accessories including, but not limited to the substrate board, vapor retarder, insulation board, cover board, roofing membrane, membrane flashings, fasteners, adhesives and termination metals and roof drain assemblies. The manufacturer shall repair defects in materials and workmanship as promptly after observation as weather and site conditions permit.

PART 2 - PRODUCTS

2.1 PVC ROOFING MEMBRANE

- A. PVC Sheet: ASTM D 4434, Type II, Grade 1, fiber reinforced, as follows:
1. Basis of Design: Sarnafil G410 thermoplastic felt-backed roofing membrane by Sika Sarnafil.
 2. Minimum product characteristics:
 - a. Design use: Single ply roofing membrane.
 - b. System: Single ply adhered to mechanically fastened cover board and insulation.
 - c. Standard: Meets or exceeds the minimum requirements of ASTM D-4434.
 - d. Exposed Face color: As shown, if not, as selected including white.
 - e. Type: Fleece-backed, fiberglass or polyester scrim reinforced PVC membrane
 - f. Thickness: Nominal 0.080 inch (2.0 mm) thickness, required for 30 year warranty.
 - g. Thickness: Nominal 0.072 inch [1.8mm], for required 25 year warranty.
 - h. Membrane: Thermoplastic composite PVC.
 - i. Energy star rating: Required.
 - j. Seams: Heat welded.
 - k. Single source: Provide a complete system and all components from a single manufacturer.
 - l. Total system: Provide a total system warranty for entire roofing system.
 3. Standard roof roll: 76 inches x 66 feet x 220 lb based upon 72 mil membrane
 4. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Duro-Last Roofing, Inc.
 - b. Carlisle SynTec.
 - c. Sarnafil Inc.
 5. Colors: Architect will select from standard and energy smart colors.
 6. Physical Properties: Provide reinforced thermoplastic PVC sheets with the following properties as determined per ASTM test method indicated; based upon 72 mill membrane performance:
 - a. Resistance to dynamic puncture: Pass per ASTM D5602.
 - b. Elongation at Break: 250/220 percent typical; ASTM D 751.
 - c. Tensile Strength: 100 lbf/inch; ASTM D 751.
 - d. Tear Strength: 20.5 lbf ; ASTM D 751.
 - e. Seam Strength: Pass ; ASTM D 751, failure occurs through membrane failure, not seam.
 - f. Water Absorption: Less than 1.8 percent mass change per ASTM D 570.
 - g. UV exposure: 10,000 hours, ASTM G 154
 - h. Thermal emittance: For Sika / Sarnafil Energy Smart colors: Initial 0.86; at 3 years 0.84 per ASTM C1371, Slide method.
 - i. Solar reflectance: For Sika / Sarnafil Energy Smart colors: Initial - 107; at 3 years – 90.

2.2 AUXILIARY MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.

1. Liquid-type auxiliary materials shall meet VOC limits of authorities having jurisdiction.
2. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as PVC sheet membrane.
3. Bonding Adhesive: Manufacturer's standard bonding adhesive for membrane, and solvent-based bonding adhesive for base flashings.
4. Walkway Pad Adhesive: Heat weld in place
5. Metal Termination Bars: Manufacturer's standard predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.
6. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.
7. Molded Pipe Flashings: Molded, furnished by membrane manufacturer designed for pipe flashings at roof penetrations, accommodating 1" o.d. pipe to 6-1/2" o.d. pipe. Include stainless steel clamping rings for compression.
8. Prefabricated Pipe Flashings: Prefabricated .060" thick or heavier membrane designed for pipe flashings at roof penetrations, accommodating 7" o.d. pipe to 18" o.d. pipe. Include stainless steel clamping rings for compression.
9. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, termination reglets, cover strips, and other accessories.

2.3 VAPOR BARRIER

- A. Vapor barrier shall be U.L. approved reinforced air vapor retarder meeting perm rating of 0.05 or better, and UL requirements for application on project decks. Provide non-slip, peel and stick sheets secured to glass mat faced board from one of the following:
 1. Roof membrane vapor barrier complying with requirements.
 2. Carlisle VapAir Seal 725TR.
 3. Firestone V-Force Vapor Barrier membrane.
 4. Soprema Soprapap'R vapor barrier.
- B. Provide manufacturer's recommended primers and roofing adhesives for application of barrier, manufactured free of asphalt compounds and designed for deck application matching project conditions.

2.4 ROOF INSULATION

- A. General: Provide preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.
 1. Thermal resistance values: As shown, but not less than R 40.
- B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, felt or glass-fiber mat facer on both major surfaces.
 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Sarnafil.
 - b. Atlas Roofing Corporation.
 - c. Carlisle SynTec Incorporated.
 - d. Firestone Building Products Company.
- C. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches or steeper unless otherwise indicated.
- D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.5 INSULATION ACCESSORIES

- A. General: Furnish roof insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.
- C. Cold Fluid-Applied Adhesive: Manufacturer's standard cold fluid-applied adhesive formulated to adhere roof insulation to substrate.
- D. Cover Board / Conventional type: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, 1/2 inch thick; provide pre-primed board where recommended by manufacturer.
 - 1. Available product: USG Secureck
 - 2. Approved equal from major manufacturers such as Georgia Pacific and USG.
- E. Cover Board / High density insulating type: High density polyisocyanurate cover boards meeting ASTM C1298, Type II, Class 4, Grade 1 and at least with the following characteristics:
 - 1. Compressive strength: 80 psi or better.
 - 2. R-value: 2.5 per 0.50 inch or better, per ASTM C518.
 - 3. Face: Coated glass facer compatible with adhered PVC, TPO, cold applied modified asphalt and the like.
 - 4. Mold resistance: Passes ASTM D3273.
 - 5. Water absorption: Less than 1.5 per cent by volume [2 hours under 1 inch water].
 - 6. Weight: 11 pounds per 48 x 96 inch sheet, or heavier.
 - 7. Product meeting this specification: Firestone Isogard HD Coverboard, 80 psi type.
 - 8. Other Manufacturers: Hunter, Carlisle, Sika/Sarnafil.
- F. Flexible Walkways: Factory-formed, nonporous, heavy-duty, solid-pvc, slip-resisting, surface-textured walkway pads or rolls approximately 3/16 inch thick, and acceptable to membrane roofing system manufacturer.
 - 1. Usage: Where shown, and at least 360 degrees around roof top equipment requiring periodic maintenance.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
 - 1. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.
 - 2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
 - 3. Verify that surface plane flatness and fastening of steel roof deck comply with requirements in Section for metal decking.
 - 4. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
 - 5. Verify that concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
 - 6. Verify that concrete curing compounds that will impair adhesion of roofing components to roof deck have been removed.
 - 7. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
- C. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.3 VAPOR-RETARDER INSTALLATION

- A. Apply vapor retarder in single layer over area to receive vapor retarder, side and end lapping each sheet a minimum of 2 inches and 6 inches respectively. Secure end and side laps. Ensure complete bond to substrate; where required roll sheet in-place.
- B. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into membrane roofing system.

3.4 INSULATION AND COVERBOARD INSTALLATION

- A. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with membrane roofing system manufacturer's written instructions for installing roof insulation.
- C. Install tapered insulation under area of roofing to conform to slopes indicated.
- D. Install one or more layers of insulation under area of roofing to achieve required thickness. Install 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.
- E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
- F. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.
 - 1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
- G. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
 - 1. Fasten insulation according to requirements in FMG's "Approval Guide" for specified Windstorm Resistance Classification.
 - 2. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.
- H. After mechanically fastening insulation in place, adhere cover board with adhesives ribbons more than 6 inches on center.

3.5 ADHERED ROOFING MEMBRANE INSTALLATION

- A. Install roofing membrane over area to receive roofing according to membrane roofing system manufacturer's written instructions. Unroll roofing membrane and allow to relax before installing.
 - 1. For PVC membrane, install sheet according to ASTM D 5036.
- B. Start installation of roofing membrane in presence of membrane roofing system manufacturer's technical personnel.
- C. Accurately align roofing membrane and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

- D. Bonding Adhesive: Apply solvent-based bonding adhesive to substrate and underside of roofing membrane at rate required by manufacturer and allow to partially dry before installing roofing membrane. Do not apply bonding adhesive to splice area of roofing membrane.
- E. Mechanically or adhesively fasten roofing membrane securely at terminations, penetrations, and perimeter of roofing.
- F. Apply roofing membrane with side laps shingled with slope of roof deck where possible.
- G. Seams: Clean seam areas, overlap roofing membrane, and hot-air weld side and end laps of roofing membrane according to manufacturer's written instructions to ensure a watertight seam installation.
 - 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roofing membrane.
 - 2. Verify field strength of seams a minimum of twice daily and repair seam sample areas.
 - 3. Repair tears, voids, and lapped seams in roofing membrane that does not meet requirements.
- H. Spread sealant or mastic bed over deck drain flange at deck drains and securely seal roofing membrane in place with clamping ring.

3.6 BASE FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.
- B. Apply solvent-based bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- D. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of sheet flashing terminations.
- E. Terminate and seal top of sheet flashings.

3.7 WALKWAY INSTALLATION

- A. Flexible Walkways: Install walkway products in locations indicated. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.8 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform roof tests and inspections and to prepare test reports. Manufacturer's Technical Representative: Engage a qualified manufacturer's technical representative to perform roof tests and inspections and to prepare test reports.
- C. Final Roof Inspection: Engage roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Designer.
 - 1. Notify Architect 48 hours in advance of date and time of inspection.
- D. Repair or remove and replace components of membrane roofing system where test results or inspections indicate that they do not comply with specified requirements.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.9 PROTECTING AND CLEANING

- A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect.
- B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements, repair substrates, and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

SECTION 07 62 00 - SHEET METAL FLASHING & TRIM
PART OF SECTION 07 00 02 ROOFING & FLASHING
[Filed Sub Bid Required]

PART 1 GENERAL

1.1 SUMMARY

- A. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section includes, without limitation, providing:
 - 1. Sheet metal flashing and trim.
 - 2. Standards and requirements for flashing furnished and installed by others.
 - 3. Removal and re-installation of indicated work.
- C. Related work
 - 1. Section 07 01 50 - Preparation For Re-Roofing Renovations
 - 2. Section 07 54 19 – Adhered PVC Membrane Roofing

1.1 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight. Conform to the following requirements:
 - 1. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
 - 2. FM Approvals Listing: Manufacture and install copings, roof edge flashings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-90. Identify materials with name of fabricator and design approved by FM Approvals.
 - 3. SPRI Wind Design Standard: Manufacture and install copings roof edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressure:

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Shop Drawings: Submit shop drawings indicating material characteristics, details of construction, connections, and relationship with adjacent construction.
- C. Samples: Submit two representative samples of each material specified indicating visual characteristics and finish. Include range samples if variation of finish is anticipated.

1.3 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
- B. Source Limitations: Obtain materials of a uniform quality, including color for exposed work, from single manufacturer for each component.
 - 1. Standards: Comply with applicable requirements, recommendations and details of SMACNA *Architectural Sheet Metal Manual*.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. In general, provide manufactured products, where not practical, shop fabricate work. Acceptable manufactures include:
1. Beach Sheet Metal Co., Inc.; Berger Building Products, Inc.; Englert, Inc.; Fiberweb Clark/Hammerbeam Corp.; Hohmann & Barnard, Inc.; National Sheet Metal Systems, Inc.; Nervastral Inc.; Petersen Aluminum Corp.; Quickflash Weatherproofing Products, Inc.; Sandell Construction Solutions; SBC Industries Flashings; or approved equal.

2.2 APPLICATIONS

- A. Applications are as shown.

2.3 MATERIALS

- A. Provide materials shown, but complying with the following minimum gages, composition and types:
1. Metal: Sheet aluminum.
 - a. Standard: ASTM B 209, alloy 3003,
 - b. Thickness As shown, if not, 20 gauge (.0359 inch).
 - c. Exposed Finish [visible]: Prefinished 2-coat 70 percent fluoropolymer
 - d. Concealed Finish: Clear anodized or prefinished 2-coat 70 percent fluoropolymer.
 2. Laminated Composition Sheet Flashing: 5 ounce copper sheet laminated between 2 layers of bituminous impregnated Kraft paper or saturated fabric. Furnish and install under Section 04 01 05.

2.4 MISCELLANEOUS MATERIALS

- A. Components include:
1. Fasteners: Match material being fastened for both type of material and finish.
 2. Isolation Coating: SSPC paint 12.
 3. Slip Sheet: 5 lb. rosin building paper.
 4. Plastic Underlayment: 6 mil carbonated polyethylene film, FS L-P-512.
 5. Reglets: Metal units of type and profile indicated or required which are compatible with flashings used.
 6. Solder: ASTM B 32, as required.
 7. Accessories: Provide all clips, cleats, straps, anchors and similar items necessary to properly complete the work. Provide accessories that are compatible with sheet metal materials used and which are of sufficient size and gage to perform as intended.
 8. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane or silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
 9. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
 10. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.
 11. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.5 FABRICATION

- A. Shop fabricate work to the greatest extent possible. Fabricate work to be truly straight, plumb, level and square, and to provide the best possible watertight, weatherproof performance with expansion provisions in running work.
- B. Provide work to sizes, shapes, and profiles indicated on approved shop drawings. Comply with referenced standards. Minimize oil-canning, buckling, tool marks and other defects.
- C. Make work with uniform, watertight joints. Make seams as inconspicuous as possible.
- D. Isolate dissimilar materials with isolation coating or other permanent separation acceptable to the Architect.
- E. Scuppers: Make work to detail shown, if not, comply with CDA or SMACNA reference manuals for applications indicated.

PART 3 EXECUTION

3.1 GENERAL

- A. Comply with the provisions of Section 01 70 00 - especially requirements related to:
 - 1. Inspection and examination. Tolerances and measurement.
 - 2. Approvals, inspections and filed quality control.
 - 3. Layout. Adjusting.
 - 4. Cleaning. Protection.

