

ROOF REPLACEMENT
BUILDING 110
VA MEDICAL CENTER
HAMPTON, VA

PROJECT 590-11-508

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SECTION 01 00 00
GENERAL REQUIREMENTS

PART I - GENERAL

1.01 GENERAL INTENTION

- A. Contractor shall completely prepare site for building operations, including demolition and removal of existing structures, and furnish labor and materials and perform work for SELECTIVE ROOF REPLACEMENT BUILDING 110, DEPARTMENT OF VETERANS AFFAIRS MEDICAL CENTER HAMPTON, VA 23667 as required by drawings and specifications.
- B. All employees of general contractor and subcontractors shall comply with VA security management program and obtain permission of the VA police, be identified by project and employer, and restricted from unauthorized access.
- C. Prior to commencing work, general contractor shall provide proof that a OSHA certified "competent person" (CP) (29 CFR 1926.20(b)(2)) will maintain a presence at the work site whenever the general or subcontractors are present. As a minimum, the competent personal will have the 30 hour OSHA Certified Construction Safety Course.
- D. Training:
 - 1. All employees of general contractor or subcontractors shall have the 10-hour OSHA certified Construction Safety course and /or other relevant competency training, as determined by VA CP with input from the ICRA team.
 - 2. Submit training records of all such employees for approval before the start of work.

1.02 STATEMENT OF BID ITEM(S)

- A. BID ITEM 1 (BASE BID); Contractor shall perform all work as indicated on the drawings, contract terms, and specifications including, roofing demolition and new roof construction, alterations, masonry work, roof drainage, mechanical and electrical work, utility systems, construction and certain other items as indicated in the contract drawings and specifications for roof areas A, G, H, I, N and R. All work will be performed at the Veterans Administration Medical Center, Hampton, VA 23667.

1.03 CONSTRUCTION SECURITY REQUIREMENTS

A. Security Plan:

1. The security plan defines both physical and administrative security procedures that will remain effective for the entire duration of the project.
2. The General Contractor is responsible for assuring that all sub-contractors working on the project and their employees also comply with these regulations.

B. Security Procedures:

1. General Contractor's employees shall not enter the project site without appropriate badge. They may also be subject to inspection of their personal effects when entering or leaving the project site.
2. For working outside the "regular hours" as defined in the contract, The General Contractor shall give 3 days notice to the Contracting Officer. This notice is separate from any notices required for utility shutdown described later in this section.
3. No photography of VA premises is allowed without written permission of the COR.
4. VA reserves the right to close down or shut down the project site and order General Contractor's employees off the premises in the event of a national emergency. The General Contractor may return to the site only with the written approval of the COR.
5. All contract personnel are required to complete VHA Privacy Policy Training on an annual basis and provide documentation of such to the COR. This training and certification can be completed through the Employ Education System (EES) at www.ees-learning.net. Go to the search option and enter the word "privacy". Do not hit enter, but select the search button. Click on the link to any of the FY09 VHA Privacy Policy Training modules to begin. When finished, you must select the certificate link in order to print the certificate for the course completed.

C. Key Control:

1. The General Contractor shall provide duplicate keys and lock combinations to the COR for the purpose of security inspections of every area of project including tool boxes and parked machines and take any emergency action.

D. Document Control:

1. Before starting any work, the General Contractor/Sub Contractors shall submit an electronic security memorandum describing the approach to following goals and maintaining confidentiality of "sensitive information".
2. The General Contractor is responsible for safekeeping of all drawings, project manual and other project information. This information shall be shared only with those with a specific need to accomplish the project.
3. All paper waste or electronic media such as CD's and diskettes shall be shredded and destroyed in a manner acceptable to the VA.
4. Notify Contracting Officer and Site Security Officer immediately when there is a loss or compromise of "sensitive information".

1.04 FIRE SAFETY

A. Applicable Publications: Publications listed below form part of this Article to extent referenced. Publications are referenced in text by basic designations only.

1. American Society for Testing and Materials (ASTM):
E84-2008.....Surface Burning Characteristics of Building
Materials
2. National Fire Protection Association (NFPA):
10-2006.....Standard for Portable Fire Extinguishers
30-2007.....Flammable and Combustible Liquids Code
51B-2003.....Standard for Fire Prevention During Welding,
Cutting and Other Hot Work
70-2007.....National Electrical Code
241-2004.....Standard for Safeguarding Construction,
Alteration, and Demolition Operations
3. Occupational Safety and Health Administration (OSHA):
29 CFR 1926.....Safety and Health Regulations for Construction

B. Fire Safety Plan: Establish and maintain a fire protection program in accordance with 29 CFR 1926. Prior to start of work, prepare a plan detailing project-specific fire safety measures, including periodic status reports, and submit to COR for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES Prior to any worker for the contractor or subcontractors beginning work, they shall undergo a

safety briefing provided by the general contractor's competent person per OSHA requirements. This briefing shall include information on the construction limits, VAMC safety guidelines, means of egress, break areas, work hours, locations of restrooms, use of VAMC equipment, etc. Documentation shall be provided to the COR that individuals have undergone contractor's safety briefing.

- C. Interim Life Safety Measures (ILSM): The contractor shall maintain a smoke tight/dust tight non-combustible separation between the occupied spaces and the roof area. Contractor shall take all measures necessary to prevent dust, debris and fumes from entering the building. Any work in the interior spaces shall be coordinated with the COR and maybe required to be undertaken outside of normal work hours or at weekends.
- D. Site and Building Access: Maintain free and unobstructed access to facility emergency services and for fire, police and other emergency response forces in accordance with NFPA 241.
- E. Separate temporary facilities, such as trailers, storage sheds, and dumpsters, from existing buildings by distances in accordance with NFPA 241. For small facilities with less than 20 feet exposing overall length, separate by 10 feet.
- F. Temporary Heating and Electrical: Install, use and maintain installations in accordance with 29 CFR 1926, NFPA 241 and NFPA 70.
- G. Means of Egress: Do not block exiting for occupied buildings, including paths from exits to roads. Minimize disruptions and coordinate with COR.
- H. Egress Routes for Construction Workers: Maintain free and unobstructed egress. Inspect daily. Report findings and corrective actions weekly to COR.
- I. Fire Extinguishers: Provide and maintain extinguishers in construction areas and temporary storage areas in accordance with 29 CFR 1926, NFPA 241 and NFPA 10.
- J. Flammable and Combustible Liquids: Store, dispense and use liquids in accordance with 29 CFR 1926, NFPA 241 and NFPA 30.
- K. Smoke Detectors: Prevent accidental operation. Remove temporary covers at end of work operations each day. Coordinate with COR.
- L. Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B. Coordinate with COR. Obtain permits from facility Program Manager, Fire Inspection Section prior to any hot work

being performed. Designate contractor's responsible project-site fire prevention program manager to permit hot work.

- M. Fire Hazard Prevention and Safety Inspections: Inspect entire construction areas daily in accordance with ILSM and ICRA permit. Coordinate with, and report findings and corrective actions weekly to COR.
- N. Smoking: Smoking is prohibited in and adjacent to construction areas, inside existing buildings and additions under construction. In separate and detached buildings under construction, smoking is prohibited. Smoking on facility grounds is permitted only in designated areas.
- O. Dispose of waste and debris in accordance with NFPA 241. Remove from buildings daily.
- P. Perform other construction, alteration and demolition operations in accordance with 29 CFR 1926.
- Q. If required, submit documentation to the COR that personnel have been trained in the fire safety aspects of working in areas with impaired structural or compartmentalization features.

1.05 OPERATIONS AND STORAGE AREAS

- A. The Contractor shall confine all operations (including storage of materials) on Government premises to areas authorized or approved by the COR. The Contractor shall hold and save the Government, its officers and agents, free and harmless from liability of any nature occasioned by the Contractor's performance.
- B. Temporary buildings (e.g., storage sheds, shops, offices) and utilities may be erected by the Contractor only with the approval of the COR and shall be built with labor and materials furnished by the Contractor without expense to the Government. The temporary buildings and utilities shall remain the property of the Contractor and shall be removed by the Contractor at its expense upon completion of the work. With the written consent of the Contracting Officer, the buildings and utilities may be abandoned and need not be removed.
- C. The Contractor shall, under regulations prescribed by the COR, use only established roadways, or use temporary roadways constructed by the Contractor when and as authorized by the Contracting Officer. When materials are transported in prosecuting the work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by any Federal, State, or local law or

regulation. When it is necessary to cross curbs or sidewalks, the Contractor shall protect them from damage. The Contractor shall repair or pay for the repair of any damaged curbs, sidewalks, or roads.

- D. Working space and space available for storing materials shall be as determined by the COR.
- E. Workmen are subject to rules of Medical Center applicable to their conduct.
- F. Execute work so as to interfere as little as possible with normal functioning of Medical Center as a whole, including operations of utility services, fire protection systems and any existing equipment, and with work being done by others.
 - 1. Do not store materials and equipment in other than assigned areas.
 - 2. Schedule delivery of materials and equipment to immediate construction working areas within buildings in use by Department of Veterans Affairs in quantities sufficient for not more than two work days. Provide unobstructed access to Medical Center areas required to remain in operation.
- G. The Contractor lay down area shall be determined at the pre-construction meeting by the COR. The COR will outline the limits of a specific location, to be maintained by the contractor for the contractor's use in performance of this contract.
- H. Utilities Services: Maintain existing utility services for Medical Center at all times. Provide temporary facilities, labor, materials, equipment, connections, and utilities to assure uninterrupted services. Where necessary to cut existing water, steam, sewer, or conduits, wires, cables, etc. of utility services or of fire protection systems and communications systems (including telephone), they shall be cut and capped at suitable places where shown; or, in absence of such indication, where directed by COR.
 - 1. No utility service such as water, gas, steam, sewers or electricity, or fire protection systems and communications systems may be interrupted without prior approval of COR. Electrical work shall be accomplished with all affected circuits or equipment de-energized. When an electrical outage cannot be accomplished, work on any energized circuits or equipment shall not commence without the Medical Center Director's prior knowledge and written approval.

2. Contractor shall submit a request to interrupt any such services to COR, in writing, 48 hours in advance of proposed interruption. For minor interruptions, request shall state reason, date, exact time of, and approximate duration of such interruption.
 3. Contractor will be advised (in writing) of approval of request, or of which other date and/or time such interruption will cause least inconvenience to operations of Medical Center. Interruption time approved by Medical Center may occur at other than Contractor's normal working hours.
 4. Major interruptions of any system must be requested, in writing, at least 15 calendar days prior to the desired time and shall be performed as directed by the COR.
 5. In case of a contract construction emergency, service will be interrupted on approval of COR. Such approval will be confirmed in writing as soon as practical.
- I. To minimize interference of construction activities with flow of Medical Center traffic, comply with the following:
1. Keep roads, walks and entrances to grounds, to parking and to occupied areas of buildings clear of construction materials, debris and standing construction equipment and vehicles. Wherever excavation for new utility lines cross existing roads, at least one lane must be open to traffic at all times.
 2. Method and scheduling of required cutting, altering and removal of existing roads, walks and entrances must be approved by the COR.
- J. Coordinate the work for this contract with other construction operations as directed by COR. This includes the scheduling of traffic and the use of roadways, as specified in Article, USE OF ROADWAYS.

1.06 TEMPORARY TRAFFIC CONTROL DEVICES

- A. Provide and maintain temporary signs, barricades and other traffic control devices in accordance with MUCDT and VDOT Virginia work area protection manual as necessary to protect personnel and new construction from damage by equipment and vehicles for all work around and/or involving roadways. Maintain traffic control devices until work is complete, operational and approved by the COR.

1.07 INTERRUPTION OF VEHICULAR TRAFFIC

- A. If during the performance of work, it becomes necessary to modify vehicular traffic patterns at any locations, notify the COR at least 15

calendar days prior to the proposed modification date. Provide a traffic control plan detailing the proposed modifications and controls to the COR for approval. Make all notifications and obtain any permits required for modification to traffic movements outside station's jurisdiction. Provide cones, signs, barricades, lights, or other traffic control devices and personnel required to control traffic. Brightly-colored (orange) vests are required for all personnel working in roadways. One lane of traffic may be closed to conduct daily work operations in the roadway. Lane closure shall be limited to seven consecutive days. Do not use foil-backed material for temporary pavement marking because of its potential to conduct electricity during accidents involving downed power lines.