3.2 EXAMINATION

- A. Examine and verify conditions per Section 01 70 00 and as follows:
 - 1. Verify substrates and underlying work is within tolerances specified.
 - 2. Verify structural components are properly placed.
 - 3. Before installation, examine rough-in and built-in construction for mechanical/electrical and other systems to verify actual locations of connections.
 - 4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 TOLERANCES

- A. For exposed work, the following allowable installed tolerances are allowable variations from locations and dimensions indicated by the Contract Document and shall not be added to allowable tolerances indicated for other work.
 - 1. Allowable Variation from True Plumb, Level, and Line: +/- 1/8" in 20'-0"
 - 2. Allowable Variation from True Plane of Adjacent Surfaces: +/- 1/16"
- B. Other Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.4 INSTALLATION

- A. Install flashing in continuous uninterrupted manner to accomplish 'intent' complete with all transitions, laps, splices, folds, seams necessary to ensure the diversion of water to the exterior. Work in close coordination with installation of exterior masonry, roofing, window, joint sealer, louver, and the like.
 - 1. Apply materials within manufacturer's requirements for temperature and weather conditions.
 - 2. Do not apply to wet or frozen substrates.
 - 3. Do not allow contamination with dust or dirt.
 - 4. Seal completely at edges, perimeter and penetrations.
- B. Strictly comply with manufacturer's instructions and recommendations and standard details and recommendations of SMACNA, except where more restrictive requirements are specified in this section. Locked and sealant locked joints as indicated on the Drawings.
- C. Securely anchor work, but allow for thermal movement and building movement. Use concealed fasteners to the greatest extent possible. Install work to be permanently weatherproof and watertight. Provide continuous cleats at all edge conditions.
- D. Provide reglets where indicated and where required. Coordinate installation with related and adjacent work.
- E. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
 - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
 - 2. Use lapped expansion joints only where indicated on Drawings.
- F. Fasteners: Use fastener sizes that penetrate wood or sheathing substrate not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws and for other substrates not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- G. Through-wall flashing at masonry walls:
 - 1. Overlap adjacent pieces of flashing minimum 2" and roll all overlaps with steel hand roller.

2. Trim bottom edge of flashing minimum of 1/2" back from exposed face of the building.
 3. Rivet or staple vertical and horizontal joints.
 4. At sheet metal seams, full solder non-moving joints.
 5. Apply a bead of sealant along top edge of flashing membrane and along seams and cuts as necessary and as recommended by manufacturer.
- F. Provide flashing at every obstruction to the downward flow of water. Design and install flashing to control and divert water to the exterior. Form at least 4" high end pans above lintels and similar conditions to extend the entire length of the lintel where possible. Flashing shall extend 4" minimum beyond end of lintel before it is panned (dammed).

3.5 FIELD QUALITY CONTROL

- A. Owner Testing and Inspecting: Owner may engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as
- B. Installer Testing and Inspecting:
 1. Flood test large areas of sheet metal work to test reliability of soldered seams and substrates.

END OF SECTION

SECTION 07 64 16 – ROOF ANCHOR SUPPORT ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this Section.
- B. Section Includes, without limitation, providing:
 - 1. Roof anchor support assemblies.
 - 2. System design.
- C. Related requirements includes, without limitation:
 - 1. Division 07 00 00 - Roofing.

1.2 REFERENCES

- A. Comply with applicable regulations, codes and standards, including:
 - 1. Occupational Safety and Health Administration (OSHA).
 - a. OSHA 1910, Subpart D, Walking and Work Surfaces.
 - b. OSHA 1910, Subpart F, Appendix C, Personal Fall Arrest Systems.
 - c. OSHA Ruling on Window Cleaning by Bosun's Chair.

1.3 DESIGN / PERFORMANCE REQUIREMENTS

- A. Design roof anchor, and suspended maintenance system to suit project requirements to AISC S342L, as specified and as follows.
 - 1. Locate anchorages to suit suspension equipment specified or required by conditions.
 - 2. Design anchor components for cleaning and suspended maintenance equipment to ASME A120.1.
 - 3. Ensure compatibility with industry standard equipment.
 - 4. Anchorage and anchor components: Designed by Engineer qualified in design of roof anchor, window cleaning and suspended maintenance equipment and licensed in State of Project location.
- B. Design system fall arrest safety anchors and equipment supports to AISC S342L (including supplement No.1) and ANSI/IWCA I-14.1, and as follows:
 - 1. Comply with OSHA 1910, Subpart F, Appendix C.
 - 2. Supports for Suspended Platforms including davits, rigging sleeves and monorail:
 - 3. SEQ CHAPTER 1 Safety factor against fracture or detachment: 4 to 1.
 - 4. Vertical service load: 1000 lbs (4.45 kN) minimum.
 - 5. Rated load against fracture: 4000 lbs (17.8 kN) minimum.
 - 6. Fall Arrest Safety Anchors:
 - a. Fall arresting force safety factor of 2 to 1 without permanent deformation: 1800 lbs (8.0 kN) minimum.
 - b. Fall arrest force against fracture or detachment: 5,000 lbs (22.4 kN) minimum.

1.4 SUBMITTALS

- A. Comply with Division 1 General Requirements and submit for approval:
 - 1. Product Data: Manufacturer's literature including installation instructions, use restrictions and limitations.
 - 2. Shop drawings: Large scale drawings for fabrication, installation and erections including plans, elevations, details, anchorages, connections and accessories along with details. Show complete layout and configuration of window cleaning and suspended maintenance system, including components and accessories. Provide templates for work installed by others.
 - a. Field Measurements: Take accurate field measurements before fabrication and indicate same on shop drawings.
 - b. Indicate design and fabrication details, window "drops", hardware, and installation details.
 - c. Provide:
 - 1) Installation and rigging instructions.
 - 2) Required restrictive working usage and general safety notes.

- 3) Non-restrictive working usage and general safety notes.
 3. Maintenance Data: Provide recommended maintenance procedures.
 4. Certification: Certify submitted materials comply with requirements.
 5. Mock-Up/Field Samples: Prior to installation, provide mock up of each type of system proposed for use for approval. Accepted mock-ups may be incorporated into the work unless otherwise noted.
- B. Product Test Reports: Submit manufacturer's certified independent lab test reports not more than 2 years old documenting product performance.
- 1.5 QUALITY ASSURANCE
- A. Qualifications:
1. Installer: Experienced and specialized in similar work required for project.
 2. Manufacturer Qualifications: Capable of providing field service representation during construction and approving application method.
- B. Provide components and materials from single manufacturer.
- C. Provide the following:
1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
 2. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- 1.6 PRODUCT REQUIREMENTS
- A. Comply with product requirements, delivery storage and handling provisions of Division1 and the following:
1. Do not deliver components until job is ready for installation.

PART 2 - PRODUCTS

- 2.1 MANUFACTURER
- A. Acceptable Manufacturer:
1. ProBel of Ontario Canada, www.pro-bel.ca.
 2. Boston Anchor www.bostonanchor.com of Quincy MA .
 3. General Safety Services Corp. /Westwood Systems, Canton MA.
 4. Owner approved vendor.
- 2.2 ANCHORING AND SUPPORT ASSEMBLIES
- A. Units: Furnish and install minimum assembly to support loads, fall support and rigs that will not damage roof edge flashing, using elements shown. If not, shown, include the following:
1. Tie back anchors.
- B. Usage: Support anchors at roof.
- C. Comply with the following:
1. ANSI/IWCA I.14.1 Window Cleaning Safety Standard.
 2. OSHA, applicable provisions of: 1910.66, 1926.451, 1915.159.
- D. Assignment of responsibility: This fabricator / supplier shall be wholly responsible for the structural design, placement and spacing of the units in question. Before proceeding with the work, this fabricator shall furnish to the structural engineer of record maximum anticipated loads on the buildings framing structure and shall obtain written confirmation that the structure is capable of sustaining the proposed loads.
- 2.3 ANCHORS
- A. Safety U-bars:
1. Size: As shown, if not, 0.75 inches (19 mm) minimum diameter material with 1.5 inches (38 mm) eye opening.
 2. Material: Mild steel, Type 300W with 44 Ksi (300 MPa) minimum yield strength,

3. Coating: Hot-dip galvanized to ASTM A123/A123M.
 4. U-bar: 0.75 inches (19 mm) minimum diameter material with 1.5 inches (38 mm) eye opening.
 5. Material: Stainless steel to ASTM A276, Type 304 with 35 Ksi (240 MPa) minimum yield strength.
 6. Material: Mild steel, Type 300W with 44 Ksi (300 MPa) minimum yield strength, hot-dip galvanized to ASTM A123/A123M.
- B. Safety Anchor Eye Plate:
1. Material: Mild steel, Type 300W with 44 Ksi (300 MPa) minimum yield strength, hot-dip galvanized to ASTM A123/A123M.
 2. Plate size: As shown, if not, 0.875 inches (22 mm) diameter material with 2 inches (50 mm) eye opening
- D. Seamless Spun Aluminum Flashing (for Roof Anchors): To AA ADM-1 Type 6061-T6 alloy and to ASTM B221, with Conformable mastic tape and torch applied heat-shrink rubber collar flashing.
1. Conformable mastic tape and torch applied heat-shrink rubber collar flashing.
 2. Deck Flange Flashing: Acceptable material: Pro-Bel Group, Aluminum Deck Flange Flashing.
 3. To NRCA Roofing and Waterproofing Manual recommendations.
- E. Miscellaneous Bolts, Nuts and Washers:
1. Mild steel, Type 300W with 44 Ksi (300 MPa) minimum yield strength, hot-dip galvanized to ASTM A123/A123M.
- F. Metal coatings, general: Conform to requirements of Section 05085 Hot Dip Galvanizing.
- G. Metal options: Confer with Owner, and where directed provide pricing to substitute all stainless steel window washing hardware.
1. Stainless steel to ASTM A276, Type 304 with 35 Ksi (240 MPa) minimum yield strength.

PART 3 - EXECUTION

3.1 GENERAL

- A. Comply with the provisions of Section 01 70 00 - especially requirements related to:
1. Inspection and examination. Tolerances and measurement.
 2. Approvals, inspections and filed quality control.
 3. Layout. Adjusting.
 4. Cleaning. Protection.

3.2 EXAMINATION & PREPARATION

- A. Examine and verify conditions per Section 01 70 00 and as follows:
1. Verify substrates and underlying work is within tolerances specified.
 2. Verify structural components are properly placed.
 3. Before installation, examine rough-in and built-in construction for mechanical/electrical and other systems to verify actual locations of connections.
 4. Proceed with installation only after unsatisfactory conditions have been corrected.
 5. Verify structural steel to receive safety anchors has adequate bearing surface as indicated on shop drawings and has 100 percent welds between anchors and structural steel.
- B. Provide experienced and qualified technicians to carry out erection, assembly and installation of window washing and suspended maintenance equipment system.
1. Do steel welding to AWS D1.2/D1.2M.
 2. Do aluminum welding to AWS D1.1/D1.1M.
- C. Comply with manufacturer's written data, including product technical bulletins, product catalog installation instructions and manufacturer's technical data sheets.

3.3 INSTALLATION

- A. Coordinate roof anchor support assembly work with work of other trades, for proper time and sequence to avoid construction delays. Comply with the following

1. Install systems, assemblies and equipment plumb and level in accordance with manufacturer's written instructions.
2. SEQ CHAPTER 1 [Mechanically fasten anchors in accordance with manufacturer's recommendations and in accordance with Section 03300].
3. Accurately fit and align, securely fasten and install free from distortion or defects.
4. Deform threads of tail end of anchor studs after nuts have been tightened to prevent accidental removal and vandalism.

3.4 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner may engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as necessary. Manufacturer's Field Services: Have manufacturer's technical representative schedule site visits to review work as follows:
 1. When preparatory work for which work of this Section depends is complete, but before installation begins.
 2. During Installation:
 - a. 2 times during progress of work at 25% and 60% of completion.
 - b. Upon completion of work, after cleaning is carried out.
- C. Testing: Test On Site 100 percent of anchors relying upon chemical adhesive fasteners using load cell test apparatus in accordance with manufacturer's written recommendations.

3.5 CLEAN UP & PROTECTION

- A. Comply with Section 01 70 00.
- B. Upon completion, remove surplus and excess materials, rubbish, tools and equipment.

END OF SECTION

SECTION 07 92 00 - JOINT SEALANTS
PART OF THE WORK OF SECTION 07 00 01 WATERPROOFING, DAMPROOFING & CAULKING
[Filed Sub Bid Required]

PART 1 GENERAL

1.1 SUMMARY

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section Includes, without limitation providing:
 - 1. Joint sealers.
 - 2. Joint fillers.
 - 3. Confirmation of adhesion.
- C. Extent:
 - 1. Where shown.
- D. Related Work:
 - 1. Division 07 00 00 – Roofing and flashing: Provide sealants built into roofing work under those sections.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Samples: Submit two representative samples of each material specified indicating visual characteristics and finish. Include range samples if variation of finish is anticipated.
 - 1. Include manufacturer's full range of color and finish options if additional selection is required.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Field-Constructed Mock-Ups: Each joint type.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Exterior Joints in Vertical Surfaces, Silicone:
 - 1. Manufacturers: Dow Corning; GE Silicones; Tremco; or approved equal.
 - 2. Materials: Two component silicone sealant.
- B. Exterior Joints in Vertical Surfaces, Preformed Compression Seals:
 - 1. Manufacturers: Watson-Bowman Acme Corp.; or approved equal.
 - 2. Materials: Preformed precompressed foam sealant.
- C. Interior Joints, Limited Movement, Acrylic:
 - 1. Manufacturers: Bostik; Pecora Corporation; Polymeric Systems, Inc.; Sonneborn Building Products; Tremco; or approved equal.
 - 2. Materials: Acrylic-emulsion, ASTM C 834.
 - 3. VOC Content: Less than 50 g/L.
- D. Colors:
 - 1. Closely match at least of one of adjacent surfaces.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Examine substrate; report unsatisfactory conditions in writing. Beginning work means acceptance of substrates.
- B. Provide sealants in colors as selected from manufacturer's standards.
- C. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections. Clean and prime joints, and install bond breakers, backer rods and sealant as recommended by manufacturers.
- D. Depth shall equal width up to 1/2 inch wide; depth shall equal 1/2 width for joints more than 1/2 inch wide.
- E. Cure and protect sealants as directed by manufacturers. Replace or restore damaged sealants. Clean adjacent surfaces to remove spillage.

END OF SECTION

SECTION 08 45 10 - TRANSLUCENT INSULATED PANEL ASSEMBLIES

PART 1 - - GENERAL

1.1 SUMMARY

- A. Related Documents: All the Contract Documents, including the Drawings, General and Supplementary Conditions and Division 1 General Requirements apply to the work of this Section.
- B. Section includes furnishing and installing:
 - 1. Flat factory prefabricated structural insulated translucent sandwich panels.
 - 2. Aluminum installation system.
 - 3. Aluminum sill flashing.
 - 4. Removal of existing insulated translucent panels.
- C. Related Sections:
 - 1. Division 07 - Flashing and Sheet Metal
 - 2. Division 07 - Sealants

1.2 SUBMITTALS

- A. Submit manufacturer's product data. Include construction details, material descriptions, profiles and finishes of skylight components.
- B. Submit shop drawings. Include plans, details, dimensions and attachments to other work.
- C. Submit manufacturer's color charts showing the full range of colors available for factory finished aluminum.
 - 1. When requested, submit samples for each exposed finish required, in same thickness and material indicated for the work and in size indicated below. If finishes involve normal color variations, include sample sets consisting of two or more units showing the full range of variations expected.
 - a. Sandwich panels: 14" x 28" units
 - b. Factory finished aluminum: 5" long sections
- D. Submit Installer Certificate, signed by installer, certifying compliance with project qualification requirements.
- E. Submit product test reports from a qualified independent testing agency indicating each type and class of skylight panel system complies with the project performance requirements, based on comprehensive testing of current products. Previously completed test reports will be acceptable if for current manufacturer and indicative of products used on this project.
 - 1. Test reports required are:
 - a. Flame Spread and Smoke Developed (UL 723) – Submit UL Card
 - b. Burn Extent (ASTM D-635)
 - c. Color Difference (ASTM D-2244)
 - d. Abrasion/Erosion Resistance (ASTM D-4060)
 - e. Impact Strength (UL 972)
 - f. Bond Tensile Strength (ASTM C-297 after aging by ASTM D-1037)
 - g. Bond Shear Strength (ASTM D-1002)
 - h. Beam Bending Strength (ASTM E-72)
 - i. Insulation U-Factor (NFRC-100)
 - j. NFRC System Certification
 - k. Condensation Resistance Factor (AAMA 1503)
 - l. Class A Roof Covering Burning Brand (ASTM E-108) UL Listed Class A Roof System (UL 790) (Optional) – Submit UL Card
 - m. Blast Analysis and Testing of Translucent Sandwich Panels Demonstrating Equivalent Performance to 1/4" Laminated Glass per DoD UFC 4-010-01 (Optional)
- F. Submit current documentation indicating regular, independent quality control monitoring under a nationally recognized building code review and listing program.

1.3 QUALITY ASSURANCE

A. Manufacturer's Qualifications

1. Material and products shall be manufactured by a company continuously and regularly employed in the manufacture of specified materials for a period of at least ten (10) consecutive years and which can show evidence of those materials being satisfactorily used on at least six (6) projects of similar size, scope and location. At least three (3) of the projects shall have been in successful use for ten (10) years or longer.
2. Skylight system must be listed by the International Code Council – Evaluation Service (ICC-ES) which requires quality control inspections and fire, structural and water infiltration testing of sandwich panel systems by an approved agency.
3. Quality control inspections and required testing shall be conducted at least once each year and shall include manufacturing facilities, sandwich panel components and production sandwich panels for conformance with "Acceptance Criteria for Sandwich Panels" as regulated by the ICC-ES.

B. Installer's Qualifications: Installation shall be by an experienced installer, which has been in the business of installing specified skylight systems for at least five (5) consecutive years and can show evidence of satisfactory completion of projects of similar size, scope and type.

C. Performance Requirements: The manufacturer shall be responsible for the configuration and fabrication of the complete skylight panel system.

1. When requested, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 PERFORMANCE REQUIREMENTS

A. The manufacturer shall be responsible for the configuration and fabrication of the complete skylight panel system.

1. When requested, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
2. Standard skylight system shall have less than 0.01 cfm/ft² air leakage by ASTM E 283 at 6.24 PSF (50 mph) and no water penetration by ASTM E 331 at 15 PSF; and structural testing by ASTM E 330.
3. Structural Loads; Provide system capable of handling the loads indicated in drawings, if not, as follows:
 - a. Live Load: 20 PSF
 - b. Snow Load: 35 PSF; Drift Load: 25 PSF
 - c. Wind Load: 30PSF

1.5 DELIVERY STORAGE AND HANDLING

A. Deliver skylight system, components and materials in manufacturer's standard protective packaging.

B. Store skylight panels on the long edge, several inches above the ground, blocked and under cover in accordance with manufacturer's storage and handling instructions.

1.6 WARRANTY

A. Submit manufacturer's and installer's written warranty agreeing to repair or replace skylight system work which fails in materials or workmanship within one (1) year of the date of delivery. Failure of materials or workmanship shall include leakage, excessive deflection, deterioration of finish on metal in excess of normal weathering and defects in accessories, insulated translucent sandwich panels and other components of the work. (Contact local representative for extended warranty periods.)

B. Provide an extended warranty of 5 years for material and workmanship.

PART 2 - - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide one of the following:

1. Kalwall Corporation; www.kalwall.com/.
2. Approved equal.

2.2 PANEL COMPONENTS

A. Face Sheets

1. Translucent faces: Manufactured from glass fiber reinforced thermoset resins, formulated specifically for architectural use.
 - a. Thermoplastic (e.g. polycarbonate, acrylic) faces are not acceptable.
2. Exterior face sheets:
 - a. Color stability: Full thickness of the exterior face sheet shall not change color more than 3 CIE Units DELTA E by ASTM D 2244 after 5 years outdoor South Florida weathering at 5° facing south, determined by the average of at least three white samples with and without a protective film or coating to ensure long-term color stability. Color stability shall be unaffected by abrasion or scratching.
 - b. Strength: Exterior face sheet shall be uniform in strength, impenetrable by hand held pencil and repel an impact minimum in ft. lbs. without fracture or tear when impacted by a 3-1/4" diameter, 5 lb. free-falling ball per UL 972. Impact strength shall meet the following:
 - 1) .070" thick exterior face is 70 ft. lbs. for 0.070 inch thick exterior face
 - 2) 230 ft. lbs for HI-Impact [manufacturer optional] exterior face.
3. Flammability of interior face sheets:
 - a. Flamespread: Underwriters Laboratories (UL) listed, which requires periodic unannounced retesting, with flamespread rating no greater than 50 (20) and smoke developed no greater than 250 (200) when tested in accordance with UL 723.
 - b. Burn extent by ASTM D-635 shall be no greater than 1".
 - c. Face sheets shall not deform, deflect or drip when subjected to fire or flame.
 - d. Face sheets shall not delaminate when exposed to 200°F for 30 minutes per IBC and NBC (300°F for 25 minutes per UBC and SBC).
4. Weatherability of exterior face sheets:
 - a. Color stability: Full thickness of the exterior face sheet shall not change color more than 3.0 (7.0) CIE Units DELTA E by ASTM D-2244 after 5 years (30 months) outdoor South Florida weathering at 5 degrees facing south, determined by the average of at least three (3) white samples with and without a protective film or coating to ensure long-term color stability. Color stability shall be unaffected by abrasion or scratching.
 - b. Erosion barrier: Exterior face shall have a permanent glass erosion barrier embedded beneath the surface to provide long-term resistance to reinforcing fiber exposure. Exterior face surface loss shall not exceed .7 mils and 40 mgs when tested in accordance with ASTM D-4060 employing CS17 abrasive wheels at a head load of 500 grams for 1000 cycles. Sacrificial surface films or coatings are not acceptable erosion barriers.
5. Appearance:
 - a. Exterior face sheets: Smooth, 0.070" thick .
 - b. Interior face sheets: Smooth, 0.045" thick .
 - c. Face sheets shall not vary more than +/- 10% in thickness and be uniform in color.
6. Strength: Exterior face sheet shall be uniform in strength, impenetrable by hand held pencil and repel an impact equal to 70 (230) ft. lbs. without fracture or tear when impacted by a 3-1/4" diameter, 5 lb. free-falling ball per UL 972.

B. Grid Core

1. Thermally broken (aluminum and composite) I-beam grid core shall be of 6063-T6 or 6005-T5 alloy and temper with provisions for mechanical interlocking of muntin-mullion and perimeter. Width of I- beam shall be no less than 7/16". The I-beam grid shall be machined to tolerances of not greater than +/- .002".
2. Thermal break: Minimum 1 inch thermoset fiberglass composite.

C. Laminate Adhesive

1. Heat and pressure resin type adhesive engineered for structural sandwich panel use, with minimum 25-years field use. Adhesive shall pass testing requirements specified by the International Code Council "Acceptance Criteria for Sandwich Panel Adhesives."
2. Minimum tensile strength of 750 PSI when the panel assembly is tested by ASTM C-297 after two (2) exposures to six (6) cycles each of the aging conditions prescribed by ASTM D-1037.
3. Minimum shear strength of the panel adhesive by ASTM D-1002 after exposure to five (5) separate conditions:

- a. 50% Relative Humidity at 73° F: 540 PSI
- b. 182° F: 100 PSI
- c. Accelerated Aging by ASTM D-1037 at room temperature: 800 PSI
- d. Accelerated Aging by ASTM D-1037 at 182° F: 250 PSI
- e. 500 Hour Oxygen Bomb by ASTM D-572: 1400 PSI

1.1 PANEL CONSTRUCTION

- D. Provide sandwich panels of flat fiberglass reinforced translucent face sheets laminated to a grid core of mechanically interlocking thermally broken (aluminum) I-beams. The adhesive bonding line shall be straight, cover the entire width of the I-beam and have a neat, sharp edge.
1. Thickness:
 - a. As shown in 2.75 inch, or 4 inch.
 - b. Where thickness is not shown on drawings, provide 4 inch thick units.
 2. Grid size: As shown, if not, Nominal 8" x 20"
 3. Grid pattern: As shown, if not, Shoji.
 4. Light transmission: Manufacturers standard per cent, if none, 35%.
 5. Solar heat gain coefficient: 0.52.
 - a. U- factor by NFRC certified laboratory: (0.23, 0.14, 0.10, 0.05) thermally broken [OR (0.53, 0.29, 0.22, 0.18) aluminum I-beam].
 6. Panel U-factor per NFRC certified laboratory with 2-3/4" aluminum grid: 0.53..
- E. Panels characteristics:
1. Deflection: No more than 1.0" at 30 psf in 10'-0" span without a supporting frame by ASTM E-72.
 2. Fire resistance: Able to withstand 1200°F fire for minimum (1)hour without collapse or exterior flaming.
 3. Thermally broken panels:
 - a. Minimum Condensation Resistance Factor of 80 by AAMA 1503 measured on the bond line.
 - b. Minimum CRF of 90 at center of grid cell.

2.3 BATTENS AND PERIMETER CLOSURE SYSTEMS

- A. Closure system: Extruded aluminum 6063-T6 and 6063-T5 alloy and temper clamp-tite screw type closure system.
1. Skylight perimeter closures shall be factory sealed to panels
- B. Sealing tape: Manufacturer's standard, pre-applied to closure system at the factory under controlled conditions.
- C. Fasteners: 300 series stainless steel screws for aluminum closures, excluding final fasteners to the building.
- D. Finish: Exposed aluminum to be manufacturer's factory applied finish that meets the performance requirements of Section 05 08 00 – Type 4 – Kynar. Where this finish is not available from manufacturer, provide finishes meeting AAMA 2604. Color: Selected from manufacturer's standard colors.

PART 3 - - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, supporting structure and installation conditions. Do not proceed with skylight erection until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Metal Protection:
1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
 2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint or method recommended by manufacturer.
 3. Where aluminum will contact pressure-treated wood, separate dissimilar materials by methods recommended by manufacturer.

3.3 INSTALLATION

- A. Install the skylight system in accordance with the manufacturer's installation recommendations and approved shop drawings.
 - 1. Anchor component parts securely in place by permanent mechanical attachment system.
 - 2. Accommodate thermal and mechanical movements.
 - 3. Set sill and curb members in a full bed of sealant compound, or with joint fillers or gaskets to provide weather-tight construction.
- B. Install joint sealants at perimeter joints and within the skylight system in accordance with manufacturer's installation instructions.

3.4 FIELD QUALITY CONTROL

- A. Water Test: Test assemblies according to procedures in AAMA 501.2.
- B. Repair or replace work that does not pass testing or that is damaged by testing and retest work.

3.5 CLEANING

- A. Clean the skylight system inside and outside, immediately after installation, according to manufacturer's written recommendations.