1.08 ALTERATIONS

- A. Survey: Before any work is started, the Contractor shall make a thorough survey with the COR in which alterations occur and areas which are anticipated routes of access, and furnish a report, signed by both, to the Contracting Officer. This report shall list:
 - 1. Shall note any discrepancies between drawings and existing conditions at site.
 - 2. Shall designate areas for working space, materials storage and routes of access to areas where alterations occur and which have been agreed upon by Contractor and COR.

1.09 INFECTION PREVENTION MEASURES

- A. Implement the requirements of VAMC's Infection Control Risk Assessment (ICRA) team. ICRA Group may monitor dust in the vicinity of the construction work and require the Contractor to take corrective action immediately if the safe levels are exceeded.
- B. Establish and maintain a dust control program as part of the contractor's infection preventive measures in accordance with the guidelines provided by ICRA Group. Prior to start of work, prepare a plan detailing project-specific dust protection measures, including periodic status reports, and submit to COR for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

1. All personnel involved in the construction or renovation activity shall be educated and trained in infection prevention measures established by the medical center.
 2. It is the responsibility of the Contractor to provide TB training annually and a PPD test annually for any employees providing services at the VA Medical Center, Hampton, Virginia. We reserve the right to review the contractor's records.
- C. Medical center Infection Control personnel shall monitor for airborne disease (e.g. aspergillosis) as appropriate during construction. A baseline of conditions may be established by the medical center prior to the start of work and periodically during the construction stage to determine impact of construction activities on indoor air quality.
- D. In general, following preventive measures shall be adopted during construction to keep down dust and prevent mold.
1. Dampen debris to keep down dust.
- E. Final Cleanup:
1. Upon completion of project, or as work progresses, remove all construction debris from above ceiling, vertical shafts and utility chases that have been part of the construction.
 2. Perform HEPA vacuum cleaning of all surfaces in the construction area. This includes walls, ceilings, cabinets, furniture (built-in or free standing), partitions, flooring, etc.
 3. All new air ducts shall be cleaned prior to final inspection.

1.10 DISPOSAL AND RETENTION

- A. Materials and equipment accruing from work removed and from demolition of buildings or structures, or parts thereof, shall be disposed of as follows:
1. Reserved items which are to remain property of the Government are noted on drawings or in specifications as items to be stored. Items that remain property of the Government shall be removed or dislodged from present locations in such a manner as to prevent damage which would be detrimental to re-installation and reuse. Store such items where directed by COR.
 2. Items not reserved shall become property of the Contractor and be removed by Contractor from Medical Center.

1.11 PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS

- A. The Contractor shall preserve and protect all structures, equipment, and vegetation (such as trees, shrubs, and grass) on or adjacent to the work site. If any limbs or branches of trees are broken during contract performance, or by the careless operation of equipment, or by workmen, the Contractor shall trim those limbs or branches with a clean cut and paint the cut with a tree-pruning compound as directed by the Contracting Officer.
- B. The Contractor shall protect from damage all existing improvements and utilities at or near the work site and on adjacent property of a third party, the locations of which are made known to or should be known by the Contractor. The Contractor shall repair any damage to those facilities, including those that are the property of a third party, resulting from failure to comply with the requirements of this contract or failure to exercise reasonable care in performing the work. If the Contractor fails or refuses to repair the damage promptly, the Contracting Officer may have the necessary work performed and charge the cost to the Contractor.

(FAR 52.236-9)

- C. Refer to Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS, for additional requirements on protecting vegetation, soils and the environment. Refer to Articles, "Alterations", "Restoration", and "Operations and Storage Areas" for additional instructions concerning repair of damage to structures and site improvements.
- D. Refer to FAR clause 52.236-7, "Permits and Responsibilities," which is included in General Conditions. The VA holds a National Pollutant Discharge Elimination System (NPDES) permit. The Contractor has extensive responsibility for compliance with permit requirements. VA will make the permit available at the VAMC Hampton GEMS office.

1.12 RESTORATION

- A. Remove, cut, alter, replace, patch and repair existing work as necessary to install new work. Except as otherwise shown or specified, do not cut, alter or remove any structural work, and do not disturb any ducts, plumbing, steam, gas, or electric work without approval of the COR. Existing work to be altered or extended and that is found to be defective in any way, shall be reported to the COR before it is

disturbed. Materials and workmanship used in restoring work, shall conform in type and quality to that of original existing construction, except as otherwise shown or specified.

- B. Upon completion of contract, deliver work complete and undamaged. Existing work (lawns, paving, roads, walks, etc.) disturbed or removed as a result of performing required new work, shall be patched, repaired, reinstalled, or replaced with new work, and refinished and left in as good condition as existed before commencing work.
- C. At Contractor's own expense, Contractor shall immediately restore to service and repair any damage caused by Contractor's workmen to existing piping and conduits, wires, cables, etc., of utility services or of fire protection systems and communications systems (including telephone) which are indicated on drawings and which are not scheduled for discontinuance or abandonment.
- D. Expense of repairs to such utilities and systems not shown on drawings or locations of which are unknown will be covered by adjustment to contract time and price in accordance with clause entitled "CHANGES" (FAR 52.243-4 and VAAR 852.236-88) and "DIFFERING SITE CONDITIONS" (FAR 52.236-2) of Section 00 72 00, GENERAL CONDITIONS.

1.13 AS-BUILT DRAWINGS

- A. The contractor shall maintain two full size sets of as-built drawings which will be kept current during construction of the project, to include all contract changes, modifications and clarifications.
- B. All variations shall be shown in the same general detail as used in the contract drawings. To insure compliance, as-built drawings shall be made available for the COR's review, as often as requested.
- C. Contractor shall deliver two approved completed sets of as-built drawings to the COR within 15 calendar days after each completed phase and after the acceptance of the project by the COR.
- D. Paragraphs A, B, & C shall also apply to all shop drawings.

1.14 USE OF ROADWAYS

- A. For hauling, use only established public roads and roads on Medical Center property and, when authorized by the COR, such temporary roads which are necessary in the performance of contract work. Temporary roads shall be constructed by the Contractor at Contractor's expense. When necessary to cross curbing, sidewalks, or similar construction, they must be protected by well-constructed bridges.

- B. When new permanent roads are to be a part of this contract, Contractor may construct them immediately for use to facilitate building operations. These roads may be used by all who have business thereon within zone of building operations.

1.15 TEMPORARY TOILETS

- A. Provide (for use of all Contractor's workmen) ample temporary sanitary toilet accommodations with suitable sewer and water connections; or, when approved by COR, provide suitable dry closets where directed. Keep such places clean and free from flies, and all connections and appliances connected therewith are to be removed prior to completion of contract, and premises left perfectly clean.

1.16 AVAILABILITY AND USE OF UTILITY SERVICES

- A. The Government shall make all reasonably required amounts of utilities available to the Contractor from existing outlets and supplies, as specified in the contract. The Contractor shall carefully conserve any utilities furnished without charge.
- B. The Contractor, at Contractor's expense and in a workmanlike manner satisfactory to the Contracting Officer, shall install and maintain all necessary temporary connections and distribution lines. Before final acceptance of the work by the Government, the Contractor shall remove all the temporary connections, distribution lines, and associated paraphernalia.
- C. Electricity (for Construction and Testing): Furnish all temporary electric services.
 - 1. Obtain electricity by connecting to the Medical Center electrical distribution system. Electricity is available at no cost to the Contractor.
- D. Water (for General Construction and Testing): Furnish temporary water service.
 - 1. Obtain water by connecting to the Medical Center water distribution system. Provide reduced pressure backflow preventer at each connection. Water is available at no cost to the Contractor.
 - 2. Maintain connections, pipe, fittings and fixtures and conserve water-use so none is wasted. Failure to stop leakage or other wastes will be cause for revocation (at COR's discretion) of use of water from Medical Center's system.

1.18 FINAL ELEVATION DIGITAL IMAGES

- A. A minimum of four (4) images of each elevation shall be taken with a minimum 6 MP camera, by a professional photographer with different settings to allow the COR to select the image to be printed. All images are provided to the COR on a CD.
- B. Photographs shall be taken upon completion, including landscaping. They shall be taken on a clear sunny day to obtain sufficient detail to show depth and to provide clear, sharp pictures. Pictures shall be 16 by 20 inches, printed on regular weight paper, matte finish archival grade photographic paper and produced by a RA4 process from the digital image with a minimum 300 PPI. Identifying data shall be carried on label affixed to back of photograph without damage to photograph and shall be similar to that provided for final construction photographs.
- C. Furnish six (6) 16 by 20 inch color prints of Building 14 constructed under this project (elevations as selected by the COR from the images taken above). Photographs shall be artistically composed showing full front elevations. All images shall become property of the Government. Each of the selected six prints shall be place in a frame with a minimum of 2 inches of appropriate matting as a border. Provide a selection of a minimum of 3 different frames from which the COR will select one style to frame all six prints. Photographs with frames shall be delivered to the COR in boxes suitable for shipping.

1.19 HISTORIC PRESERVATION

Where the Contractor or any of the Contractor's employees, prior to, or during the construction work, are advised of or discover any possible archeological, historical and/or cultural resources, the Contractor shall immediately notify the COR verbally, and then with a written follow up.

1.20 HAZARDOUS MATERIALS

Where the Contractor or any of the Contractor's employees, prior to, or during construction work, are advised of or discover any possible hazardous material, the Contract shall immediately stop work in the area and notify the COR verbally, with a written follow-up.

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**SECTION 01 00 10
ADDITIONAL CONDITIONS**

PART I - GENERAL

1.01 DEFINITIONS

- A. The contract document consists of the AGREEMENT, the GENERAL CONDITIONS, SUPPLEMENTARY GENERAL CONDITIONS of the contract, the DRAWINGS and the SPECIFICATIONS, including all revisions hereto.
- B. The Owner, Architect, Consultant and the Contractor shall be indicated as such throughout these documents. The term Contractor as used herein shall designate the successful bidder to whom the roof contract is awarded.
- C. The term Owner shall be understood to be The Department of Veterans Affairs, Hampton, Virginia.
- E. The terms Owner's Representative shall be understood to mean the COR.

1.02 OWNER'S REPRESENTATIVE STATUS

- A. The Owner's Representative shall have general Rights of Inspection of the work and is the agent of the Owner in all matters pertaining to the work as provided in the Contract Documents. The Contracting Officer has the authority to stop work whenever such stoppage may be necessary to ensure the proper execution of the contract. The Owner's Representative shall have authority to reject any and all materials, whether worked or unworked, if such materials are not in accordance with the plans and specifications.

1.03 CONDITION OF SITE

- A. In considering the bids, the Owner will assume that the bidders are aware of all items, pertinent to their work and have made allowance for same in their bids.

1.04 VERIFICATION OF DIMENSIONS AND ELEVATIONS

- A. Dimensions and elevations indicated on the drawings in reference to existing structures or utilities are the best available data obtainable but are not guaranteed by the Owner, Architect, or Owner's Representative nor is the Owner's Representative responsible for their accuracy. If any work is performed by the Contractor or any of his/her sub-contractors prior to adequate verification or applicable data, any resultant extra cost for adjustment of work as required to conform to

existing limitations, shall be assumed by the Contractor without reimbursement or compensation by the Owner.

1.05 PROTECTION OF OWNER'S OPERATIONS

- A. The Contractor shall erect such barriers, tarpaulins, doors, etc., as may be necessary to protect the Owner's operations while work is in progress. Any such openings that are essential to carrying on the work shall be securely closed by the Contractor when not in use to protect the Owner's operations.
- B. The Contractor shall maintain water tight integrity of all roof areas during demolition and construction phases of this project. All through deck penetrations and exposed roof framing members shall be bedded with roof cement and sealed with hot asphalt.

1.06 PROTECTION OF WORK AND PROPERTY

- A. The Contractor shall maintain adequate protection of all his/her work from damage and shall protect the Owner's and adjacent property from injury or loss arising from this contract. He/she shall provide and maintain at all times any danger signs, guards and/or obstructions necessary to protect the public and his/her workmen from any dangers inherent with or created by the work in progress. He/she shall hold the Owner harmless from any loss arising due to injury or accident to the public or his/her workmen, or from theft of materials stored at the job site. All materials will be stored in locations other than on roof surfaces except as necessary and shall then be placed on plywood or other type of material to protect the roof surface at all times.
- B. Before starting any work, the Contractor shall protect all grounds, copings, paving and exterior of all buildings where work will be performed.
- C. In those areas where materials and/or hot asphalt will be raised to the roof area, a protective covering shall be placed from the base of the wall extending up and over the top edge of the roof. This coverage shall be wide enough to assure that the exterior walls do not become stained or soiled during roofing operations.
- D. Any areas of the building or grounds which have become stained or damaged in any way shall be repaired or replaced by the Contractor prior to the final inspections. The method of repair used must be acceptable to both the Owner and the Owner's Representative.

1.07 MATERIAL STORAGE AND CLEAN-UP

- A. The Contractor shall keep the premises free from rubbish at all times and shall arrange his/her material storage so as not to interfere with the Owner's operations. At the completion of the job, all the unused material and rubbish shall be removed from the site. The ground shall be raked clean and the building shall be broom cleaned. If the Contractor refuses at any time to remove his/her debris from the premises, or to keep the working area clean, such cleaning will be completed by the Owner and deducted from the balance due the Contractor. The Contractor shall also remove drippage of bitumen or adhesive from all walls, windows, floors, ladders and finished surfaces. Failure to do so will result in the work being done by others and the cost shall be deducted from the balance due the Contractor. After twenty-four (24) hours of written notice by the Owner, the Owner shall back charge prime contractor for cleaning at a rate of not less than \$80.00 per man hour.
- B. Materials must be delivered with manufacturer's label intact and legible. Labels must be affixed to the outside of the package stating the type of product, name and address of the manufacturer. All materials shall be stored and protected against weather, vandalism, and theft. Any materials found to be damaged or missing shall be replaced by the Contractor at no cost to the Owner.

1.08 INSPECTION OF WORK

- A. Where the drawings or specifications require the inspection and approval of any work in progress by the Owner's Representative, the Contractor shall give that Representative ample notice to allow for scheduling the inspection, which shall be made promptly to avoid delay of work. If work has progressed without the required inspections or approval by the Representative, it shall be uncovered for inspection at the Contractor's sole expense.
- B. Uncovering of work not originally inspected, or uncovering questioned work may be ordered by the Owner's Representative and it shall be done by the Contractor. If examination proves such work to be incorrectly done or not done in accordance with the plans and specifications, the Contractor shall bear all cost of the reexamination. If the work is proven correctly installed, all such expense shall be born by the Owner.

1.09 INSPECTION OF WORK IN PROGRESS AND UPON COMPLETION

- A. If directed by the Owner's Representative, the Contractor shall cut not more than four (4) cores, of approximately 200 square inches each, from every newly constructed roof area, in order to establish the amount of materials used per square foot, and shall restore all such areas to sound and watertight conditions as prior to the core testing.
- B. In the event that such core cuts disclose any deficiency in materials, or soundness of construction, the Contractor shall, at his/her own expense, apply additional materials or otherwise correct the deficiencies to the satisfaction of the Owner's Representative.
- C. Noncompliance with the terms of this specification and ensuing contract can result in either the cancellation of the contract, or complete replacement of the defective areas at the Contractor's expense. In the event of cancellation, the Owner will not be obligated to compensate the Contractor for any work undertaken in a defective manner.
- D. Damages caused by water infiltration resulting from the failure of the Contractor to secure each day's work in a weather tight manner, will be corrected at the Contractor's sole expense. Included as damages will be all labor costs incurred by the Owner as a result of such water infiltration.
- E. The Owner will require the Owner's Representative to examine the work in progress, as well as upon completion, in order to ascertain the extent to which the materials and procedures conform to the requirements of these specifications and to the published instructions of the Manufacturer. Where the specifications and details are more stringent than the published instructions of the Manufacturer, the specifications shall be enforced and the Contractor shall perform all work as specified. The Consultant shall make the final decision as to how the work shall be installed and detailed.
- F. The authorized Owner's Representative shall be responsible for:
 - 1. Keeping the Owner informed on a periodic basis as to the progress and quality of the work;
 - 2. Calling to the attention of the Contractor those matters he/she considers being in violation of the contract requirements;
 - 3. Reporting to the Owner any failure or refusal of the Contractor to correct unacceptable practices;
 - 4. Conducting preliminary and subsequent job-site meetings with the Contractor's official job representative;

5. Supervising the taking of test cuts, and overseeing the Contractor's restoration of such areas;
 6. Rendering any other inspection services which the Owner may designate;
 7. Certifying, after completion of the work, the extent to which the Contractor has complied with these specifications as well as to the published instructions of the Roof Systems Manufacturer.
 8. The owner, at their sole discretion may require moisture surveying of any completed or partially completed roof section by means of Infra-Red Imaging as well as destructive core cut confirmation analysis. These moisture surveying services shall be performed by REDCO and if sub-surface moisture is found, the Contractor shall bear the cost of the survey and core cut analysis as well as be required to replace all areas where sub-surface moisture is detected. If no subs-surface moisture is detected, the owner shall bear the cost of the moisture survey and core cut analysis.
- G. The presence and activities of the Owner's Representative/Consultant shall in no way relieve the Contractor of his/her contractual responsibilities.

1.10 MISCELLANEOUS UTILITIES

- A. Electrical power will be furnished by the Owner for small tools only. All connections to the electrical system will be furnished by the Contractor.
- B. All fees, permits, meters, hook-ups and associated costs for water usage for the mixing and application of lightweight insulating concrete shall be the sole responsibility of the Contractor. Water for concrete, mortar, washing and drinking purposes will be furnished by the Owner. Any connections to the water system shall be completed by the Contractor.
- C. At the completion of the work, or when the above connections are no longer required, the Contractor shall remove all connections and leave the facilities in a condition at least as satisfactory as prior to the commencement of his/her work.
- D. Toilet facilities will be provided by the Contractor. The Contractor will be responsible for supplying a portable toilet on the job-site. The Contractor's personnel are not permitted to enter the building without proper authorization from the Owner or Owner's Representative.

1.11 CHANGES OR EXTRA WORK

- A. The Owner may, without invalidating the original contract, order such changes or additions as may from time to time be deemed desirable. In so doing, the contract price shall be adjusted, as stated below, with all work being done under the conditions of the original contract except for such adjustments in extension of time as may be acceptable to the Owner. The value of such extra work shall be determined in one of the following ways:
1. By firm price adjustment;
 2. By cost plus with a guaranteed maximum;
 3. By cost with a fixed fee; or
 4. By unit cost.
- B. If agreement is reached that the extra cost shall be handled as per methods 2, 3, or 4, the Contractor shall keep and compile a correct amount of the cost together with such vouchers, etc., as may be necessary to substantiate same for presentation to the Owner. The Owner's Representative shall have authority to make minor job changes or additions as may be necessary to expedite the job providing such changes do not involve additional material cost. No major change or addition shall be made except upon receipt by the Contractor of a signed order from the Owner authorizing such a change. No claims for an extra to the contract price shall be valid unless so authorized.
- C. All work covered by unit prices submitted by the Contractor in his/her proposal must be covered by a written work order. The Owner's Representative will prepare the work order in triplicate covering the quantity of work and the total cost of the work. The work order which will be written at the end of the each day will be signed by the Owner's Representative and the Contractor's foreman and/or superintendent.

1.12 CORRECTION OF WORK PRIOR TO FINAL PAYMENT

- A. The Contractor shall promptly remove any work that does not meet the requirements of the plans and specifications or is incorrectly installed or otherwise disapproved by the Owner or the Owner's Representative as failing to meet the intent of the plans and specifications. The Contractor shall promptly replace any such work without expense to the Owner and shall bear the cost of making good all

work of other contractors, or the Owner, destroyed or damaged by such removal or replacement.

1.13 CORRECTION OF WORK AFTER FINAL PAYMENT

- A. The Contractor shall guarantee all materials and workmanship for one (1) year from date of final payment of the contract by the Owner. Any defects which may arise during this period shall be promptly repaired by the Contractor including any damage done to the Owner's property due to such defects.

1.14 DEDUCTION FOR UNCORRECTED WORK

- A. If the Owner deems it unacceptable to have the Contractor correct work which has been incorrectly done, a deduction from the contract price shall be agreed upon therefore. Such a deduction from the contract price shall in no way affect the Contractor's responsibility for defects which may occur nor his/her ability for correcting them, and damage caused by them.

1.15 LIENS

- A. The Contractor shall, if required by the Owner, furnish him/her with a release in full of all liens arising out of this contract or in lieu thereof, and receipts in full for all materials and labor on the job. In either case, the Contractor shall furnish an affidavit that the liens or receipts include all the labor and material for which a lien could be filed. In lieu of the above, the Contractor may at his/her option furnish a bond to indemnify the Owner against all hazards of liens. Neither part nor final payment shall in any way release the Contractor from the above obligation and in the event that part or full payment has been made and any lien remains un-discharged, the Contractor shall refund to the Owner the necessary funds to discharge such a lien including all cost and attorney's fees.

1.16 JOB CONDITIONS

- A. All surfaces to be covered shall be smooth, dry, and free from dirt, debris, and foreign material before any of this work is installed. Pumping equipment shall be located on the ground at a safe distance from building; the location being subject to the approval of the Owner and Consultant. The Contractor shall be responsible for guarding against fires, and shall provide suitable fire extinguishers conveniently located at the site. Competent operators shall be in attendance at all times equipment is in use. Materials shall be stored

neatly in areas designated by the Owner and dispersed so as to present a minimum fire hazard. Loads placed on the roof at any point shall not exceed the safe load for which the roof is designed.

- B. There is NO tobacco use allowed on the Owner's property, including but not limited to: snuff, chewing tobacco, cigars, cigarettes, and pipes, and the Contractor shall be responsible for enforcement of this job rule at all times with his/her personnel. Violators are subject to expulsion from the Owner's premises for the duration of the project.
- C. The Contractor should be aware of Owner's property when tearing off the existing roof. This is required for removal of dirt, silt, debris, roof membrane and insulation from the roof surface in order to preserve the ecology, eliminate unsightly conditions and protect building surfaces. Specific locations will be discussed at the pre-construction conference.
- D. Rolled Roofing Materials: All rolled roofing materials must be stored standing on end on a pallet or otherwise raised off of the roof. The materials are to be covered in a proper manner to assure that they will not become wet prior to application. Any materials that become wet or damaged must be removed from the job-site and replaced at the Contractor's expense.
- E. Asphalt Kettle: Placement of the kettle (If one is used) shall be in a position so as not to interfere with the ongoing operations of the Owner. The asphalt to be used must be placed on a protective covering of some type until it is raised to the roof. A minimum of two (2) fire extinguishers and "Fire Out" must be adjacent to the kettle.
- F. Ladders: Any ladders used on this project must be in good condition. The ladder must also be secured at the roof line at all times while in use. All ladders must be O.S.H.A. approved.
- G. No drugs or alcoholic beverages are permitted on the grounds.
- H. The Contractor shall place necessary barriers and/or protection around or under all work areas where his/her operations involve risk of injury to plant personnel.
- I. The Contractor will also protect the building structure from damage in the process of the job. In the event that damage does occur to any property or equipment, or the Owner's work in process, notification must be made within two (2) working days of the incidents to the Owner and Owner's Representative.

During the progress of the job, if waste material and rubbish are found or damage resulting from the Contractor's operations is found, or the Contractor does not comply with the requirement by keeping the premises free of accumulations of rubbish and debris and correct the damage, it shall be the Owner's prerogative to hire personnel to do so; and the cost of this work will be deducted from the balance due the Contractor.