END OF SECTION

SECTION 09 64 60.1 – PERFORMANCE WOOD FLOORING REPAIR & REFINISHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. New wood flooring to match existing.
 - 2. Replacing existing damaged flooring.
 - 3. Piecing-in wood at missing or damaged conditions.
 - 4. Refinishing existing & pieced-in flooring.
 - 5. Flooring protection.
 - 6. Removal and salvage of re-usable existing flooring during the work.
- B. Extent: As shown on drawings.
 - 1. Before bidding, verify extent of refinishing of existing flooring intended to remain.
 - 2. Verify extent of flooring replacing by reviewing drawings, job site and understanding specification requirements.
- C. Related work:
 - 1. Section 06 08 00 - Wood Preservative & Fire-Retardant Treatments
 - 2. Section 06 10 50 - Wood Blocking
 - 3. Section 09 91 15 – Gymnasium Floor Paint Striping

1.3 SYSTEM DESCRIPTION

- A. Repair to almost like-new condition. Depending upon wood species comply with requirement of :
 - 1. Maple Flooring Manufacturers Association [MFMA].

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show installation details including location and layout of each type of wood, athletic-flooring assembly and accessory. Include the following:
 - 1. Expansion provisions and trim details.
 - 2. Layout, colors, widths, and dimensions of game lines and markers.
 - 3. Locations of athletic equipment floor anchors installed in wood flooring.
- C. Samples for Initial Selection: Manufacturer's color charts showing colors and glosses available for the following:
 - 1. Floor finish.
- D. Samples for Verification: For each type of wood flooring, and , and accessory required; approximately 12 inches long and of same thickness and material indicated for the Work. Include sample sets showing the full range of normal color and texture variations expected.
 - 1. Provide samples of existing flooring and new flooring.
 - 2. Include sample of existing subflooring, sleepers, clips, and resilient pads and the like, if and where systems below new flooring require replacement or renovation.
- E. Maintenance Literature:
 - 1. Submit written maintenance instructions.
 - 2. Provide not less than 2 hours of training and discussion with Owner's maintenance staff on care of floor.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed wood, athletic flooring similar in material, design, and extent to that indicated for this Project and whose work has resulted in wood, athletic-flooring installations with a record of successful in-service performance.
 - 1. Installer's Responsibilities: Installation of flooring assembly, including the following:
 - a. Subfloor.
 - b. Wood finish flooring.
 - c. Accessories.
 - d. Sleepers/blocking/substrate/resilient components.
- B. New wood flooring: Comply with MFMA grading rules for grade and cut.
 - 1. Certification: Provide flooring that carries MFMA Certification Mark on each piece.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver wood-flooring materials in unopened cartons or bundles.
- B. Protect wood flooring from exposure to moisture. Do not deliver wood flooring until after concrete, masonry, plaster, ceramic tile, and similar wet work is complete and dry.
- C. Do not deliver work until permanent HVAC, lighting, plumbing, sprinklers and related systems are installed overhead and up and functioning properly.
- D. Store wood-flooring materials in a dry, warm, well-ventilated, weather-tight location.
- E. Move wood flooring into spaces where it will be installed at least seven days before installation.

1.7 PROJECT CONDITIONS

- A. Conditioning: Maintain relative humidity conditions planned for building occupants, but not greater or less than the relative humidity range recommended by MFMA, and an ambient temperature between 55 and 75 deg F in spaces to receive wood flooring for at least seven days before installation, during installation, and for at least seven days after installation. After post installation period, maintain relative humidity conditions and ambient temperature planned for building occupants.
 - 1. Open sealed packages to allow wood flooring to acclimatize.
 - 2. Do not install flooring until it adjusts to the relative humidity of and is at the same temperature as the space where it is to be installed.
 - 3. Close spaces to traffic during flooring installation and for time period after installation recommended in writing by flooring and finish manufacturer, but not less than 10 days.
 - 4. Ensure concrete floors have been installed for at least 60 days and have been at or above 65 degrees F for at least 7 days prior to installation.
 - 5. Test moisture content of concrete floor and provide written documentation of same for approval before commencing work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS / NEW WOOD FLOORING

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Wood, Performance-Flooring Assemblies:
 - a. Action Floor Systems, Inc.
 - b. Connor-AGA.
 - c. Horner Flooring Co.
 - d. Wooden Kiwi Productions.
 - e. Robbins Sports Surfaces.
 - f. Superior Floor Company, Inc.
 - g. Original manufacturer.
 - h. Approved equal.
 - 3. Finishing Materials:
 - a. Flooring-assembly manufacturer.

- b. Basic Coatings.
- c. BonaKemi USA, Inc.
- d. Crawford Laboratories.
- e. Hillyard Inc.
- f. Huntington Laboratories, Inc.
- g. National Coatings Co.
- h. Original manufacturer.

2.2 VAPOR BARRIER

- A. Vapor Retarder:
 1. Intent: To match existing.
 2. Typical product: ASTM D 4397, polyethylene sheet not less than 6 mils thick.

2.3 NEW WOOD FLOORING

- A. Strip Flooring:
 1. Wood species: Matches existing, but equal to Northern hard maple (*Acer saccharum*), kiln dried.
 2. Grade: First, unless otherwise indicated.
 3. Cut: Match existing.
 4. Lengths: Random, nominal 15 to 96 inches complying with MFMA grading rules, unless otherwise required for patterns indicated or required to match existing
 5. Matching: Tongue and groove, and end matched.
 6. Backs: Channeled (kerfed) for stress relief.
 7. Thickness: Match existing.
 8. Face Width: 2-1/4 inches .
- B. Preservative Treatment: Clear, penetrating, water-repellent wood preservative that protects against mold, mildew, staining, and decay fungi; complying with MFMA's written recommendations and applied by immersion.

2.4 WOOD SUBFLOOR SYSTEM

- A. Re-use existing or replace to match existing.

2.5 FINISHING MATERIALS

- A. Floor-Finish System: MFMA-listed system of compatible components recommended by flooring and finish manufacturers for application indicated.
 1. Type: Group 5, Water Based Finishes; polyurethane/acrylic.
 2. Floor Sealer: Pliable, penetrating type, VOC compliant, water-based catalyzed sealer, applied in not less than 2 coats and equal to Basic Coatings "Commercial Catalyzed Sealer".
 3. Finish Coats: Formulated for gloss or matt finish and multicoat application; applied in not less than 3 coats and equal to Basic Coatings "Street Shoe XL Super Matte".
 4. Prior to submitting bids and prior to issuing submittals, verify that Owner and athletic department do not prefer to use Group 3 Urethane oil/solvent based floor finishes in lieu of specified water based products above.
- B. Marker Paint: If markers are shown or required, provide high-gloss enamel compatible with finish and recommended by finish and paint manufacturers for this purpose. Furnish and install under Section 09 91 15.

2.6 ACCESSORY MATERIALS

- A. Vapor Retarder: ASTM D 4397, polyethylene sheet not less than 6 mils (0.15 mm) thick.
- B. Fasteners: Type and size recommended by manufacturer, but not less than those recommended by MFMA for application indicated. In general fasteners shall comply with:
 1. Subflooring: 1 inch staples or equivalent.
 2. Strip flooring: 2 inch barbed cleats or coated staples.
- C. Wall Base: Provide product shown, if not, molded, vented, rubber cove base; 4 by 3 by 48 inches (101 by 75 by 1219 mm); with premolded outside corners in architect selected colors
- D. Wall Base: Provide product shown. Nominal 1-by-3-inch wood base matching species of wood flooring.

- E. Trowelable Leveling and Patching Compound: Latex-modified, hydraulic-cement-based formulation approved by wood floor manufacturer
- F. Thresholds: Existing or new flooring milled and cut to fit stained and finished to match existing.
- G. Shims: Type recommended by flooring manufacturer.
- H. Underlayments: Generally match existing, materials normally include:
 - 1. 6 ounce rosin sized building paper.
 - 2. Wood underlayment: As shown, if not, APA exposure 1, waterproof glue rated plywood; underlayment grade and touch sanded.
- I. Sleepers: A. Match existing.
- J. Cork Expansion Strip: Composition cork strip complying with FS HH-C-576, Type I-B, Class 2.
- K. Wood Filler: Formulated to fill and repair seams, defects, and open-grain and closed grain hardwood floors; compatible with Urethane Finish System being used: Complete system of compatible components that is recommended by finish manufacturer for application indicated.
 - 1. Filler performance: Water based, trowel grade, wood flooring filler; capable of being stained, drilled, and sanded; specifically intended for flooring application.
 - 2. Reference product: 2 part epoxy wood repair filler: J.E. Mosers® Epoxy Paste.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Review floor condition.
 - 1. Determine which portions of floor is not suitable for re-finishing. Commencing work constitutes acceptance of conditions.
 - 2. Determine which joints are not suitable for filling or re-working.
 - 3. Comply with specifications and Architect directives concerning acceptable and non-acceptable open joints.
- B. Examine substrates, areas and conditions, with Installer present, for compliance with requirements, installation tolerances, and other conditions affecting performance of wood-flooring assembly. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Concrete Slabs: Verify that concrete slabs comply with requirements, if exposed. If slabs are to be re-used, comply with the following
 - 1. Verify that slabs are dry according to test methods recommended in writing by flooring manufacturer.
 - 2. Submit written verification of slab moisture test results to Owner, GC and Architect.
 - 3. Comply with slab moisture testing requirements specified in Section 09 65 50 - Resilient flooring installation.
 - 4. Ensure slabs are broom and vacuum clean before starting work.

3.2 REMOVAL AND SALVAGE

- A. Remove flooring to be re-used. Store, stack and protect. Comply with the following:
 - 1. Remove flooring carefully using appropriate tools.
 - 2. Extract nails and fasteners without damaging tongues or grooves.
 - 3. Do not split, dent or damage work to be salvaged.
 - 4. Stack, bundle, label and secure flooring to be re-used.
 - 5. Store where directed.

3.3 PREPARATION OF SUBSTRATES [WHERE & IF REQUIRED]

- A. Grind high spots and fill low spots on concrete substrates to remove ridges, irregularities and roughness substrates with a maximum 1/8 inch deviation in any direction when checked with a 10 foot straight edge.
- B. Use trowelable leveling and patching compounds, according to manufacturers written instructions, to fill cracks, holes, and depressions in substrates.

- C. Remove substrate coatings including but not limited to paint, soap, wax, oil, grease, silicone, solvents, adhesives, adhesive removers, alkaline salts, laitance, dust, mold, mildew, curing compounds, sealers, hardeners, and other contaminants.
 - 1. Shot blasting, grinding, honing, scraping, brushing, vacuuming, and other means or combination of methods may be required.
- D. Broom and vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.4 PREPARATION OF WOOD FLOORING

- A. Remove portions of flooring not acceptable for re-use. Not acceptable conditions includes flooring that is:
 - 1. Lacking top tongue or groove.
 - 2. Cracked, split or loose.
 - 3. Coated or impregnated with cut back mastics, or hazardous or toxic substances.
 - 4. Or has loose, cracked, powdered or unsightly fillers.
 - 5. Or has corroded or otherwise damaged fasteners.
 - 6. Unsightly or otherwise unacceptably stained in the opinion of the Architect.
 - 7. Indicated to be replaced.
- B. Minor repairs:
 - 1. Open joints: Remove loose caulking and fillers and replace with new work to match flooring color. Do not fill joints over 3/32 in width or where tongues are damaged, cracked or missing.
 - a. Do no filling without prior Architect approval.
 - 2. Wide open joints to remain: Not permitted in this application, unless approved by Architect.
 - 3. Wide open joints to remain: Route out flooring and glue new matching work in place using occasional face fastener of noncorrosive finish screw set and filled. Subject to approved samples only.
- C. Infill:
 - 1. Missing Flooring: Remove grates, trim, and work interfering with new installation.
 - 2. Acclimatize flooring to be re-used in spaces scheduled for installation. Ensure proper humidity levels are maintained.
 - 3. Install "new" re-used wood flooring to match color, grain and flooring direction of adjacent work.
 - 4. In general blind nail work in place. Where not alternative exists, use face fastener of non corrosive finish screw set and filled.
 - a. Obtain prior Architect approval for each exposed fastener, in writing.
- D. Special Conditions:
 - 1. Indentations: Hand or machine sand floor which will be missed by screening process.
 - 2. Missing finishing: Hand or machine sand portions of flooring which will be missed by screening process and provide new finish before screen.
 - 3. Loose or flaking or damaged flooring: Secure sound flooring; remove and replace unsound flooring.

3.5 ACCLIMATIZATION

- A. Store wood strip flooring in space under climate controlled conditions using building's permanent HVAC system for not than 2 times the usually recommendation period but in no case less than 120 hours [5 full days] with system running at the HVAC system designers recommended temperature for usual occupancy.
- B. Do not use any wood which has not been acclimatized and maintain proper temperature and humidity in space throughout installation and until acceptance.

3.6 INSTALLATION

- A. General: Comply with flooring-assembly manufacturer's written instructions, but not less than recommendations of MFMA applicable to flooring type indicated.
- B. Pattern: Lay flooring parallel with the long dimension of the space to be floored, unless otherwise indicated.

- C. Expansion Spaces: Provide as indicated, but not less than that required by manufacturer's written instructions and MFMA's written recommendations at walls and other obstructions, and at interruptions and terminations of flooring.
 - 1. Cover expansion spaces with base molding, trim, and saddles, as indicated, if not indicated, according to MFMA recommendations and best practice of trade.
 - D. Vapor Retarder: Install over substrate with joints lapped a minimum of 6 inches and sealed.
 - E. Installation Tolerances: 1/8 inch in 10 feet variance from level or better with no discernable valleys or ridges from a normal viewing angle.
- 3.7 SUBFLOOR SYSTEM
- A. Match existing installation.
- 3.8 SANDING AND FINISHING
- A. Allow installed flooring to acclimate to ambient conditions for at least 10 days before sanding.
 - B. Sanding:
 - 1. Remove finishes to bare wood.
 - 2. Machine sand with coarse, medium, and fine grades of sandpaper to achieve a level, smooth, uniform surface without ridges or cups. Remove sanding dust. Comply with MFMA, flooring manufacturers and athletic associations recommendations for gymnasium floor surfaces and not less than the following:
 - a. For stained floor: Final cut with 80-100 grit paper and 80-100 screen.
 - b. For unstained floor: Final cut with 80-100 grit paper and 120-150 screen.
 - c. Burnish to reduce with Tampico brush on a buffer.
 - d. Vacuum thoroughly.
 - e. Tack with dry microfiber cloths or mops.
 - C. Inspect entire area of floor to ensure surface is acceptable for finishing and completely free of sanding dust.
 - D. Finish: Apply seal and finish coats of finish system according to manufacturer's written instructions. Provide not less than four coats total and not less than two finish coats.
 - 1. Buff and clean floor between coats.
 - 2. Water-Based Finishes: Use finishing methods recommended by finish manufacturer to reduce grain raise and side bonding effect.
 - 3. Lines and Markers: Under Section 09 91 15, apply marker paint between final seal coat and first finish coat according to paint manufacturer's written instructions. Mask flooring to provide sharp edges. Where game lines cross, break minor game line at intersection; do not overlap lines.
 - E. Install base molding and other cover trim indicated for expansion spaces at edges and interruptions of flooring.
 - F. Floor marking and striping: Section 09 91 15.
- 3.9 REQUIREMENTS WHEN USING WATERBORNE FINISHES
- A. Waterborne finishes require special steps and application processes. The following is generally applicable. Verify with manufacturer of product being used their required application recommendations, limitations and restrictions. If none, comply with the following.
 - B. Mixing: Shake or still well before applying. Do not thin.
 - 1. Shake finish (Part A) well for 30 seconds.
 - 2. Add Hardener (Part B) to finish (Part A).
 - a. A 10.38 oz (294.3 grams) bottle of hardener activates 1 gallon (3.78 L) of finish.
 - b. To mix finish amounts of less than one gallon, use a 1:11.33 ratio.
 - 3. Immediately shake mixture vigorously for 30 to 45 seconds.
 - 4. Insert supplied filter into bottle.
 - 5. Let sit for 5 to 10 minutes before applying. Most waterborne finishes cannot be re-hardened.
 - 6. Application:
 - a. Apply finish going with grain of wood.
 - b. Feather out each stroke to avoid applicator marks.
 - c. Use manufacturer's recommended coverage rate of square feet per gallon (sq m per L).

- d. Allow each coat to dry thoroughly. Recommended conditions of 65 to 80 degrees F (18 degrees C to 27 degrees C), and 40 to 60 percent relative humidity.
 - 1) Waterborne Finishes: 2 to 3 hours.
 - 2) High humidity and/or low temperature conditions extend dry time.
 - 3) Increased ventilation and airflow reduces dry time.
- e. For Smoothest Results: See "Intercoat Abrasion" recommendations below. At a minimum between coats, vacuum and tack thoroughly with a Microfiber Tacking Pad (dry or slightly dampened with water).
- f. Pot Life: The finish/hardener mixture must be used within 4 hours after it is mixed. Product properties are diminished after 4 hours.
 - 1) The finish and hardener can be mixed only one time.
 - 2) Caution: To avoid pressure build-up, do not tightly recap finish/hardener mixture.
- g. Intercoat Abrasion: It is not necessary to abrade between typical waterborne sealer and finish coats unless more than 48 hours has passed since the previous coat was applied.
 - 1) For Smoothest Results: Abrade between coats as necessary. Use multidisc .
 - 2) Bona Diamond 180 to 240 grit abrasives with Bona Intermediate Pads.
 - 3) Thoroughly clean abraded floor using Power Scrubber or vacuum and tack with Microfiber Tacking Pads (dry or slightly dampened with water).
 - 4) When using solvent-based sealers, always, vacuum and tack before finish coats.
- h. Curing: Process varies depending on product. Floors may be walked on after 24 hours but remains susceptible to scuffing or marring until completely cured. Protect finishes until the floor has fully cured.

3.10 CLEANING

- A. Remove excess and waste material from work area.

3.11 PROTECTION

- A. Protect wood flooring during remainder of construction period to allow finish to cure and to ensure that flooring and finish are without damage or deterioration at time of Substantial Completion.
 - 1. Do not cover floors after finishing until finish reaches full cure, and not before seven days after applying last finish coat.
 - 2. Do not move heavy and sharp objects directly over floors. Protect fully cured floor finishes and surfaces with plywood or hardboard panels to prevent damage from storing or moving objects over floors

END OF SECTION

SECTION 09 91 15 - GYMNASIUM FLOOR PAINT STRIPING

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, without limitation, providing:
 - 1. Floor striping painting.
- B. Related Requirements:
 - 1. Division 09 – Flooring

1.3 DEFINITIONS

- A. NCAA: The National Collegiate Athletic Association.
- B. NFHS: National Federation of State High School Associations.
- C. Athletic Associations:
 - 1. FIBA: Federation Internationale de Basketball Amateur (The International Basketball Federation).
 - 2. BWF: Badminton World Federation.
 - 3. FIVB: Federation Internationale de Volleyball (The International Volleyball Federation).
 - 4. USAV: USA Volleyball.
- D. For the purposes of this section *floor striping*, *game line striping*, and *line marking* shall refer to the same work process.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For gymnasium stripe or field layout.
 - 1. Include dimensioned plans, tied to existing measurements.
 - 2. Layout, colors, widths, and dimensions of game lines and markers.
- C. Samples: For each exposed product and for each game line and marker paint finish and color specified or selected.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Court layout plans, drawn to scale, and coordinated with floor inserts, game lines, and markers applied to finished flooring.
- B. Qualification Data: For Installer.
- C. Product Certificates: For each type of gymnasium striping paint.
- D. Sample Warranty: For special warranty.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. Not less than 1 five gallon unopened can of each color.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.8 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For gymnasium equipment to include in emergency, operation, and maintenance manuals.

1.9 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and have successfully completed at least 5 comparable projects.
- B. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not apply work until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Verify position and location of flooring and layout for gymnasium striping.
- C. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- D. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

1.11 COORDINATION

- A. Coordinate installation of court layout and game lines and markers on finish flooring.
- B. Coordinate layout and installation of floor installation and permanent equipment.

1.12 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of gymnasium striping that fail in materials or workmanship within specified warranty period.
 1. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 BASKETBALL/GAME LINE MARKING & STRIPING

- A. Installer: Use only installers having not less than 5 years of experience. Available installers include:
 1. Sports Floors Inc.' <http://www.sportsfloorsinc.com/>.
 2. Hur Flooring; <http://hurflooring.com/>.
 3. Conrad Floors Inc.; <http://www.conradfloors.com/>.
 4. Approved equal.
- B. Provide lines shown, in dimensions indicated, if not, complying with indicated rules, and as follows:
 1. Layout standards: Comply with drawings or one of the following:
 - a. NCAA: The National Collegiate Athletic Association.
 - b. NFHS: National Federation of State High School Associations.
 2. Colors: Per selected association.
 3. Material: Acceptable product: Hillyard GYM LINE MARKING PAINT or CONTENDER GYM MARKING PAINT
 4. Verify proposed materials with manufacturers especially where installed over sheet goods such as vinyl or linoleum.
 5. Use low VOC paints where available and recommended by striping manufacturers.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for play court layout, alignment of mounting substrates, installation tolerances, operational clearances, accurate locations of connections to building electrical system, and other conditions affecting performance of the Work.
 - 1. Verify critical dimensions.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. General: Comply with manufacturer's written installation instructions and competition rules indicated for each type of gymnasium striping required.

3.3 STRIPPING

- A. Layout floor per drawings and selected basketball rules organization or other applicable sporting events.
- B. Comply with layout standards and recommendations of the Hillyard Company; see section called "Laying Out Court": <https://www.hillyard.com/MediaCenter/Documents/Literature/LIT-Wood-LLG.pdf/>.
- C. Comply with painting requirements of manufactures for materials and use low VOC and application methods.
- D. Ensure paint materials are compatible with substrate.
- E. Existing floor or new applied gym flooring finishes: Prepare and correct minor defects, cracks, ridges, holes, and the like under the work of this section. Make minor repairs where required to produce a smooth, flat even surface. Before paint application, wash surfaces or prepare surfaces as recommended. Remove dust or other defects prior to paint application. Ensure floor coatings are completely cured before application.

3.4 CLEANING

- A. After completing gymnasium striping installation, inspect lines and surfaces. Remove spots, dirt, and debris and touch up damaged shop-applied finishes according to manufacturer's written instructions.
- B. Replace gymnasium finishes that cannot be cleaned and repaired, in a manner approved by Architect, before time of Substantial Completion.

END OF SECTION

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SECTION 23 00 00

HEATING, VENTILATING AND AIR CONDITIONING

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. **For this project, the HVAC Contractor is the General Contractor.**
- B. The work described herein shall be interpreted as work to be done by the HVAC Subcontractor.

Work to be performed by other trades will always be specifically referenced to a particular Contractor or Subcontractor. **The HVAC Contractor shall be the General Contractor and shall be responsible for the entire scope of work.** The work covered by this Section of the Specifications includes the furnishing of all labor and materials and in performing all operations in connection with the installation of the project.

The work includes, but is not limited to, the following:

1. Humidifier and associated steam piping and duct wand.
2. Makeup water piping.
3. Makeup water filter.
4. Drain Piping and Pump.
5. Equipment protective cage
6. Automatic Temperature Controls.
7. Testing, Adjusting and Balancing.
8. Commissioning
9. O&M Manuals.
10. Operating Instructions.
11. Record Drawings.
12. Staging, Ladders, Scaffolding, Hoists and All Related Equipment.
13. Coring, Cutting and Patching.
14. Firestopping at all penetrations.
15. Finish painting, including painting of supporting steel for mechanical equipment.

1.02 PROVISIONS INCLUDED

- A. The Conditions of the Contract including Part A of the Project Manual and Division 1 - General Requirements, apply to the Work under this Section.
- B. Refer to all drawings and other Sections of these Specifications to determine the type and extent of work therein affecting the work of this Section, whether or not such work is specifically mentioned herein.

1.03 RELATED WORK UNDER OTHER SECTIONS

- A. The following work is not included under this Section and shall be performed under the Sections indicated:
 1. By the Electrical Subcontractor:
 - a. All power wiring required for the automatic temperature control system Electrical Subcontractor at a minimum shall provide a 120-volt power junction box in the boiler room, Custodial Office, and seven other locations as shown on the electrical drawings for the automatic temperature control system. ATC Sub-Contractor to review with the Electrical Contractor if additional required. Automatic temperature control wiring shall be provided by the Control Sub-subcontractor under Division 23.
 - b. All electrical power wiring and connections and all disconnect switches not provided with or as integral part of the HVAC equipment shall be provided by the Electrical Subcontractor.
 - c. Refer to Electrical specification for more information.

1.04 CODES, ORDINANCES AND PERMITS

- A. All material and work provided shall be in accordance with the following codes and standards:
 - 1. Massachusetts State Building Code.
 - 2. State Department of Public Safety.
 - 3. Local codes.
 - 4. Standards of the Underwriters Laboratories (UL).
 - 5. Occupational Safety and Health Act (OSHA).
 - 6. National Fire Protection Association (NFPA).
 - 7. Massachusetts and National Electrical Codes.
 - 8. International Mechanical Code (IMC) 2015.
 - 9. International Energy Conservation Code (IECC) 2018.
 - 10. International Plumbing Code.
- B. Where the contract documents indicate more stringent requirements than the above codes and ordinances, the Contract Documents shall take precedence.
- C. All necessary permits, inspections, and approvals are to be obtained and paid for by this Subcontractor.

1.05 CONTRACT DRAWINGS AND SPECIFICATIONS

- A. The drawings showing layout of the HVAC systems indicate the approximate location of piping, ductwork, equipment and location of services. They are schematic and are not intended to show the exact routing or all fittings required. The final determination as to the routing shall be governed by structural conditions and other obstructions. No cutting or removal of any wood or concrete members will be allowed, unless approved in writing by the Architect.
- B. The right to make any reasonable change in the location of ducts, piping, apparatus and equipment up to the time of roughing-in is reserved by the Architect without involving any additional expense to the Owner.
- C. The specifications supplement the drawings and provide specifics pertaining to the methods and material to be used in the execution of the work.
- D. Any discrepancies between the drawings and specifications or within the drawings/specifications shall be brought to the attention of the Architect/Engineer for clarifications.
- E. HVAC Subcontractor shall read and understand the Contract Documents and submit the bid in accordance therewith. Failure to examine the Contract Documents and site plans shall not relieve the HVAC Subcontractor from any obligation under the bid as submitted.

1.06 SHOP DRAWING AND MATERIALS SCHEDULE

- A. Within fifteen days after the date of notice to proceed and before purchasing any materials or equipment, submit for approval a complete list, in six copies, of all materials to be incorporated in the work. After the list has been processed, submit complete shop drawings of all equipment. These shop drawing submittals shall be submitted within fifteen days after the processing date of original submittal list.
- B. The approval of equipment does not relieve the HVAC Subcontractor from the responsibility for shop drawing errors in details, sizes, quantities, wiring diagram arrangements and dimensions which deviate from the specification, contract drawings and/or job conditions as they exist.
- C. Refer to General Requirements for substitution of equipment and submittal of shop drawings. If apparatus or materials are substituted for those specified and such substitution necessitates changes in or additional connections, supports or construction, same shall be provided. The HVAC Subcontractor shall assume cost and entire responsibility thereof.
- D. Submit the name(s) and contact information for a minimum of two qualified vendors that are eligible to provide operations and maintenance on the installed HVAC system.