- K. Existing roof top equipment walls, windows, etc. shall be completely protected by masking or other effective methods. Any mastics or asphalt must be cleaned off metal surfaces.
- L. The Contractor is responsible for protecting all materials from the elements. If any material, such as insulation, becomes wet, it cannot be installed and must be replaced at the Contractor's sole expense.
NOTE: Insulation and rolled roofing materials must be covered with waterproof tarps at the end of each work day. Plastic wrappers supplied by the insulation manufacturer are not acceptable substitutes for tarps. The Owner's Representative will reject any covering method or material which does not adequately protect roofing materials.
- M. Anyone guilty of willful destruction or unlawful removal of company property will be dismissed from the job and is subject to prosecution by law.
- N. Any lawns damaged by Contractor vehicles will be restored with a stand of grass at the Contractor's expense. Any damaged pavements or over ground/underground utilities will likewise be restored and at the Contractor's sole expense.
- O. The Contractor must verify that all materials can be installed to accommodate the building design, pertinent codes and regulations, and the manufacturer's current recommendations.
- P. The Contractor will ensure that all substrates are clean, dry, sound, smooth, and free of dirt, debris, and other contamination before any materials are supplied.
- Q. Any isolated areas that must be torn off and replaced will be built-up to the height of the existing roof prior to the installation of the new roofing membrane system.

1.17 WORKMANSHIP

- A. All materials will be securely fastened and placed in a watertight, neat and workmanlike manner. All workmen shall be thoroughly experienced in the particular class or work upon which they are

employed. All work shall be done in accordance with these specifications and shall meet the approval of the Owner and Owner's Representative. The Contractor's representative or job supervisor shall have a complete copy of specifications and drawings on the job-site at all times. If the Contractor's representative or job supervisor does not have a complete copy of the specifications and drawings on the job-site, the work will be stopped until a complete copy of the specifications and drawings is on the job-site.

- B. Contractor shall plan and conduct the operations of the work so that each section started on one day is complete and thoroughly protected before the close of work for that day.

1.18 ROOF DECK

- A. Contractor shall notify the Consultant of any unforeseen areas of unsuitable or damaged roof decking. Where the damage is serious and extensive, it will be the Consultant's prerogative to authorize removal and replacement of deteriorated decking. Where damage to the roof deck is found, the Contractor shall remove and replace unsuitable materials at the listed unit price for removal and replacement or repair of the damaged deck, listed on the bid form submitted by the Contractor.

B. HOT WORK OPERATIONS:

1. Hot Work:

- a. Hot work includes, but is not limited to, open flames and spark producing operations, welding, cutting, grinding, roof torches, etc.

2. Hot Work Permits:

- a. The Contractor shall be responsible for all hot work and hot work monitoring. The Contractor shall be responsible for coordinating hot work with the COR.
- b. Hot work shall not be initiated until written approval from the Architect has been provided to the Contractor.
- c. The Contractor shall be responsible for complying with the NRCA/CERTA program, and ensuring all required precautions are met.
- d. The Contractor shall be responsible for the hot work operations of their subcontractors, and shall monitor hot work operations conducted by their subcontractors.

3. Work Area:

- a. The Contractor shall inspect conditions listed on the Hot Work Permit, and as required.
 - b. The Contractor shall be responsible for inspecting the work area prior to beginning work. The Contractor shall notify the Architect of unsatisfactory conditions, and ensure conditions are satisfactory to proceed with work.
 - c. Where roofing torch application is specified, and fire safe conditions cannot be assured by the Contractor, the Contractor shall notify the Architect, Owner and the Manufacturer immediately to develop alternate methods of roofing material application to ensure fire prevention. Roofing operations shall not proceed when unsafe conditions are found.
 - d. The Contractor shall seal all building openings to prevent flames or burning debris from entering concealed spaces and building interior. All openings, roof deck joints, curbs, ducts, etc. shall be stripped or otherwise sealed and protected. Wood materials shall be protected as required to eliminate direct flame exposure from torch. Alternate methods of application are encouraged where fire prevention measures cannot be fully assured by the Contractor.
 - e. The Contractor shall disconnect air handling equipment in the hot work area as required to prevent smoke and flames from being pulled into the building and equipment. This shall be coordinated in advance with The Architect before disconnecting equipment.
 - f. The Contractor shall remove all other combustibles from the hot work area. Remove all solvents, roofing adhesives, roofing cement, and all other flammable liquids from the hot work area.
4. Fire Watch:
- a. The Contractor shall provide fire watch personnel to closely monitor and inspect the work area and adjacent areas for fires, smoldering materials, hot surfaces and smoke.
 - b. The Contractor shall inspect and monitor the inside areas where hot work is being conducted, as well as any concealed areas between the roof deck and ceiling during and after hot work.
 - c. The Contractor shall monitor conditions for the period of time specified by the Hot Work Permit, and as conditions dictate. The work area and adjacent areas shall be closely monitored by the

Contractor for no less than one after hot work has ceased. The time period shall be recorded by the Contractor.

- d. The Contractor shall provide designated fire watch personnel to monitor interior conditions and exterior conditions during, and after, hot work operations.
 - e. The Contractor shall be responsible for properly training and instructing fire watch personnel of their responsibilities and duties.
 - f. Fire watch shall meet The Architect requirements as dictated by the Hot Work Permit Program.
 - g. Contractor shall monitor the work area and building interior, and coordinate monitoring with The Architect during roofing torch operations. Contractor shall ensure proper hot work procedures are maintained in all curbs, ducts, concealed spaces and building interior.
5. Roofing Torch Training:
- a. Roofing torch operators shall be trained in accordance with the current published requirements of the Certified Roofing Torch Applicator (CERTA) Program or accepted equivalent training. The CERTA Training Program may be obtained from NRCA/MRCA, 10255 W. Higgins Rd. Suite 600, Rosemont, IL 60018-5607.
 - b. When required by the Owner during work, the Contractor shall be able to produce documentation indicating the torch operators have up to date certifications and training. The lack of such documentation will require untrained personnel to be replaced with trained personnel.
6. Roofing Torch Equipment:
- a. Torches shall not have pilot flames. The torch flames shall go out when the trigger is disengaged Torches shall be of the "dead-man" type "trigger on/trigger off operation."
 - b. Equipment, valves, regulators, tanks, hoses and all associated equipment shall be properly stored and handled, and maintained as required by the respective equipment manufacturer and other applicable requirements.
7. Fire Prevention and Fire Safety:
- a. Fire prevention and fire safety shall be the Contractor's responsibility. Contractor shall be responsible for developing a

pre-fire emergency plan, coordinated with The Architect to plan for fire emergencies.

- b. It is the responsibility of the Contractor to enforce fire safety precautions and to ensure safety measures are followed at all times by the Contractor's and Subcontractor's personnel.
- c. Contractor shall be responsible for maintaining sufficient fire suppression equipment, including fire extinguishers and a water hose that can reach all areas of the roof and work areas.

1.19 OWNER'S RULES

- A. The Contractor and all his/her personnel/agent(s) shall abide by all owners' rules, as specified in the contract documents and / or in owner's policies and / or procedures currently or established during the term of this contract.
- B. The Contractor shall properly notify all employees of conditions relating to roof areas with very poor condition and which will be worked on. After such notification, the Contractor must take all necessary precautions to ensure the safety of his/her employees as well as the building personnel.

1.20 SAFETY

- A. Contractor shall conform to requirements as designated by the United States Federal Government (O.S.H.A.). Contractor shall abide by all regulations as outlined in the O.S.H.A. handbook and shall have a handbook on location at all times. Contractors hereby acknowledged that they and their workers have undergone Safety Training and shall at all times act in compliance with all NRCA recommended safety compliance rules and regulations.

1.21 WORK HOURS AND DAYS

- A. When the bid is awarded, the Contractor will contact the Owner's Representative to arrange the work schedule and the hours of the day that the workmen may be on the building. The job is to be bid under the assumption that all work will be performed in such a manner as to complete the project by the date indicated in the specifications, without disruption of the normal operation of the facility.

1.22 COMPLIANCE WITH LAWS

- A. The Contractor shall give notices, pay all fees, permits and comply with all laws, ordinances, rules and regulations bearing on the conduct of work.

1.23 SAFETY AND ECOLOGY

- A. The Contractor(s) shall conform to the requirements as designated by the United States Federal Governments (e.g., O.S.H.A.).

PART II - INSTRUCTIONS TO BIDDERS

2.01 QUESTIONS

- A. If the Contractor feels a conflict exists between what is considered good roofing practice and these specifications, he/she shall state in writing all objections prior to submitting quotations.
- B. It is the Contractor's responsibility, during the course of the work, to bring to the attention of the Owner's Representative any defective membrane, insulation or deck discovered which has not been previously identified.

2.03 RESPONSIBILITY FOR MEASUREMENTS AND QUANTITIES

- A. The Bidding Contractors shall be solely responsible for all accuracy of all measurements and for estimating the material quantities required to satisfy these specifications.

2.04 DISCREPANCIES AND ADDENDA

- A. Should a Bidder find any discrepancies in the Drawings and Specifications, or should he be in doubt as to their meaning, he/she shall notify the Owner's Representative at once, who will send a written Addendum to all Bidders concerned. Oral instructions or decisions, unless confirmed by Addenda, will not be considered valid, legal or binding.
- B. No extras will be authorized because of the Contractor's failure to include work called for in the Addenda in his/her bid.
- C. It shall be the responsibility of all Bidders to call to the Owner's Representative's attention prior to bid opening, any discrepancies which may exist between or with any of the contract documents, or any questions which may arise as to their true meaning.
- D. Modifications to the specifications (if necessary) will be followed by an addendum; no verbal discussions or agreements shall be recognized.

2.05 COMPETENCY OF THE BIDDER

- A. To enable the Owner to evaluate the competency and financial responsibility of a Contractor, all Bidders shall submit with his/her bid package, the required Roof System Manufacturer's Approved Applicator Agreement Letter.

2.07 WARRANTY

- A. A written warranty which will commence from date of acceptance by Manufacturer must be supplied with the roof installation. This warranty will cover all defects in workmanship and materials. This warranty shall be for a period of Twenty -Years (20 Years), having a No Dollar Limit (NDL) for labor and materials necessary to repair or replace any defective roofing materials, insulations, flashings, structural supports for metal roofing and edge metals. Damages caused by storm, vandalism and other trades are not included in the warranty. This warranty shall be from the roof systems manufacturer (See further, Statement of Policy).
- B. A one (1) year workmanship warranty is required from the Contractor to both the Owner and the Roof System Manufacturer for any and all necessary repairs, replacements as well as all remedial maintenance done under the terms of this contract.

2.08 START AND COMPLETION DATE

- A. Work may begin upon issuance of notice to proceed. Work shall be completed by prior to the deadline established in the Invitation to Bid.
- B. All work as required in these specifications and drawings shall be completed by the completion date as indicated in these specifications.
- D. The Contractor is responsible for supplying trained workmen in proper numbers and for scheduling and laying out his/her work, so that it will be started and completed in a professional manner within the time period indicated on his/her Proposal Form.
- E. If the Contractor sets equipment or materials onto the job-site without commencing work immediately, the action will be considered "Spiking the job" which is unacceptable and will be considered a breach of contract by the Contractor; thereby, the contract will be terminated and the Contractor at no cost to the Owner, must remove his/her equipment and possessions from the job-site upon notification by the Owner.

2.09 PAYMENT

- A. Payment request shall be in accordance with the Owner's procurement policies and this specification. All requests for payment shall be in triplicate, itemized and presented to REDCO for review and approval. Approved payment request shall be forwarded to the owner for payment.

PART III - CONTRACTOR'S INSTRUCTIONS

3.01 SPECIAL NOTICE TO CONTRACTORS:

- A. The attention of the bidder is invited to the provision of Chapter II of Title, 54.1 of the Code of Virginia regulating the practice of general contracting under which it will be necessary for the bidder to show evidence of certificate of registration as provided by said code.

3.02 TAXES

- A. Contractor must comply with all state, federal and local taxes. The Contractor shall accept sole and exclusive responsibility for any and all state and federal taxes with respect to Social Security, old age benefits, unemployment benefits, withholding taxes and sales taxes.

3.03 CONTRACTOR'S LICENSE

- A. All pertinent state and local licenses will be required.

3.04 QUALIFICATION OF BIDDERS

- A. Provide Manufacturer's Authorized Applicator Agreement Letter with Bid Documents.

3.05 BUILDING PERMITS

- A. The acquisition of the applicable permits will be the responsibility of the successful Contractor. Contractor is to supply permits for but not limited to the following trades: Roofing, Asbestos Abatement and Removal, Plumbing, Carpentry, Mechanical and Electrical work.

3.06 JOB COORDINATION

- A. Contractor is responsible for daily communication with the Owner or Owner's Representative relating to areas of roof work in order that the Owner may adequately protect tenant's personal belongings, and the people themselves against possible damage or injury. Contractor is also responsible for policing and protecting areas involving removal and replacement of roof projections, defective decking or other work involving deck penetration.
- B. Twenty-four hours prior to starting of the project and/or delivery of materials, the Contractor shall notify the COR

3.07 CLEAN-UP

- A. Accumulated debris shall be removed daily to assure maximum safety and sanitation at all times. At completion of work, the Contractor shall remove all excess material and debris from the site and leave all roof surfaces free from accumulations of dirt, debris and other extraneous

materials. The Contractor shall also remove any and all dripage of bituminous materials from the face of the buildings, floor, window, ladders and other finished surfaces.

3.08 SUPERINTENDENT

- A. The Contractor shall keep a competent English Speaking superintendent, satisfactory to the Owner and Consultant, on the job at all times when work is in progress. The superintendent shall have a minimum of three years documented experience in the installation of the specified roofing and insulation system. The Contractor shall provide documentation of the superintendent's experience to the Consultant at the Pre-Construction Meeting. The superintendent shall not be changed without notifying the Owner and Consultant. If the superintendent is changed, the same qualification process will be required of the new superintendent.
- B. The superintendent shall be responsible for the conduct of all the Contractor's employees on the premises and shall promptly take necessary measures to correct any abuses called to his/her attention by the Owner or Consultant.

3.09 INSPECTIONS

- A. Before any material applications are made, the Owner or the Owner's Representative and the Material Manufacturer's Technical Representative (not the Materials Manufacturer's Sales Representative) shall be available to ensure a complete understanding of the specification.
- B. The accepted Material Manufacturer will have a Technical Representative who is a full time employee of the Material Manufacturer (not the Materials Manufacturer's Sales Representative) on site a minimum of every other week during the project to verify compliance with the specifications, answer questions that may arise and provide on-going inspection services. This representative must make his/her weekly inspection date/time known to the Consultant 24 hours prior to arrival at the jobsite and report findings to the Consultant.
- C. A final inspection shall be conducted by Owner, Contractor, and the Consultant and Manufacturer's Technical Representative upon being notified of completion of specified work and clean-up.

PART IIII - STATEMENT OF POLICY

4.01 GUARANTEES

- A. A roofing guarantee is available for review from the Material Manufacturer for the roofing systems published in these specifications. The guarantee will be issued only upon completion of all the guarantee requirements by an approved Contractor. Such guarantees cannot be altered or amended, nor may any other warranties, guarantees or representations be made by an agent or employee of the Material Manufacturer unless such alteration, amendment or additional representation is issued in writing and is signed by a duly authorized officer of the Material Manufacturer, and sealed with the Material Manufacturer seal.
- B. The Contractor will warranty the roof to the Owner and Material Manufacturer for a period of one (1) year. The Contractor will inspect the roof with the Owner and Owner's Representative and Material Manufacturer's Technical Representative 18 months after completion, and, at the Contractor's expense, correct any workmanship defects before the 24th month following completion of the project.

4.02 APPROVED CONTRACTORS

- A. The roof systems shall be applied only by those Contractors who have received written approval from the Material Manufacturer for such installations. Contractors shall provide with their bid, a Roofing System Manufacturer's Approved Applicator Agreement Letter. This Manufacturer's Approved Applicator Agreement Letter must show the Contractor to have a minimum of four years approval by the Manufacturer and the Manufacturer's Approved Applicator Agreement must include the date of the Contractor's Approved Applicator status. This agreement shall be signed by an Officer of the Roof System Manufacturer, not signed by a Roof System Manufacturer's Sales Representative or Sales Agent. The Contractor shall provide proof that the Manufacturer's Roof Systems as specified in this document have been installed by the Contractor that are a minimum of three years old. No portion of the Roofing System or Roofing Insulation (except for the installation of Lightweight Insulating Concrete Insulation Systems if used), Flashings, Terminations, Wall Coverings, Nailers, Copings or Edge Metal Applications shall be sub-contracted. All roofing related work shall be performed by the Contractor and their full time employees only. All Plumbing, Mechanical and Electrical work shall be performed by

licensed, qualified, competent firms specializing in the specified scope of work.

4.03 ROOFING SEQUENCE

- A. Phase roofing is not acceptable for any reason for hybrid modified bitumen roofing system installation that is, roof systems employing non-waterproof fiberglass felts mopped to the insulation in a two or three ply configuration to be used as the underlayment for the modified bitumen cap sheet. Any insulation or base layers laid in any one day must be covered with the properly installed roof system that same day. Failure to do so will constitute a violation of the specification requirements and resulting in removal and replacement of the new roofing system at the Contractor's sole expense. Phase roofing may be considered for two ply modified bitumen systems which employ a single, waterproof polymer modified base sheet used as the underlayment for the modified bitumen cap sheet may, at the sole discretion of the Consultant. The roofing sequence of roof areas to be replaced shall be outlined to the Contractor at the pre-construction meeting.

4.04 ACCEPTABILITY OF COMPLETED WORK

- A. The acceptability of completed roofing work will be based on its conformance to the contract requirement. The Consultant, Owner and Material Manufacturer are not obligated to accept non-conforming work, and such non-conforming work may be rejected. The rejected work shall be promptly replaced or corrected in a manner and by methods approved by the Consultant and Material Manufacturer at the Contractor's sole expense. The Consultant and the Material Manufacturer will instruct the Contractor's foreman and work crew on the proper methods of installation of the roofing system, and will follow-up on a regular basis to inspect the work being done. Any deficiencies from the specified work noted by the Material Manufacturer will be immediately reported to the Consultant, along with recommended corrective actions necessary. The Consultant, Material Manufacturer or Owner shall not act in a supervisory capacity, and will not be responsible for the Contractor's errors or omissions.

- - - E N D - - -

**SECTION 01 09 00
STANDARDS**

PART I - GENERAL

1.01 Related Documents

- A. The provisions of the Contract, the General Conditions, the Supplementary Conditions and Division I Specifications Sections, apply to the work in this section.

1.02 Industry Standards

- A. Applicable standards of the construction industry have the same force and affect (and are made a part of the contract Documents by reference) as if copied directly or bound herewith.

AIA	American Institute of Architects 1735 New York Avenue, N. W. Washington, D.C. 29996
ASTM	American Society for Testing and Materials 1916 Race Street Philadelphia, Pennsylvania 19103
FM	Factory Mutual Engineering Corporation 1151 Boston-Providence Turnpike Norwood, Massachusetts 02062
NRCA	National Roofing Contractor's Association 8600 Bryn Mawr Avenue Chicago, Illinois 60631
SMACNA	Sheet Metal and Air Conditioning Contractors National Association P.O. Box 70 Merrifield, Virginia 22116
UL	Underwriters Laboratories 333 Pfingsten Road North Brook, Illinois 60062

1.03 Overlapping and Conflicting Requirements

- A. Where compliance with two (2) or more industry standards, or sets of requirements are specified, and overlapping of those different standards or requirements establishes different or conflicting minimums or levels of quality, the most stringent requirement which is generally recognized to be also most costly) is intended and will be enforced, specifically detailed language written into contract documents (not by way of reference to an industry standard) clearly indicates that a less stringent requirement is to be fulfilled. Refer apparently-equal-but-different requirements, and uncertainties as to which level of quality is more stringent, to the Consultant for a decision before proceeding.

- - END - -

SECTION 01 11 00
SUMMARY OF WORK

PART I - GENERAL

1.01 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.

1.02 PROJECT IDENTIFICATION

- A. The project name shall be "Selective Roof Replacement Project, Building 110" as shown in the contract documents.

The project is located at Building 110 Department of Veterans Affairs, Hampton, Virginia

1.03 WORK INCLUDED

- A. The work covered by this contract shall include, but is not limited to the following:
- B. For selected roof areas, remove existing roofing system consisting of but not limited to roofing membranes, gravel, membrane flashings, insulations, edge metal, terminations. Examine existing roof deck and bring to the Consultant's attention any defective, deteriorated or unsuitable roof decking. Examine existing wood blocking at curbs, penetrations and perimeters and replace any unsuitable blocking with new blocking as per specifications and details. Raise all penetrations and curbs and sleeper curbs to be a minimum of 8" above finished roof surface.
- C. The Contractor shall provide a Masonry Professional who shall remove brick and replace with new to repair openings left by the removal of the existing through wall flashings, installing new through wall flashings, installation of new overflow roof scuppers, repairing per Brick Industry Association Requirements and Guidelines and per Specifications and Details. New brick must match existing and surrounding brick.
- D. For selected roof areas: Provide and install new insulation system, nailers to match new insulation heights as per specifications and drawings. Provide and install new specified Modified Bitumen Membrane Roofing System with specified new (PMMA) Poly Methyl Methacrelate fully

reinforced liquid resin membrane flashings and terminations, per specifications and detail drawings. Provide and install new schedule 80 PVC conduit for all mechanical and electrical through deck lines, per specifications and detail drawings. Provide and install new gypsum roof board, new through wall flashings, new roof overflow scuppers, new coping caps, new roof drains and new curb caps per specifications and detail drawings.

- E. The Contractor shall provide licensed, professional mechanical, electrical and plumbing contractors to perform all mechanical, electrical and plumbing disconnects and reconnects and re-routing. Provide all Crane Service, Electrical and Mechanical Disconnects and Reconnects as required to lift and reinstall existing HVAC units where necessary. Provide and install new sleeper curbs for all HVAC units on wood sleepers or fibrous blocks, per specifications and drawings.

Provide and install new .050 aluminum counterflashing extensions, counterflashings, new .050 aluminum fascia, overflow scuppers and flanges, HVAC counterflashing and coping cap flashings, new .063 aluminum continuous cleats, fasteners, membrane, sealants, terminations, wood blocking, per specifications and details. Provide and install new 26 gauge stainless steel through wall counterflashing at wall areas as shown on drawings. Provide masonry professional to perform all required masonry removals and replacements per specifications and details.

- F. For all roof areas, clean and paint with rust inhibiting paint, all pipe penetrations, existing roof top ventilators, roof top ventilator hoods per specifications and drawings.

- G. Provide and install new cast iron clamping rings, new stainless steel clamping ring bolts and washers and new drain strainers for all existing roof drains.

1.04 GENERAL ROOFING NOTES

- A. The Roofing Contractor should fully understand that the Work includes the use of manufacturer's certified/approved installers (roofers) in order to obtain long term manufacturer's guaranty.
- B. The division of Work among the various trades or subcontractors (if any) necessary and the coordinating of the total Work is the Contractor's responsibility.

- C. The Roofing Contractor shall field verify existing dimensions and conditions as indicated on drawings.
- D. Confine movements on Owner's property to areas designated at the pre-construction conference.
- E. Materials are shown layered for clarity. Treatments are continuous. Materials are new unless otherwise indicated.
- F. Principle openings through roof may not be shown. Contractor shall provide new flashings, curbs, etc., throughout to complete roof system.
- G. Once a particular treatment is noted on a Detail or Roof Section, it will not be repeated on subsequent Details and Roof Sections.
- H. New curbs shall be wood-faced.
- I. Curb heights shall be 8" minimum from top of membrane to top of curb. Provide additional nailers to curbs under 8". Curb tops shall be level.
- J. Fasteners to be mechanical fasteners or as indicated. Fasteners used in the work are to provide 1-inch penetration into the substrate or as required by the fastener manufacturer.
- K. Flashings are to be provided in a water-shedding fashion.
- L. Should conditions exist that are not adequately detailed, inform the Owner's Representative and additional details/directions will be provided. Do not proceed without direction from the Owner's Representative

- - END - -

**SECTION 01 14 00
WORK RESTRICTIONS**

PART I - GENERAL

1.01 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.