1.07 COOPERATION AND COORDINATION WITH OTHER TRADES

- A. The work shall be so performed that the progress of the entire building construction including all other trades, shall not be delayed nor interfered with. Materials and apparatus shall be installed as fast as conditions of the building will permit and must be installed promptly when and as desired.
- B. Confer with all other trades relative to location of all apparatus and equipment to be installed and select locations so as not to conflict with work of other Sections. Any conflicts shall be referred immediately to the Architect/Engineer for decision to prevent delay in installation of work. All work and materials placed in violation of this clause shall be readjusted to the Architect's/Engineer's satisfaction, at no expense to the Owner.
- C. Where work of this section will be installed in close proximity to work of other sections or where there is evidence that the work of this section will interfere with work of other sections, assist in working out space conditions to make satisfactory adjustment. Prepare and submit for approval 3/8-inch scale or larger working drawings and sections, clearly showing how this work is to be installed in relation to the work of other sections. If the work of this section is installed before coordinating with other trades or so as to cause interference with work of other trades, make changes necessary to protect conditions without extra charge.
- D. Keep fully informed as to the shape, size and position of all openings required for all apparatus and give information in advance to build openings into the work. Furnish and set in place all sleeves, pockets, supports and incidentals.
- E. All distribution systems which require pitch or slope such as sanitary drains and water piping shall have the right of way over those which do not. Confer with other trades as to the location of pipes, ducts, lights and apparatus and install work to avoid interferences.
- F. Where there is evidence that work of this Subcontractor will interfere with the work of other trades, this Subcontractor shall assist in working out space conditions to make satisfactory adjustments.
- G. This Subcontractor shall, with the approval of the Engineer and without extra charge, make reasonable modifications in his work as required by structural interference's, or by interference with work of other trades, or for proper execution of the work.
- H. If this Subcontractor installs his work before coordinating with other trades and his work causes interference with the work of such other trades, he shall make all necessary changes in his work to correct the condition without extra charge and as directed by the Engineer.
- I. This Subcontractor shall protect all materials and work of other trades from damage that may be caused by his work and shall make good any damages so caused.

1.08 RECORD DRAWINGS

- A. Provide two sets of black line prints to be used as working record drawings during construction. One set of prints shall be maintained at the job site and shall, at all times, be accurate, clear and complete, showing the actual location of all equipment ducts and piping. The working record drawings shall be available for review at the job site by the Architect's/Engineer's field representative. The marked up As Built Drawings required to be maintained under this section are Drawings M-1 & M-2.
- B. Any addenda sketches, supplementary drawings and change orders issued during the course of construction shall be transferred to the working record drawings.
- C. At the completion of all work submit an accurate, checked set of working record drawings. Non-availability of these drawings will postpone the final inspection until the record drawings are available.
- D. The HVAC Subcontractor shall incorporate all changes on the original drawings. The Subcontractor shall submit to the designer, disks of drawings on Auto CAD Version 2013 format with two sets of prints and reproducible drawings. Inaccuracies in Record Drawings, as determined by the designer, shall be corrected.
- E. All costs related to these requirements shall be paid for by the HVAC Subcontractor.

1.09 OPERATING INSTRUCTIONS AND MAINTENANCE MANUALS

- A. Provide operating instructions to the Owner's designated representatives with respect to operating functions and maintenance procedures for all equipment and systems installed. The cost of providing a manufacturer's

representative at the site for instructional purposes shall be included in the contract price. The operating instructions shall be presented in scheduled, pre-arranged formal periods. The HVAC contractor shall include in his contract price, the cost for instructions, up to four (4) hours, which shall not necessarily be consecutive.

1. Contractor Responsibilities:

- a. Provide designated Owner personnel with comprehensive orientation and training in the understanding of the systems and the operation and maintenance of each piece equipment.
- b. During any demonstration, should the system fail to perform in accordance with the requirements of the O&M manual or sequence of operations, the system will be repaired or adjusted as necessary and the demonstration repeated.
- c. The HVAC contractor or manufacturer's representative shall provide the instructions on each major piece of equipment. This person may be the start-up technician for the piece of equipment, the installing contractor or manufacturer's representative. Practical building operating expertise as well as in-depth knowledge of all modes of operation of the specific piece of equipment are required. More than one party may be required to execute the training.
- d. The controls contractor shall attend sessions other than the controls training, as requested, to discuss the interaction of the controls system as it relates to the equipment being discussed.

2. Training Scope:

- a. HVAC equipment locations and areas served.
- b. Operational/Design intent of equipment and interactions with other equipment or systems
- c. Equipment operations; Start-up, Shutdown and Normal operations.
- d. Provide DOC system training including Detailed sequence of operations.
- e. Review of system drawings and schematics
- f. Preventative Maintenance and replacement part sources
- g. O&M Manual review
- h. Questions and Answers

B. Maintenance Manuals:

1. At the completion of the project, turn over to the Architect/Engineer, two complete manuals containing the following:
 - a. Complete shop drawings of all equipment.
 - b. Operation description of all systems.
 - c. Names, addresses and telephone numbers of all major suppliers of equipment on a separate indexing sheet.
 - d. Preventive maintenance instructions for all equipment.
 - e. Spare parts list of all system components.
2. The Contractor shall collect the operating instructions, bind them into two complete sets and deliver them to the Architect/Engineer who will check for completeness and deliver them to the Owner. All information shall be in three-ring, loose-leaf binders.
3. Delivery of the operating and maintenance manuals shall be a condition precedent to final payment.

1.10 GUARANTEE

- A. This Subcontractor shall obtain, in the Owner's name, the standard written manufacturer's guarantee for one year or greater of all materials furnished under this section where such guarantees are offered in the manufacturer's published product data. All these guarantees shall be in addition to, and not in lieu of, other liabilities which this Subcontractor may have by law or other provisions of the contract documents.

- B. This Contractor shall warranty workmanship and materials for a period of not less than one year from the date of substantial completion. Should any defects in materials or workmanship appear during this period, they shall be corrected or replaced by the Subcontractor to the satisfaction of the Architect, and at no expense to the Owner.

1.11 PERMITS

- A. This Subcontractor shall be responsible for obtaining and paying for all permits and inspections required to complete all work described in this section. Refer to Division 1 specifications for more information.

1.12 STORAGE OF MATERIALS

- A. Store materials prior to their installation where designated by the General Contractor. Be responsible for all stored equipment and materials and protect all installed equipment and materials from damage.

1.13 INSPECTION AND TESTS

- A. If inspection of materials installed shows defects, such defective work, materials and/or equipment shall be replaced at no cost to the Owner and the inspection and tests repeated.
- B. Make all reasonable tests as required and prove the integrity of all work and leave the entire HVAC installation in correct adjustment and ready to operate.

1.14 ELECTRICAL CHARACTERISTICS

- A. In general, and unless specifically indicated otherwise in the specifications or noted on the drawings, all HVAC equipment shall be of the HP, voltage, and phase as indicated on the drawings.
- B. Control wiring and conduit for the HVAC systems shall be furnished under this Section. Power wiring, including provisions for disconnect switches not otherwise furnished as an integral part of the mechanical equipment, is under the work of the Electrical Subcontractor.
- C. Fractional horsepower motors wired for single phase operation shall have automatic reset overload protection built into the motor.

1.15 DEFINITION OF TERMS

- A. "Furnish" or "Supply" means to purchase, procure, acquire and deliver.
- B. "Install" means to rig, erect, mount and connect, unless specifically noted otherwise.
- C. "Furnish and Install" means to supply, deliver, rig, erect, mount and connect in readiness for operation, unless specifically noted otherwise.
- D. "Provide" is synonymous with "Furnish and Install".
- E. "Piping" means pipe, tubing, fittings, flanges, unions, valves, strainers, traps, hangers and other accessories related to such piping.
- F. "Concealed" means hidden in chases, furred spaces and walls, above ceilings or enclosed in construction.
- G. "Exposed" means visible or not installed "Concealed" as defined above.
- H. "Approved Equal" or "or equal" means any equipment or material which is approved by the Engineer as equal in quality, durability, appearance, strength, design and performance to the equipment or material originally specified.
- I. "Underground" means buried exterior to or within the building.

1.16 SCAFFOLDING AND STAGING

- A. All staging, exterior and interior, required to be over eight feet in height, shall be furnished and erected by this Subcontractor and maintained in safe condition by him without charge to and for the use of all trades as needed by them for proper execution of their work, except where specified to the contrary in any filed sub-bid Section of the Specification.
 - 1. Erection and dismantling of staging shall be performed only by trained, certified, and experienced staging personnel qualified to perform such work.

2. Copies of such certifications, clearly indicating qualifications, shall be provided to the Architect prior to commencement of such erecting and dismantling work.
- B. Provide, maintain and remove safe and adequate interior and exterior staging, ladders, scaffolding, hoists, and all other related equipment for proper and complete execution of the work of this section in accordance with requirements of the Contract Documents. Staging, scaffolding, hoists and all other related equipment shall comply with all applicable federal, state and local regulations.
- C. Staging, ladders, scaffolding, hoists and all other related equipment shall be provided, maintained and removed when no longer required.

1.17 WORK COORDINATION AND JOB OPERATIONS

- A. HVAC equipment shall not be installed in congested and possible problem areas without first coordinating the installation of same with the other trades. Relocate HVAC equipment should it interfere with the proper installation of equipment to be installed by the other trades.
- B. Furnish to the other trades, all information relative to the portion of the HVAC installation that will affect them, so that they may plan their work and installations accordingly.

1.18 DESCRIPTION OF WORK

- A. All of the Contract Documents, including Drawings, General Conditions, Supplementary Conditions, and all Sections of Division 01 – General Requirements, apply to the Work of this Section.

PART 2 - PRODUCTS

2.1 STEAM HUMIDIFIER

- A. Provide a steam humidifier system for distribution of humidity (steam vapor) into an air handling system as indicated on the drawings. This system shall be a self-contained, electrically controlled, system manufactured by Condair, Armstrong, Carel, Dri Steem, or approved equal.
- B. General: The unit shall be a packaged electrode humidifier that modulates to generate atmospheric pressure steam from potable water. The system shall consist of a steam generating unit, steam piping, duct mounted distribution manifolds, and controls. The humidifier shall be of the type, capacity, and arrangement as shown on the project drawings. The humidifier shall conform to ARI 640, "Standard for Commercial and Industrial Humidifiers".
- C. Steam Generator: Packaged system with electrode cylinder steam generation technology.
1. Powder coated steel cabinet with zero side clearance requirement.
 2. Cylinder optimized for humidifier capacity and supply voltage. Cylinder must have welded seam to ensure watertight and have high water sensor to prevent overfilling.
 3. Modulating output between 20% and 100% of rated capacity.
 4. Internal drain water tempering to ensure maximum 140°F drain water discharge.
 5. Integral fill cup with air gap to prevent back siphoning.
 6. Full cylinder indication and pre-notification of automatic shutdown at end of cylinder life.
 7. Automatic pulse feature to clean obstructions from the drain solenoid valve.
 8. Automatic off-season shut-down [after 3 days of "no call"] will completely drain the cylinders and automatically restart on call for humidity. Adjustable on/off and time sequence.
- D. Duct Manifolds: Short Absorption Manifold with horizontal stainless-steel header supplying steam to a bank of vertical stainless-steel tubes, spaced as necessary to meet absorption distance requirements, and to minimize condensation loss.
1. The steam inlet and condensate return shall be located on same side of header. The condensate return shall be located at lowest point of header.
 2. Stainless steel nozzles with metered orifices, sized to provide even distribution of the discharged steam, spaced for optimum steam absorption.
- E. Controls: The humidifier shall be provided with a controls package capable of controlling the unit and interfacing with the buildings BAS system. The control system shall be capable of performing humidification control, safeties, alarms, and diagnostics as indicated in the sequence of operation.
1. Provide a touchscreen controller with standard building automation connection to BAS.
 2. Embedded web interface for configuration and remote monitoring.
 3. Provide a high limit humidistat downstream of each distribution manifold.
 4. Provide with airflow switch to prove flow prior to operation.
- F. Installation: The humidifier shall be installed in accordance with all manufacturer's instructions and requirements.
1. The humidifier shall be securely mounted to structure to minimize vibration and movement.
 2. Provide unit with secondary drainpan with leak detection beneath the unit.
 3. The humidifier shall be installed within a protective wire enclosure with door. The enclosure shall be sized to allow for required access and clearances.
 4. Humidifier start-up and project inspection by qualified factory trained representative.
- G. Warranty: The humidifier manufacturer must comprehensively warrant all equipment and material of its manufacturer and all equipment and material of all subassemblies manufactured by others but factory installed onto the unit against

defects in workmanship and material for not less than one year from the date of substantial completion. The comprehensive equipment and material warranty must repair or replace defective components, including labor to do so, at no cost to the owner.

2.2 PIPE AND FITTINGS

- A. Steam Piping: Low-pressure steam piping shall be rigid copper pipe, (MED Type-L) with wrought copper fittings. Use long radius elbows. Use full sized tees for traps to condensate system.
- B. Drain Piping: Drain piping shall be shall be rigid copper pipe, (MED Type-L) with wrought copper fittings, sized as indicated on the drawings. Provide trap for each condensate drain line connection. Provide clean-outs at each change in direction of piping. Use tees and a 45-degree fitting for a branch line joining a main. Clean-outs shall be made with threaded plug tees. Pitch piping down in direction of flow.
- C. Domestic Water Connection (type "L" copper): Material shall be type "L" hard-drawn copper tubing with wrought copper fittings.

2.3 BOLTS, GASKETS AND JOINTS

- A. All screwed joints shall be made tight with teflon tape.
- B. All solder joints shall be made with 95-5 solder and shall make perfect adhesion between pipe tubing and fitting.
- C. Provide dielectric fittings for all connections between ferrous and non-ferrous piping.