1.02 USE OF PREMISES

- A. The work shall be performed so as to not interfere with safe access to the building. Confine activities to the areas of work indicated. Do not disturb portions of site beyond areas in which the Work is indicated.
- B. Confine construction operations to roof areas and contractor staging areas indicated on Drawings and as directed by the Owner's Representative.
- C. Work may be performed between the hours of 7:00 AM and 7:00 PM, Monday through Friday. Weekend work is permitted when approval is obtained in advance from the Owner and Owner's Representative and the Architect and Roof Consultant are notified in advance. No other hours of work will be allowed unless cleared by the Owner's Representative.
- D. Keep driveways, sidewalks and parking areas cleared of materials and debris at all times. Isolate areas designated for loading and off-loading of materials and debris.
- E. The Contractor shall protect surfaces to prevent damage to the structure, interior and exterior finishes, landscaping and vegetation, and will be responsible for repair of damage caused by construction operations to the satisfaction of the Owner.
- F. The location of all of the Contractor's equipment, material at the ground level must be confined to the contractor staging areas as discussed at the pre-construction conference.
- G. There shall be no unauthorized access to the interior of the building.
- H. Limited use of a crane is permitted on the site. Materials not loaded with a crane, must be lifted to the roof with a mechanical hoist.
- I. Contractor shall access the roof with personnel and small materials from the outside of the building only; no interior building access is permitted for any reason.

J. Contractor shall not load roof with debris or roofing materials.

Contractor shall not stage roofing materials on roof top areas.

1.03 COORDINATION WITH OCCUPANTS

A. The Owner will occupy the site and building during the entire construction period. The Contractor shall coordinate activities to minimize conflicts and facilitate Owner usage. The Contractor shall perform all work so as to not interfere with the Owner's normal operations.

- - END - -

**SECTION 01 27 00
UNIT PRICES**

PART I - GENERAL

1.01 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.

1.02 SUMMARY

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

1.03 DEFINITIONS

- A. A unit price is a price per unit of measurement for materials or services added to or deducted from the Contract Sum by Change Order, if estimated quantities of Work required by the Contract Documents, as part of the Base Bid, are increased or decreased.

1.04 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit. No additional mark-ups or compensation will be paid by the Owner. The Consultant and Contractor will jointly verify quantities prior to execution of unit price work. Refer to individual Specification Sections for construction activities requiring the establishment of unit prices. Methods of measurement and payment for unit prices are specified in those sections.

PART II - PRODUCTS (Not Used)

PART III - EXECUTION (Not Used)

- - END - -

SECTION 01 31 00
PROJECT MANAGEMENT AND COORDINATION

PART I- GENERAL

1.01 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.

1.02 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General project coordination procedures.
 - 2. Conservation.
 - 3. Coordination Drawings.
 - 4. Administrative and supervisory personnel.
 - 5. Project meetings.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 1 Section "Closeout Procedures" for coordinating Contract closeout.

1.03 COORDINATION

- A. Coordination: Coordinate construction operations included in various Sections of the Work to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different efforts that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.

- B. If necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 - 1. Preparation of Contractor's Construction Schedule.
 - 2. Preparation of the Schedule of Values that will accompany the Request for Payment.
 - 3. Installation and removal of temporary facilities and controls.
 - 4. Delivery and processing of submittals.
 - 5. Progress meetings.
 - 6. Project closeout activities.
 - 7. Provide list of all subcontractors with contact person and telephone numbers.
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
 - 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work.

1.04 SUBMITTALS

- A. Staff Names: Within 15 days of starting construction operations, submit a list of principal staff 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 and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.
 - 1. Post copies of list in the temporary field office, and by each temporary telephone.
- B. Daily Reports: The Contractor's project superintendent shall provide the Architect and Owner with copies of his daily report on a weekly

basis including manpower per trade, job progress, weather and activities.

1.05 PROJECT MEETINGS

- A. General: Schedule and conduct 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 Architect of scheduled meeting dates and times.
 - 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 - 3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within 3 days of the meeting.
- B. Preconstruction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement. Hold the conference at Project site or another convenient location. The Architect will conduct the meeting to review responsibilities.
 - 1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; manufacturers; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Any critical work sequencing.
 - c. Existing Facility requirements.
 - d. Designation of responsible personnel.
 - e. Procedures for processing field decisions and Change Orders.
 - f. Procedures for processing Applications for Payment with the Schedule of Values.
 - g. Distribution of the Contract Documents.
 - h. Submittal procedures.
 - i. Preparation of As-Built Documents.
 - j. Use of the premises.

- k. Responsibility for temporary facilities and controls.
 - l. Parking availability.
 - m. Office, work, and fenced storage areas.
 - n. Equipment deliveries and priorities.
 - o. First aid.
 - p. Security.
 - q. Progress cleaning.
 - r. Working hours.
- C. Progress Meetings: Conduct progress meetings at bi-weekly intervals. Coordinate dates of end-of-the-month meetings with preparation of Applications for Payment.
- 1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Temporary facilities and controls.

- 7) Hazards and risks.
 - 8) Quality and work standards.
 - 9) Change Orders.
 - 10) Documentation of information for Applications for Payment and distribution.
3. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.
- a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

- - END - -

SECTION 01 32 16
Project SCHEDULES AND SEQUENCING

PART I- GENERAL

1.01 DESCRIPTION:

- A. The Contractor shall develop a Critical Path Method (CPM) plan and schedule demonstrating fulfillment of the contract requirements (Project Schedule and Sequencing), and shall keep the Project Schedule and Sequencing up-to-date in accordance with the requirements of this section and shall utilize the plan for scheduling, adherence to sequencing requirements, coordinating and monitoring work under this contract (including all activities of subcontractors, equipment vendors and suppliers). Conventional Critical Path Method (CPM) technique shall be utilized to satisfy both time and cost applications.

1.02 CONTRACTOR'S REPRESENTATIVE:

- A. The Contractor shall designate an authorized representative responsible for the Project Schedule and Sequencing including preparation, review and progress reporting with and to the Contracting Officer's Representative (COR).
- B. The Contractor's representative shall have direct project control and complete authority to act on behalf of the Contractor in fulfilling the requirements of this specification section.
- C. The Contractor's representative shall have the option of developing the project schedule and sequencing within their organization or to engage the services of an outside consultant.

1.3 COMPUTER PRODUCED SCHEDULES

- A. The contractor shall provide weekly, to the Department of Veterans Affairs (VA), all computer-produced time/cost schedules and reports generated from weekly project updates. This must be submitted with and substantively support the contractor's monthly payment request and the signed look ahead report. At a minimum the contractor shall submit updated CPM report in the form of a GANTT timeline.
- B. The contractor shall be responsible for the correctness and timeliness of the computer-produced reports. The Contractor shall also be responsible for the accurate and timely submittal of the updated project schedule and sequencing and all CPM data necessary to produce the computer reports and payment request that is specified.

C. The VA will report errors in computer-produced reports to the Contractor's representative within five calendar days from receipt of reports. The Contractor shall reprocess the computer-produced reports when requested by the Contracting Officer's representative, to correct errors which affect the payment, schedule and sequencing for the project.

1.04 THE PROJECT SCHEDULE AND SEQUENCING SUBMITTAL

A. The Contractor shall submit with bid documents for the Contracting Officer's review:

three blue line copies of the interim schedule and sequencing on sheets of paper 765 x 1070 mm (30 x 42 inches) and an electronic file.

The submittal shall also include three copies of a computer-produced activity/event ID schedule showing project duration; phase completion dates; and other data, including event cost.

Each activity/event on the computer-produced schedule shall contain as a minimum, but not limited to, activity/event ID, activity/event description, duration, budget amount, early start date, early finish date, late start date, late finish date and total float.

Work activity/event relationships shall be restricted to finish-to-start or start-to-start without lead or lag constraints.

Activity/event date constraints, not required by the contract, will not be accepted unless submitted to and approved by the Contracting Officer.

The contractor shall make a separate written detailed request to the Contracting Officer identifying these date constraints and secure the Contracting Officer's written approval before incorporating them into the network diagram. The Contracting Officer's separate approval of the Project Schedule and Sequencing shall not excuse the contractor of this requirement. Logic events (non-work) will be permitted where necessary to reflect proper logic among work events, but must have zero duration. The complete working schedule shall reflect the Contractor's approach to scheduling the complete project. The final Project Schedule in its original form shall contain no contract changes or delays which may have been incurred during the final network diagram development period and shall reflect the entire contract duration as defined in the bid documents. These changes/delays shall be entered at the first update after the final Project Schedule has been approved. The Contractor should provide requests for time and supporting time extension analysis

for contract time as a result of contract changes/delays, after this update, and in accordance with Article, ADJUSTMENT OF CONTRACT COMPLETION.

- D. Within 14 calendar days after Notice to Proceed, the Contracting Officer or his representative, will do one or both of the following:
 - 1. Notify the Contractor concerning his actions, opinions, and objections.
 - 2. A meeting with the Contractor at or near the job site for joint review, correction or adjustment of the proposed plan will be scheduled if required. Within 14 calendar days after the joint review, the Contractor shall revise and shall submit three blue line copies of the revised Project Schedule and Sequencing, three copies of the revised computer-produced activity/event ID schedule and a revised electronic file as specified by the Contracting Officer. The revised submission will be reviewed by the Contracting Officer and, if found to be as previously agreed upon, will be approved.
- E. The approved baseline schedule and the computer-produced schedule(s) generated there from shall constitute the approved baseline schedule until subsequently revised in accordance with the requirements of this section.
- F. The Complete Project Schedule shall contain approximately 75 work activities/events.

1.05 WORK ACTIVITY/EVENT COST DATA

- A. The Contractor shall cost load all work activities or events except procurement activities. The cumulative amount of all cost loaded work activities or events(including alternates) shall equal the total contract price. Prorate overhead, profit and general conditions on all work activities or events for the entire project length. The contractor shall generate from this information cash flow curves indicating graphically the total percentage of work activity/event dollar value scheduled to be in place on early finish, late finish. These cash flow curves will be used by the Contracting Officer to assist him in determining approval or disapproval of the cost loading. Negative work activity/event cost data will not be acceptable, except on VA issued contract changes.
- B. The Contractor shall cost load work activities or events for guarantee period services, test, balance and adjust various systems in accordance

with the provisions in Article, FAR 52.232 - 5 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS) and VAAR 852.236 - 83 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS).

- C. In accordance with FAR 52.236 - 1 (PERFORMANCE OF WORK BY THE CONTRACTOR) and VAAR 852.236 - 72 (PERFORMANCE OF WORK BY THE CONTRACTOR), the Contractor shall submit, simultaneously with the cost per work activity/event of the construction schedule required by this Section, a responsibility code for all activities or events of the project for which the Contractor's forces will perform the work.
- D. The Contractor shall cost load work activities or events for all BID ITEMS. The sum of each BID ITEM work shall equal the value of the bid item in the Contractors' bid.