2.4 HANGERS AND SUPPORTS

- A. Provide pipe supports, hangers, and other devices necessary to support firmly and substantially the piping and the apparatus described in the specifications and shown on the drawings. Hangers shall be arranged to maintain the required grading and pitch, to prevent vibration, and to provide for expansion and contraction. All hangers and supports shall be in compliance with seismic requirements of the State Building Code.
- B. Where the weight of piping or other apparatus makes it impracticable to support same from the ceiling alone, flange pipe standards shall be installed to support the weight of piping, valves and fittings.
- C. Piping shall not be supported from ductwork, breeching, equipment, ceiling suspension systems or other piping.
- D. Brackets of approved type may be used along walls.
- E. Each vertical line shall be supported at its base using a suitable hanger placed in the horizontal line near the riser.
- F. Piping 2-inch diameter and smaller shall be supported by "A" bands with adjustable steel rod with concrete insert or beam clamp.
- G. 1A bands and clevis hangers shall be installed outside the thermal insulation. Provide 18 gauge, 12" long pipe covering protection shields on insulated piping at 1A bands and clevis hangers. Provide galvanized metal shields between pipe hangers and insulation where saddles are not required and where hangers are installed outside of insulation.
- H. The maximum spacing between pipe supports shall be in accordance with the latest addition of ANSI/MSS SP-69 & SP-58 Tables 3 & 4. The following excerpts from the tables shall be verified prior to work.

1. Horizontal Copper Pipe:

| <u>Nominal Pipe Size (in)</u> | <u>Rod Diameter (in)</u> | <u>Maximum Spacing (ft)</u> |
|-------------------------------|--------------------------|-----------------------------|
| 1/4 – 3/4 | 3/8 | 5 |
| 1 | 3/8 | 6 |
| 1-1/4 | 3/8 | 7 |
| 1-1/2 | 3/8 | 8 |

These spans apply to straight runs of piping without concentrated loads. Spans shall be shorter as required by changes in direction or by concentrated loads such as strainers, valves, or related items. Supplementary steel shall be furnished and installed as required by ANSI/MSS SP-58.

2.5 SLEEVES, INSERTS AND ESCUTCHEONS

- A. All piping passing through masonry walls, slabs, floor partitions or other building construction shall be provided with pipe sleeves at least two pipe sizes larger than the pipe passing through them or the insulation jacket on covered pipes. Sleeves shall be flush on either side of masonry walls or partitions. All sleeves in floor slabs shall extend ½" above finished floors. All sleeves shall be standard weight steel pipe.
- B. Where exposed pipes pass through floors, finished walls or finished ceilings, they shall be fitted with neat, heavy spun or stamped steel, chrome plated escutcheons, firmly secured to the pipes. In unfinished areas, escutcheons shall be cast iron, split and painted to match the adjacent surfaces. Escutcheons shall be of sufficient outside diameter to amply cover the sleeved openings for the pipe.
- C. Where pipes penetrate fire rated assemblies, walls or floors, openings shall be firestopped. At all partition penetrations, walls or floors, openings shall be firestopped. Match rating of existing assembly.

2.6 VALVES

- A. Furnish and install valves as indicated on the drawings and specified herein. All valves in each class shall be manufactured by the same manufacturer.
- B. Isolating valves on piping 2" diameter and smaller shall be ball valves, Apollo Series 70-100 or 70-200 or equal as manufactured by Hammond, Jenkins or Stockham.
- C. Check valves on piping 2" diameter and smaller shall be Class 150 bronze, threaded regrinding swing check valves with bronze disc and screw-in cap as manufactured by Hammond, Jenkins or Crane. Valves shall conform to MSS SP-80.
- D. Pressure reducing valve (PRV): Bronze body, stainless steel and thermo-plastic internal parts, fabric-reinforced diaphragm, strainer, threaded and single union ends. PRV shall be an Apollo 35series or equal manufactured by Armstrong, Mueller, Sarco, or Watts.
- E. Drain valves shall be provided on all low points of water piping. Drain valves shall be ¾" bronze drain valves with solid bronze cap and chain, Jenkins Fig. No. 314, or equal as manufactured by Apollo, Hammond or Crane.
- F. Relief valves shall be ½" brass valves, Bell & Gossett Model A3 set for 50 psig or equal as manufactured by B&G, Taco, Apollo, or Amtrol.

2.7 STEAM & HYDRONIC SPECIALTIES

- A. Furnish and install, where indicated on the drawings and in accordance with the manufacturer's recommendations.
- B. Steam Traps: Steam traps shall be 15 psig float and thermostatic traps as manufactured by Barnes and Jones, Armstrong, Sarco, Watson McDaniel, or equal.
- C. Strainers:
 - 1. Furnish and install strainers as indicated on the drawings. Strainers shall be as manufactured by Apollo, Armstrong, Mueller, Sarco, Victaulic, Yarway, or approved equal.
 - 2. Furnish and install full size, Y-pattern, self-cleaning strainers where specified and where indicated on the drawings. Strainers shall have stainless steel screens with perforations recommended by the manufacturer for the intended service.
 - a. Strainers 2" diameter and smaller shall be semi-steel, iron body or bronze body, screwed strainers rated for 250 psig.
 - b. Strainers 2-1/2" diameter and larger shall be semi-steel or cast-iron body flanged strainers rated for 125 psig.
 - 3. A valved dirt blow out connection shall be made to each strainer with a ball valve located 3" to 6" below the strainer. Blow off valves shall be ¾" on strainers 2" and smaller. Blow off valves shall be 1" on strainers 2-1/2"

and larger. The blow out connections shall terminate at a point where there will be no risk of danger to personnel or damage.

2.8 INSULATION

- A. Provide pipe covering and insulation of the type hereinafter specified. All sealers, solvents, tapes, adhesives and mastics used in conjunction with this section of the specifications shall possess the maximum safety quantities available and Standards #90A and #90B. Insulation shall be fiberglass except as specified hereinafter having a minimum density of four pounds per cubic foot. Insulation shall be as manufactured by Armstrong, CertainTeed, Johns-Manville, Knauf, Owens/Corning, or equal and installed in accordance with the manufacturer's recommendations.
- B. Piping: All new piping and fittings throughout the building, as shown on the drawings, shall be insulated with Owens/Corning Fiberglass, or equal, 25 ASJ glass fiber insulation in molded sections. Glass fiber insulation shall have a minimum density of 3-1/4 pounds per cubic foot with a thermal conductivity ("K" value) of 0.23 at 75°F mean temperature. All piping shall have a factory applied all service vapor barrier jacket. The end joints of the insulation shall be sealed with factory furnished end joint sealing tape. Longitudinal seams shall be sealed with Benjamin Foster 85-75 adhesive. The thickness of insulation to be applied to piping shall be as follows:
 1. Steam & Condensate Return: Insulation on steam and condensate return piping up to 4" shall be 2-1/2" thick.
 2. Cold Water Piping: All cold-water make-up piping shall be covered with 1/2" fiberglass pipe covering with factory applied flame resistant vapor barrier adhesive. End joints shall be finished with 4" wide matching vapor barrier strips, sealed with adhesive. Staples shall not be used in any part of this installation.
 3. Drain Piping: All drain piping exposed in gym shall be covered with 1/2" fiberglass pipe covering with factory applied flame resistant vapor barrier adhesive. End joints shall be finished with 4" wide matching vapor barrier strips, sealed with adhesive. Staples shall not be used in any part of this installation.
 4. The end joints of insulation shall be tightly butted and covered with factory furnished end joint sealing tapes. The jacket overlap shall be sealed with an approved sealer which shall not mar the jacket finish. Staples shall not be used for fastening insulation.
 5. All fittings, valves and flanges shall be insulated with the same thickness of fiberglass as on the piping, with mitered segments of pre-molded F/G fittings wired in place after which a one mil aluminum foil vapor barrier shall be wrapped tightly over the insulation with all laps sealed with the manufacturer's vapor seal mastic. Wet coats of vapor seal mastic with imbedded glass fabric shall be applied to fittings, per the manufacturer's recommendations. Staples or tacks shall not be used.
 6. Provide PVC plastic pipe jacket over pipe insulation on locations indicated on drawings. Jacket shall be 10 mil thickness, ASTM C921, sheet material, ASTM E96; 0.002 perm-inches. Adhesives and mastic shall be compatible with insulation. Jacket color shall be white or dark blue as indicated on the drawings.

2.9 CONDENSATE PUMPS

- A. Where called for on the design drawings, furnish and install condensate pumps as indicated. The pumps shall be manufactured by Hartell, Little Giant, Blue Diamond, Liberty Pumps, or approved equal.
- B. High Temperature Pumps: Provide pump equal to Hartell A5X Series. Pump shall be rated to operate at 212°F, have automatic start/stop, built in check valve, hard wired electrical connection, and be capable of pumping 462 GPH at 24' of head.
- C. The pump shall be installed inside the humidifiers protective cage and shall be protected by a secondary drain pan with leak detection alarm.

2.10 CLEANING & TREATMENT OF PIPING SYSTEMS

- A. The HVAC contractor shall provide all water analysis as required to document the cleaning, passivation, and treatment of the piping systems in the project.
- B. System Cleaning: The HVAC contractor shall coordinate with a water treatment contractor to provide all required materials and services to clean the piping and humidifier of all oils, dirt, flux, pipe mill varnish, iron oxide corrosion by-products, and microbial agents. The process must be capable of removing grease and petroleum products, and must passivate wetted surfaces of ferrous and non-ferrous material.

- C. Testing: Verify system cleanliness and system chemistries to ensure the specifications stated above are achieved.

2.11 AUTOMATIC TEMPERATURE CONTROL SYSTEM

A. General:

1. Furnish and install automatic temperature controls suitable for controlling the project equipment as specified in the sequence of operations, and providing connection and interface with the existing Building Automation System.
2. IT IS THE RESPONSIBILITY OF THE HVAC SUBCONTRACTOR TO VERIFY THE CONTROL COMPONENTS BEING PROVIDED BY THE VARIOUS EQUIPMENT MANUFACTURERS AS PART OF THE EQUIPMENT AND REVIEW THIS INFORMATION WITH THE ATC SUBCONTRACTOR TO ENSURE WHAT EXTRA CONTROL COMPONENTS WOULD BE PROVIDED BY THE ATC SUBCONTRACTOR TO INSTALL A FULLY FUNCTION SYSTEMS AS NOTED IN THIS SECTION. ATC SUBCONTRACTOR IS RESPONSIBLE TO PROVIDE ALL CONTROL COMPONENTS FOR INSTALLATION AND OPERATION OF THE VARIOUS EQUIPMENT AS PER THIS SPECIFICATION.

B. Scope:

1. Install and/or wire all control devices furnished with equipment which is not factory installed and/or wired. Furnish all control devices required for equipment which is not furnished with the equipment.
2. Provide all hardware and software and not limited to, temperature sensors, temperature transmitters, controllers, automatic valves, pressure sensors, DDC control panels, operator devices, and other accessory equipment, relays, transformers, along with a complete system of electrical & control wiring to fulfill the intent of the specification and provide for a complete and operable system. All control equipment shall be fully proportioning, except as noted otherwise. A well-defined component naming convention shall be established to clearly identify all the control components. The object naming convention shall be approved by the building Owner before controls installation and programming begins.

C. The following incidental work shall be furnished by the designated contractor under the supervision of the control contractor:

1. The HVAC contractor shall:
 - a. Coordinate the work required for the ATC system with other contractors.
 - b. Install automatic valves, instruments wells, taps, and other similar devices specified to be furnished by the ATC Subcontractor.
 - c. Provide, on magnetic starters furnished, all necessary auxiliary contacts, with buttons and switches in required configurations.
 - d. Furnish and install access doors or other approved means of access through ceiling and walls for service to control equipment.
 - e. Provide all necessary cutting, patching.
2. The Electrical Subcontractor shall,
 - a. Provide 120v power to all facility management and/or temperature control panels.
 - b. Wire all power feeds through all disconnect starters to electric motor.
 - c. Wire and remote start/stop switches and manual or automatic motor speed control devices not furnished by the ATC manufacturer.

D. Electric Wiring:

1. All electric wiring and wiring connections, either line voltage or low voltage, required for the installation of the temperature control system, as herein specified, shall be provided by the temperature control contractor unless specifically shown on the electrical drawings or called for in the electrical specifications. The wiring installation shall be in accordance with National and local codes and with the electrical portion of these specifications. All wiring shall be run concealed wherever possible. Exposed wiring in occupied spaces shall be run in raceways. Raceways shall be Wiremold 200 Series with all elbows, raceways, covers, mounting stops, box extensions and wiring for a complete and neat installation. 120-volt power shall be provided by the Electrical Subcontractor. Exposed wiring in the Mechanical spaces shall be run in EMT conduit.
2. All wiring shall comply with the requirements of the state and National Electric Code.

3. All conduits for control system wiring and cabling must match the color of the buildings wiring convention.
- E. Submittal Brochure: The following shall be submitted for approval:
1. Control drawings with detailed piping and wiring diagrams, including bill of material and description of operation for all systems.
 2. Panel layouts and nameplate lists for all local panels.
 3. Valve schedules showing size, Cv, configuration, capacity and location of all equipment.
 4. Data sheets for all control system components.
 5. Control strategies (software flow charts) shall be included within the first ATC shop drawing submittal. The listing of each strategy shall be in English and demonstrate the desired ATC sequence of operation. Submittal shall be complete with proposed schedules, listing of setpoints and end device point listing and address.
 6. Sequence of operations.
 7. Point names and addresses.
 8. System riser diagrams.
 9. Data sheets for all control system components.
- F. Guarantee: The control system designated on drawings and plans and herein specified shall be guaranteed to be free from original defects in both material and workmanship for a period of eighteen (18) months or normal use and service, excepting damages from other causes. This guarantee shall become effective starting the date the owner begins to receive beneficial use of the system. During the eighteen (18) month guarantee period, Contractor shall provide programming changes to the installed system as requested by the Owner for a maximum of two (2) hours.
- G. Local Area Network:
1. Operator workstation and DDC panels shall directly reside on a dedicated local area network such that communication may be executed directly between controllers, directly between workstation, and between controllers and workstation on a peer-to-peer basis.
 2. All operator devices, either network resident or connected via modems, shall have the ability to access all point status and application report data, or execute control functions for any and all other devices via the local area network. Access to data shall be based upon logical identification of building equipment. Access to system data shall not be restricted by the hardware configuration of the facility management system. The hardware configuration of the EMA network shall be totally transparent to the user when accessing data or developing control programs.
- H. Control Units – General:
1. Provide an adequate number of control units to achieve monitoring and control of all data points specified and necessary to satisfy the sequence of operation for all mechanical systems shown on the plans. Multiple DDC controllers may control one system provided that all points associated with individual control loops are assigned to the same DDC controller. Points used for control loop reset such as outside air or space temperature are exempt from this requirement. Each of the following panel types shall meet the following requirements.
 2. Controllers shall be suitable for the anticipated ambient conditions.
 - a. Controllers used outdoors and/or in wet ambient conditions shall be mounted within waterproof enclosures, and shall be rated for operation at -40°F to 140°F and 5 to 95% RH, non-condensing.
 3. Serviceability: Provide diagnostic LEDs for power, communication, and processor. All wiring connections shall be made to field-removable, modular terminal strips or to a termination card connected by a ribbon cable.
 4. Memory: The Control Units shall maintain all BIOS and programming information in the event of a power loss for at least 72 hours.
 5. Immunity to power and noise: Controller shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shutdown below 80% nominal voltage. Operation shall be protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W at 3 ft.
- I. Sensors:
1. Humidity Sensors: Bulk polymer sensor element.
 - a. Accuracy: 2 percent at 10-90% RH with linear output.

- b. Room Sensors: Range of 0 to 100 percent relative humidity
 - c. Duct and Outside-Air Sensors: With element guard and mounting plate, range of 0 to 100 percent relative humidity.
 2. Equipment Operation Sensors:
 - a. Status Inputs for Electric Motors: Current-sensing relay with current transformers, adjustable and set to 175 percent of rated motor current.
 3. Electronic Valve/Damper Position Indication: Visual scale indicating percent of travel and 2- to 10-V dc, feedback signal.
- J. Equipment
 1. Application Specific Controllers (ASC): The air handling units (DOAS, RTU, MAU, AHU, AC, FCU) shall be furnished with control panels by the unit manufacturer. Furnish and install application specific controllers for each cabinet unit heater, wall heater, unit heater and exhaust fans. Application specific controllers shall be 16-bit microcomputer based, providing a multi-tasking, multi-user operating system. The ASC controllers shall permit the simultaneous operation of all control, communication facilities management and operator interface software as programmed by the ACT Contractor or user. Modification of the on-board ASC controller data base shall be performed online using the built in or portable POT. Systems which require the ASC to be removed from service while DDC control sequences are modified shall not be accepted. ASC controllers shall utilize true floating-point arithmetic capabilities.
 2. Miscellaneous Devices: Provide all the necessary relays, cumulator, temperature and humidity sensors, carbon dioxide sensors, air flow measuring devices, positioners, transformers, and other devices to make a complete and operable system.
 3. Points List: The Building Management System shall have the ability to control, adjust and monitor each system as described in the sequence of operation. Provide all control points as required to provide a fully functional and controllable system, including but not limited to those listed below:
 - a. Humidifier Points:
 - 1) Unit Status. (On/Off)
 - 2) Return air humidity. (Rh %)
 - 3) Secondary drain pan moisture sensor.

2.12 SEQUENCE OF OPERATION

- A. Humidifier (H-1): The unit shall operate a packaged humidification unit consisting of a steam generator, duct mounted distribution manifold, condensation drain, and associated controls. The BAS and the onboard humidifier controls shall modulate the unit to maintain building humidity levels.
 1. Operation: If the relative humidity levels in the space, as measured by the humidity sensor in the RTU-6 return air duct, are below (35% adj.) The BAS shall energize the humidifier unit. The BAS shall supply the unit with a humidity setpoint (40% adj.) and with the space relative humidity value. The humidifier onboard controls shall modulate the unit to maintain the humidity setpoint.
 2. Safeties: Safeties must be hard wired and not depend on the operation of the BMS to work. If the high limit relative humidity setpoint (85% adj.) is exceeded, disable the unit.
 3. Alarms: Alarms must appear and buffer at the alarm reporting locations until acknowledged.
 - a. If the humidifier controller generates an alarm, annunciate an alarm to the BAS.
 - b. If the secondary drain pan moisture sensor activates, annunciate an alarm to the BAS.

PART 3 - EXECUTION

3.1 PIPING

- A. Provide and erect in a workmanlike manner all piping systems shown on plans or as required to complete the installation as intended. All piping shall be installed so as to provide access to all valves and equipment.
- B. The drawings are schematic and do not indicate all offsets and fittings which may be required. The HVAC Subcontractor shall carefully investigate the structural and finish conditions of other trades affecting all his work and arrange his work accordingly.
- C. All piping, valves, fittings and appurtenances shall be installed at sufficient distances from other work to permit clearance of not less than 1/2" between the finished covering of such piping and all adjacent work whether under this or any other section of the specifications.
- D. All mains and risers shall be securely anchored to the building construction. Anchors shall be constructed from heavy, forged wrought iron secured to the piping and the building construction.
- E. All openings in pipe and fittings shall be capped or plugged until permanent connections are made. Use care to keep foreign materials out of the system.
- F. Where pipe or tubing cutters are used, or where the pipe is threaded, the burr shall be reamed out to the full inside diameter of the pipe.
- G. All piping within the building shall be so installed that it shall in no way be strained or distorted by expansion and contraction.
- H. The steam line must have a constant minimum upslope of 2 in/12 in (10°), or a constant minimum downslope of 1/2 in/12 in (2°).
- I. The condensate drain line from the steam distributor must have a constant minimum downslope of 1 in/48 in (1.2°), with a minimum trap height of 8 in.
- J. The Condensate lines must also be installed at all low points and at vertical transitions in the steam line. The condensate drain lines should always connect to full-size "T" connectors in the steam line. Install full-size "T" connectors for condensate drain lines at all transitions from vertical to horizontal
- K. Where piping passes through fire rated walls and floors, the HVAC Subcontractor shall repack the openings with a fire-retardant material so as to maintain the integrity of the fire rated wall assemblies.

3.2 MATERIALS AND WORKMANSHIP

- A. All specified materials and equipment shall be furnished new and free of defects.
- B. Store all equipment and materials in a clean, dry place to preserve initial quality.
- C. Protect installed materials and equipment against damage and corrosion. All equipment shall be left in a first-class condition. The Architect shall determine the adequacy of equipment condition and appearance and it shall be the responsibility of this Contractor to rectify any deficiencies. This shall include, but is not limited to furnishing and applying paint in accordance with the manufacturer's recommendation.
- D. All work shall be installed in a first-class manner consistent with the best current trade practices. All devices, materials and equipment shall be securely installed plumb and/or level.

3.3 PROTECTION AND CLEANUP

- A. Protection:
 - 1. Be responsible for the maintenance and protection of all material and equipment furnished during all phases of construction from loss, damage or deterioration until final acceptance by the Owner.
 - 2. All materials and equipment on the job site shall be suitably stored and protected from the weather.
 - 3. During the progress of the work all pipes, ducts and equipment openings shall be temporarily closed so as to prevent obstruction and damage.

B. Cleanup:

1. After installation, equipment with factory finished surfaces shall be cleaned and damaged spots touched up with the same type paint applied at the factory.
2. Keep the job site free from accumulation of waste material and rubbish, construction equipment and surplus materials from the site and leave the premises in a clean condition.

3.4 SYSTEM START-UP AND OPERATION

- A. After completion of the installation and before acceptance by the Owner, this Contractor shall start-up, operate and thoroughly check the entire HVAC system to assure complete adherence to the design intent. It is intended that the start-up/operational endeavor shall conclusively establish that all systems are functioning properly with respect to rotation of equipment, wiring interlocks, control interlocks and sequential control. Should any portion of system performance be found to be contrary to the specified intent, same shall be corrected as required, at no cost to the Owner.
- B. After completion of the system check procedure and when the HVAC Contractor is firmly convinced that all systems are performing properly and efficiently, he shall submit in writing to the Architect a certified statement to that effect.

3.5 SYSTEMS IDENTIFICATION

- A. All valves on the new HVAC piping systems shall have circular brass valve tags of at least 1-1/2" in diameter, attached with brass hooks to each valve stem. Stamp number of the valve and the service, such as "HWS" "CHWS" "HWR" and "CHWR" for hot water supply, chilled water supply, chilled water return, and hot water return respectively. The numbers of each service shall be consecutive and shall correspond with the numbers indicated for valves and controls on the record drawings and on three printed valve lists. These printed lists shall state number and locations of each valve and control and the equipment which it controls and other necessary information, such as sequencing of valves.
 1. These printed lists shall be prepared in a form to meet the approval of the Architect and one copy shall be framed under glass mounted in an approved location.
- B. All hydronic piping shall be identified by semi-rigid plastic pipe markings which shall be provided under this contract. Markers shall be applied on supply and return sides of the humidifier, on supply and return lines throughout the building. Markings shall indicate pipe content and direction of flow. The basic marker shall be in color as called for under the ANSI Specifications A-13.1. Also, an identification of the pipe content and flow arrows shall be shown in black. Brush applied paint and adhesive marking systems shall not be used on this installation. Provide markings 20 feet on center except on vertical piping in gym. The vertical piping in the gym shall not be marked.
- C. All items of mechanical equipment such as the humidifier shall be identified by approved nameplates provided by this Subcontractor.
 1. The nameplates to be aluminum 2-1/2" x 3/4" with a black background with etched or engraved natural aluminum lettering. The nameplates shall bear notations corresponding to the same unit notations indicated on the design drawings.
 2. All equipment nameplates shall be conspicuously visible externally.
 3. Units with unique names i.e. H-1 shall be tagged with the scheduled names.

3.6 SUPPLEMENTAL SUPPORTS

- A. Furnish and install all supplementary steel, channels and supports required for the proper installation, mounting and support of all equipment. Method of attachment to the building structure shall be in a manner approved by the Architect. Type and size of supports shall be determined by the HVAC Contractor and shall allow only a minimum amount of deflection.
- B. All supplementary steel and channels shall be installed in a neat and workmanlike manner parallel to the walls, floor and ceiling construction. All turns shall be made with 90 degree and 45-degree fittings, as required to suit the construction and installation conditions.

3.7 SAFETY PRECAUTIONS

- A. Furnish, place and maintain proper guards for the prevention of accidents and any other necessary construction required to secure safety of life and property. Conform to all OSHA requirements.

3.8 TESTING, BALANCING AND CLEANING

- A. The contractor shall engage a Certified Balancing Contractor to balance and adjust the systems, using methods and procedures which have been developed and employed to accomplish this service. The HVAC Subcontractor shall coordinate with the Balancing Contractor and provide required information, access and clearances.
 - 1. Piping System Pressure Testing, Balancing and Cleaning:
 - a. After completion of the installation of the entire water system and prior to acceptance, the system shall be adjusted and balanced to deliver the water quantities indicated on the drawings.
 - b. All equipment and piping shall be thoroughly cleaned of foreign matter as they are installed. Cleaning and flushing of the systems with the main circulators operating and all trapped air removed shall be carried out in accordance with the specifications as indicated in Cleaning and Treatment of Hydronic Systems.

3.9 FIRESTOPPING

- A. The Work of this Section shall include, but not be limited to, furnishing and installation of through-penetration firestop systems for penetrations through fire-resistance-rated assemblies.
- B. For penetrations through fire-resistance-rated assemblies, provide through-penetration firestop systems that are produced and installed to resist spread of fire, resist passage of smoke and other gases, and maintain original fire-resistance rating of the assembly being penetrated.
 - 1. Fire-resistance-rated assemblies include firewalls, fire partitions, fire barriers, smoke barriers, floors, floor/ceiling assemblies, and ceiling membranes of roof/ceiling assemblies.
- C. Provide Shop Drawings for each through-penetration firestop system, indicating each type of assembly penetrated, relationships to adjoining construction, and type of penetrating item. Include UL through penetration firestop system design designation and qualified testing and inspecting agency that evidences compliance with requirements for each condition indicated.
- D. Provide a drawing(s) and schedule(s) identifying the locations of penetrations and associated UL through penetration firestop systems, along with the following information:
 - 1. Type of penetrating item including but not limited to material, size, bare or insulated, insulation material, and insulation thickness.
 - 2. Type of assembly penetrated identified by a UL assembly designation.
 - 3. Through-penetration firestop system to be used for each location identified by UL firestop design designation.
- A. All through-penetration firestop systems, for each combination of penetration and assembly, shall be obtained from a single manufacturer.
- B. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to the specific UL through penetration system designation requirements. Particular attention shall be paid to the annular space between penetrants and assemblies.
- C. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate the UL through-penetration firestop systems. Particular attention shall be paid to the annular space between penetrants and assemblies.
- D. Provide through-penetration firestop systems that are compatible with one another; with the substrates forming openings; and with any items penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by the approved through-penetration firestop system manufacturer based on testing and field experience.
- E. Provide accessory components for each through-penetration firestop system as required by the approved manufacturer to install fill materials. Use only components specified by the approved through-penetration firestop system manufacturer and approved by a qualified testing and inspecting agency for firestop systems indicated. Accessories shall include, but not be limited to, the following items:
 - 1. Permanent forming/damming/backing materials, including the following:

- a. Slag or rock wool fiber insulation.
 - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
 - c. Fire-rated form board.
 - d. Fillers for sealants.
2. Temporary forming materials.
 3. Substrate primers.
 4. Intumescent collars.
 5. Sleeves.
- F. Drawings, schedules, and shop drawings shall be reviewed and approved by the design team, proof of which shall accompany such submission.

END OF SECTION

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