1.06 project schedule REQUIREMENTS

- A. Show on the project schedule the sequence of work activities or events required for complete performance of all items of work. The Contractor Shall:
 - 1. Show activities or events as:
 - a. Contractor's time required for submittal of shop drawings, templates, fabrication, delivery and similar pre-construction work.
 - b. Contracting Officer's and Architect/Engineer's review and approval of shop drawings, equipment schedules, samples, template, or similar items.
 - c. Interruption of VA Facilities utilities, delivery of Government furnished equipment, and rough-in drawings, project phasing and any other specification requirements.
 - d. Test, balance and adjust various systems and pieces of equipment, maintenance and operation manuals, instructions and preventive maintenance tasks.
 - e. VA inspection and acceptance activity/event with a minimum duration of five work days at the end of each phase and immediately preceding any VA move activity/event required by the contract phasing for that phase.
 - 2. Show not only the activities or events for actual construction work for each trade category of the project, but also trade relationships to indicate the movement of trades from one area, floor, or

- building, to another area, floor, or building, for at least five trades who are performing major work under this contract.
3. Break up the work and identify indicated sequencing into activities or events of a duration not longer than 5 work days each or one reporting period, except as to non-construction activities or events (i.e., procurement of materials, delivery of equipment, concrete and asphalt curing) and any other activities or events for which the COR may approve the showing of a longer duration. The duration for VA approval of any required submittal, shop drawing, or other submittals will not be less than 14 work days.
 4. Describe work activities or events clearly, so the work is readily identifiable for assessment of completion. Activities or events labeled "start," "continue," or "completion," are not specific and will not be allowed. Lead and lag time activities will not be acceptable.
 5. The schedule shall be generally numbered in such a way to reflect either discipline, phase or location of the work.
- B. The Contractor shall submit the following supporting data in addition to the project schedule:
1. The appropriate project calendar including working days and holidays.
 2. The planned number of shifts per day.
 3. The number of hours per shift.
- Failure of the Contractor to include this data shall delay the review of the submittal until the Contracting Officer is in receipt of the missing data.
- C. To the extent that the Project Schedule and Sequencing or any revised Project Schedule and Sequencing shows anything not jointly agreed upon, it shall not be deemed to have been approved by the COR. Failure to include any element of work required for the performance of this contract shall not excuse the Contractor from completing all work required within any applicable completion date of each phase regardless of the COR's approval of the Project Schedule and Sequencing.
- D. Compact Disk Requirements and CPM Activity or Event Record
Specifications: Submit to the VA an electronic file(s) containing one file of the data required to produce a schedule, reflecting all the activities or events of the complete project schedule being submitted.

1.07 PAYMENT TO THE CONTRACTOR:

- A. Monthly, the contractor shall submit the AIA application and certificate for payment documents G702 & G703 reflecting updated schedule activities and cost data in accordance with the provisions of the following Article, PAYMENT AND PROGRESS REPORTING, as the basis upon which progress payments will be made pursuant to Article, FAR 52.232 - 5 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS) and VAAR 852.236 - 83 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS). The Contractor shall be entitled to a monthly progress payment upon approval of estimates as determined from the currently approved updated project schedule. Monthly payment requests shall include: a listing of all agreed upon project schedule changes and associated data; and an electronic file (s) of the resulting monthly updated schedule.
- B. Approval of the Contractor's monthly Application for Payment shall be contingent, among other factors, on the submittal of a satisfactory monthly update of the project schedule.

1.08 PAYMENT AND PROGRESS REPORTING

- A. Weekly schedule update meetings will be held on dates mutually agreed to by the COR and the Contractor. Contractor and their CPM consultant (if applicable) shall attend all weekly schedule and sequencing update meetings. The Contractor shall accurately update the Project Schedule and all other data required and provide this information to the COR three work days in advance of the schedule update meeting. Job progress will be reviewed to verify:
 - 1. Actual start and/or finish dates for updated/completed activities/events.
 - 2. Remaining duration for each activity/event started, or scheduled to start, but not completed.
 - 3. Logic, time and cost data for change orders, and supplemental agreements that are to be incorporated into the Project Schedule and Sequencing.
 - 4. Changes in activity/event sequence and/or duration which have been made, pursuant to the provisions of following Article, ADJUSTMENT OF CONTRACT COMPLETION.

5. Completion percentage for all completed and partially completed activities/events.
 6. Logic and duration revisions required by this section of the specifications.
 7. Activity/event duration and percent complete shall be updated independently.
- B. After completion of the joint review, the contractor shall generate an updated computer-produced calendar-dated schedule and supply the Contracting Officer's representative with reports in accordance with the Article, COMPUTER PRODUCED SCHEDULES, specified.
- C. After completing the weekly schedule update, the contractor's representative or scheduling consultant shall rerun all current period contract change(s) against the prior approved weekly project schedule. The analysis shall only include original workday durations and schedule logic agreed upon by the contractor and resident engineer for the contract change(s). When there is a disagreement on logic and/or durations, the Contractor shall use the schedule logic and/or durations provided and approved by the resident engineer.
- D. Following approval of the CPM schedule, the VA, the General Contractor, its approved CPM Consultant, RE office representatives, and all subcontractors needed, as determined by the SRE, shall meet to discuss the weekly updated schedule. The main emphasis shall be to address work activities to avoid slippage of project schedule and to identify any necessary actions required to maintain project schedule and sequencing during the reporting period. The Government representatives and the Contractor should conclude the meeting with a clear understanding of those work and administrative actions necessary to maintain project schedule status during the reporting period. This schedule coordination meeting will occur after each weekly project schedule update meeting utilizing the resulting schedule reports from that schedule update. If the project is behind schedule, discussions should include ways to prevent further slippage as well as ways to improve the project schedule status, when appropriate.

1.09 RESPONSIBILITY FOR COMPLETION

- A. If it becomes apparent from the current revised weekly progress schedule that phasing or contract completion dates will not be met, the Contractor shall execute some or all of the following remedial actions:

1. Increase construction manpower in such quantities and crafts as necessary to eliminate the backlog of work.
 2. Increase the number of working hours per shift, shifts per working day, working days per week, the amount of construction equipment, or any combination of the foregoing to eliminate the backlog of work.
 3. Reschedule the work in conformance with the specification requirements.
- B. Prior to proceeding with any of the above actions, the Contractor shall notify and obtain approval from the COR for the proposed schedule changes. If such actions are approved, the representative schedule revisions shall be incorporated by the Contractor into the Project Schedule before the next update, at no additional cost to the Government.

1.10 CHANGES TO THE SCHEDULE

- A. Within 7 calendar days after VA acceptance and approval of any updated project schedule, the Contractor shall submit a revised electronic file (s) and a list of any activity/event changes including predecessors and successors for any of the following reasons:
1. Delay in completion of any activity/event or group of activities/events, which may be involved with contract changes, strikes, unusual weather, and other delays will not relieve the Contractor from the requirements specified unless the conditions are shown on the CPM as the direct cause for delaying the project beyond the acceptable limits.
 2. Delays in submittals, or deliveries, or work stoppage are encountered which make rescheduling of the work necessary.
 3. The schedule does not represent the actual prosecution and progress of the project.
 4. When there is, or has been, a substantial revision to the activity/event costs regardless of the cause for these revisions.
- B. CPM revisions made under this paragraph which affect the previously approved computer-produced schedules for Government furnished equipment, vacating of areas by the VA Facility, contract phase(s) and sub phase(s), utilities furnished by the Government to the Contractor, or any other previously contracted item, shall be furnished in writing to the Contracting Officer for approval.

- C. Contracting Officer's approval for the revised project schedule and sequencing and all relevant data is contingent upon compliance with all other paragraphs of this section and any other previous agreements by the Contracting Officer or the VA representative.
- D. The cost of revisions to the project schedule resulting from contract changes will be included in the proposal for changes in work as specified in FAR 52.243 - 4 (Changes) and VAAR 852.236 - 88 (Changes - Supplemental), and will be based on the complexity of the revision or contract change, man hours expended in analyzing the change, and the total cost of the change.
- E. The cost of revisions to the Project Schedule and Sequencing not resulting from contract changes is the responsibility of the Contractor.

1.11 ADJUSTMENT OF CONTRACT COMPLETION

- A. The contract completion time will be adjusted only for causes specified in this contract. Request for an extension of the contract completion date by the Contractor shall be supported with a justification, CPM data and supporting evidence as the COR may deem necessary for determination as to whether or not the Contractor is entitled to an extension of time under the provisions of the contract. Submission of proof based on revised activity/event logic, durations (in work days) and costs is obligatory to any approvals. The schedule must clearly display that the Contractor has used, in full, all the float time available for the work involved in this request. The Contracting Officer's determination as to the total number of days of contract extension will be based upon the current computer-produced calendar-dated schedule for the time period in question and all other relevant information.
- B. Actual delays in activities or events which, according to the computer-produced calendar dated schedule, do not affect the extended and predicted contract completion dates shown by the critical path in the network, will not be the basis for a change to the contract completion date. The Contracting Officer will within a reasonable time after receipt of such justification and supporting evidence, review the facts and advise the Contractor in writing of the Contracting Officer's decision.

- C. The Contractor shall submit each request for a change in the contract completion date to the Contracting Officer in accordance with the provisions specified under FAR 52.243 - 4 (Changes) and VAAR 852.236 - 88 (Changes - Supplemental). The Contractor shall include, as a part of each change order proposal, a sketch showing all CPM logic revisions, duration (in work days) changes, and cost changes, for work in question and its relationship to other activities on the approved network diagram.
- D. All delays due to non-work activities or events such as RFI's, WEATHER, STRIKES, and similar non-work activities or events shall be analyzed on a month by month basis.

- - - E N D - - -

**SECTION 01 33 00
ROOF SUBMITTALS**

PART I - GENERAL

1.01 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.

1.02 SUMMARY

- A. This Section includes non-administrative submittals such as shop drawings, product samples, manufacturer's data and other related items. These submittals are in addition to such administrative items as Permits, Insurance Certificates, CPM plan and schedule, Listing (Subcontractors, Suppliers and Fabricators).

1.03 PROCEDURES

- A. Manufacturer's literature, certificates, color charts:
- B. The Contractor shall submit six copies of the requested submittals to the Consultant at least 14 days prior to beginning work. The Consultant will process submittals within 7 days of receipt.
- C. Submittals shall be clearly marked with the Project name and clearly show which portions of the contents are being submitted for review. The submittal shall be organized into a single submittal package with an index of the items included.

- - END - -

SECTION 01 33 23
SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

- 1-1 Refer to Articles titled SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION (FAR 52.236-21) and, SPECIAL NOTES (VAAR 852.236-91), in GENERAL CONDITIONS.
- 1-2 For the purposes of this contract, CPM plan and schedule, samples, test reports, certificates, and manufacturers' literature and data shall also be subject to the previously referenced requirements. The following text refers to all items collectively as SUBMITTALS.
- 1-3 Submit for approval, all of the items specifically mentioned under the separate sections of the specification, with information sufficient to evidence full compliance with contract requirements. Materials, fabricated articles and the like to be installed in permanent work shall equal those of approved submittals. After an item has been approved, no change in brand or make will be permitted unless:
- A. Satisfactory written evidence is presented to, and approved by Contracting Officer, that manufacturer cannot make scheduled delivery of approved item or;
 - B. Item delivered has been rejected and substitution of a suitable item is an urgent necessity or;
 - C. Other conditions become apparent which indicates approval of such substitute item to be in best interest of the Government.
- 1-4 Forward submittals in sufficient time to permit proper consideration and approval action by Government. Time submission to assure adequate lead time for procurement of contract - required items. Delays attributable to untimely and rejected submittals will not serve as a basis for extending contract time for completion.
- 1-5 Submittals will be reviewed for compliance with contract requirements by Architect-Roof Consultant, and action thereon will be taken by COR on behalf of the Contracting Officer.
- 1-6 Upon receipt of submittals, Architect-Roof Consultant will assign a file number thereto. Contractor, in any subsequent correspondence, shall refer to this file and identification number to expedite replies relative to previously approved or disapproved submittals.

- 1-7 The Government reserves the right to require additional submittals, whether or not particularly mentioned in this contract. If additional submittals beyond those required by the contract are furnished pursuant to request therefor by Contracting Officer, adjustment in contract price and time will be made in accordance with Articles titled CHANGES (FAR 52.243-4) and CHANGES - SUPPLEMENT (VAAR 852.236-88) of the GENERAL CONDITIONS.
- 1-8 Schedules called for in specifications and shown on shop drawings shall be submitted for use and information of Department of Veterans Affairs and Architect-Roof Consultant. However, the Contractor shall assume responsibility for coordinating and verifying schedules. The Contracting Officer and Architect- Roof Consultant assumes no responsibility for checking schedules or layout drawings for exact sizes, exact numbers and detailed positioning of items.
- 1-9 A. Submittals must be submitted by Contractor only and shipped prepaid. Contracting Officer assumes no responsibility for checking quantities or exact numbers included in such submittals.
- A. Submit samples in single units unless otherwise specified. Submit shop drawings, schedules, manufacturers' literature and data, and certificates in quadruplicate, except where a greater number is specified.
- B. Submittals will receive consideration only when covered by a transmittal letter signed by Contractor. Letter shall be sent via first class mail and shall contain the list of items, name of Medical Center, name of Contractor, contract number, applicable specification paragraph numbers, applicable drawing numbers (and other information required for exact identification of location for each item), manufacturer and brand, ASTM or Federal Specification Number (if any) and such additional information as may be required by specifications for particular item being furnished. In addition, catalogs shall be marked to indicate specific items submitted for approval.
1. A copy of letter must be enclosed with items, and any items received without identification letter will be considered "unclaimed goods" and held for a limited time only.
 2. Each sample, certificate, manufacturers' literature and data shall be labeled to indicate the name and location of the Medical

- Center, name of Contractor, manufacturer, brand, contract number and ASTM or Federal Specification Number as applicable and location(s) on project.
3. Required certificates shall be signed by an authorized representative of manufacturer or supplier of material, and by Contractor.
- C. If submittal samples have been disapproved, resubmit new samples as soon as possible after notification of disapproval. Such new samples shall be marked "Resubmitted Sample" in addition to containing other previously specified information required on label and in transmittal letter.
- D. Approved samples will be kept on file by the COR at the site until completion of contract, at which time such samples will be delivered to Contractor as Contractor's property. Where noted in technical sections of specifications, approved samples in good condition may be used in their proper locations in contract work. At completion of contract, samples that are not approved will be returned to Contractor only upon request and at Contractor's expense. Such request should be made prior to completion of the contract. Disapproved samples that are not requested for return by Contractor will be discarded after completion of contract.
- E. Submittal drawings (shop, erection or setting drawings) and schedules, required for work of various trades, shall be checked before submission by technically qualified employees of Contractor for accuracy, completeness and compliance with contract requirements. These drawings and schedules shall be stamped and signed by Contractor certifying to such check.
1. For each drawing required, submit one legible photographic paper or vellum reproducible.
 2. Reproducible shall be full size.
 3. Each drawing shall have marked thereon, proper descriptive title, including Medical Center location, project number, manufacturer's number, reference to contract drawing number, detail Section Number, and Specification Section Number.
 4. A space 4-3/4 by 5 inches shall be reserved on each drawing to accommodate approval or disapproval stamp.

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5. Submit drawings, ROLLED WITHIN A MAILING TUBE, fully protected for shipment.
 6. One reproducible print of approved or disapproved shop drawings will be forwarded to Contractor.
 7. When work is directly related and involves more than one trade, shop drawings shall be submitted to Architect-Engineer under one cover.
- 1-10 A. At the time of transmittal to the Architect-Engineer, the Contractor shall also send a copy of the complete submittal directly to the COR.
- 1-11 A. Samples for approval shall be sent to Architect-Engineer, in care of McEntire Davis Architects, 1001 W. Washington St., Suffolk, VA 23434.

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SECTION 01 42 19
REFERENCE STANDARDS

PART I - GENERAL

1.01 DESCRIPTION

This section specifies the availability and source of references and standards specified in the project manual under paragraphs APPLICABLE PUBLICATIONS and/or shown on the drawings.

1.02 AVAILABILITY OF SPECIFICATIONS LISTED IN THE GSA INDEX OF FEDERAL SPECIFICATIONS, STANDARDS AND COMMERCIAL ITEM DESCRIPTIONS FPMR PART 101-29 (FAR 52.211-1) (AUG 1998)

- A. The GSA Index of Federal Specifications, Standards and Commercial Item Descriptions, FPMR Part 101-29 and copies of specifications, standards, and commercial item descriptions cited in the solicitation may be obtained for a fee by submitting a request to - GSA Federal Supply Service, Specifications Section, Suite 8100, 470 East L'Enfant Plaza, SW, Washington, DC 20407, Telephone (202) 619-8925, Facsimile (202) 619-8978.
- B. If the General Services Administration, Department of Agriculture, or Department of Veterans Affairs issued this solicitation, a single copy of specifications, standards, and commercial item descriptions cited in this solicitation may be obtained free of charge by submitting a request to the addressee in paragraph (a) of this provision. Additional copies will be issued for a fee.

1.03 AVAILABILITY FOR EXAMINATION OF SPECIFICATIONS NOT LISTED IN THE GSA INDEX OF FEDERAL SPECIFICATIONS, STANDARDS AND COMMERCIAL ITEM descriptions (FAR 52.211-4) (JUN 1988)

The specifications and standards cited in this solicitation can be examined at the following location:

DEPARTMENT OF VETERANS AFFAIRS:

Office of Construction & Facilities Management
Facilities Quality Service (00CFM1A)
811 Vermont Avenue, NW - Room 462
Washington, DC 20420
Telephone Numbers: (202) 461-8217 or (202) 461-8292
Between 9:00 AM - 3:00 PM

1.04 AVAILABILITY OF SPECIFICATIONS NOT LISTED IN THE GSA INDEX OF FEDERAL SPECIFICATIONS, STANDARDS AND COMMERCIAL ITEM DESCRIPTIONS (FAR 52.211-3) (JUN 1988)

The specifications cited in this solicitation may be obtained from the associations or organizations listed below.

AA	Aluminum Association Inc. http://www.aluminum.org
AABC	Associated Air Balance Council http://www.aabchg.com
AAMA	American Architectural Manufacturer's Association http://www.aamanet.org
AAN	American Nursery and Landscape Association http://www.anla.org
AASHTO	American Association of State Highway and Transportation Officials http://www.aashto.org
AATCC	American Association of Textile Chemists and Colorists http://www.aatcc.org
ACGIH	American Conference of Governmental Industrial Hygienists http://www.acgih.org
ACI	American Concrete Institute http://www.aci-int.net
ACPA	American Concrete Pipe Association http://www.concrete-pipe.org
ACPPA	American Concrete Pressure Pipe Association http://www.acppa.org
ADC	Air Diffusion Council http://flexibleduct.org
AGA	American Gas Association http://www.aga.org
AGC	Associated General Contractors of America http://www.agc.org
AGMA	American Gear Manufacturers Association, Inc. http://www.agma.org
AHAM	Association of Home Appliance Manufacturers http://www.aham.org

AISC	American Institute of Steel Construction http://www.aisc.org
AISI	American Iron and Steel Institute http://www.steel.org
AITC	American Institute of Timber Construction http://www.aitc-glulam.org
AMCA	Air Movement and Control Association, Inc. http://www.amca.org
ANLA	American Nursery & Landscape Association http://www.anla.org
ANSI	American National Standards Institute, Inc. http://www.ansi.org
APA	The Engineered Wood Association http://www.apawood.org
ARI	Air-Conditioning and Refrigeration Institute http://www.ari.org
ASAE	American Society of Agricultural Engineers http://www.asae.org
ASCE	American Society of Civil Engineers http://www.asce.org
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers http://www.ashrae.org
ASME	American Society of Mechanical Engineers http://www.asme.org
ASSE	American Society of Sanitary Engineering http://www.asse-plumbing.org
ASTM	American Society for Testing and Materials http://www.astm.org
AWI	Architectural Woodwork Institute http://www.awinet.org
AWS	American Welding Society http://www.aws.org
AWWA	American Water Works Association http://www.awwa.org
BHMA	Builders Hardware Manufacturers Association http://www.buildershardware.com

BIA	Brick Institute of America http://www.bia.org
CAGI	Compressed Air and Gas Institute http://www.cagi.org
CGA	Compressed Gas Association, Inc. http://www.cganet.com
CI	The Chlorine Institute, Inc. http://www.chlorineinstitute.org
CISCA	Ceilings and Interior Systems Construction Association http://www.cisca.org
CISPI	Cast Iron Soil Pipe Institute http://www.cispi.org
CLFMI	Chain Link Fence Manufacturers Institute http://www.chainlinkinfo.org
CPMB	Concrete Plant Manufacturers Bureau http://www.cpmf.org
CRA	California Redwood Association http://www.calredwood.org
CRSI	Concrete Reinforcing Steel Institute http://www.crsi.org
CTI	Cooling Technology Institute http://www.cti.org
DHI	Door and Hardware Institute http://www.dhi.org
EGSA	Electrical Generating Systems Association http://www.egsa.org
EI	Edison Electric Institute http://www.eei.org
EPA	Environmental Protection Agency http://www.epa.gov
ETL	ETL Testing Laboratories, Inc. http://www.etl.com
FAA	Federal Aviation Administration http://www.faa.gov
FCC	Federal Communications Commission http://www.fcc.gov

FPS	The Forest Products Society http://www.forestprod.org
GANNA	Glass Association of North America http://www.cssinfo.com/info/gana.html/
FM	Factory Mutual Insurance http://www.fmglobal.com
GA	Gypsum Association http://www.gypsum.org
GSA	General Services Administration http://www.gsa.gov
HI	Hydraulic Institute http://www.pumps.org
HPVA	Hardwood Plywood & Veneer Association http://www.hpva.org
ICBO	International Conference of Building Officials http://www.icbo.org
ICEA	Insulated Cable Engineers Association Inc. http://www.icea.net
ICAC	Institute of Clean Air Companies http://www.icac.com
IEEE	Institute of Electrical and Electronics Engineers http://www.ieee.org/
IMSA	International Municipal Signal Association http://www.imsasafety.org
IPCEA	Insulated Power Cable Engineers Association
NBMA	Metal Buildings Manufacturers Association http://www.mbma.com
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry Inc. http://www.mss-hq.com
NAAMM	National Association of Architectural Metal Manufacturers http://www.naamm.org
NAPHCC	Plumbing-Heating-Cooling Contractors Association http://www.phccweb.org.org
NBS	National Bureau of Standards See - NIST

NBBPVI	National Board of Boiler and Pressure Vessel Inspectors http://www.nationboard.org
NEC	National Electric Code See - NFPA National Fire Protection Association
NEMA	National Electrical Manufacturers Association http://www.nema.org
NFPA	National Fire Protection Association http://www.nfpa.org
NHLA	National Hardwood Lumber Association http://www.natlhardwood.org
NIH	National Institute of Health http://www.nih.gov
NIST	National Institute of Standards and Technology http://www.nist.gov
NLMA	Northeastern Lumber Manufacturers Association, Inc. http://www.nelma.org
NPA	National Particleboard Association 18928 Premiere Court Gaithersburg, MD 20879 (301) 670-0604
NSF	National Sanitation Foundation http://www.nsf.org
NWWDA	Window and Door Manufacturers Association http://www.nwwda.org
OSHA	Occupational Safety and Health Administration Department of Labor http://www.osha.gov
PCA	Portland Cement Association http://www.portcement.org
PCI	Precast Prestressed Concrete Institute http://www.pci.org
PPI	The Plastic Pipe Institute http://www.plasticpipe.org
PEI	Porcelain Enamel Institute, Inc. http://www.porcelainenamel.com
PTI	Post-Tensioning Institute http://www.post-tensioning.org

RFCI	The Resilient Floor Covering Institute http://www.rfci.com
RIS	Redwood Inspection Service See - CRA
RMA	Rubber Manufacturers Association, Inc. http://www.rma.org
SCMA	Southern Cypress Manufacturers Association http://www.cypressinfo.org
SDI	Steel Door Institute http://www.steeldoor.org
IGMA	Insulating Glass Manufacturers Alliance http://www.igmaonline.org
SJI	Steel Joist Institute http://www.steeljoist.org
SMACNA	Sheet Metal and Air-Conditioning Contractors National Association, Inc. http://www.smacna.org
SSPC	The Society for Protective Coatings http://www.sspc.org
STI	Steel Tank Institute http://www.steeltank.com
SWI	Steel Window Institute http://www.steelwindows.com
TCA	Tile Council of America, Inc. http://www.tileusa.com
TEMA	Tubular Exchange Manufacturers Association http://www.tema.org
TPI	Truss Plate Institute, Inc. 583 D'Onofrio Drive; Suite 200 Madison, WI 53719 (608) 833-5900
UBC	The Uniform Building Code See ICBO
UL	Underwriters' Laboratories Incorporated http://www.ul.com
ULC	Underwriters' Laboratories of Canada http://www.ulc.ca

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WCLIB West Coast Lumber Inspection Bureau
 6980 SW Varns Road, P.O. Box 23145
 Portland, OR 97223
 (503) 639-0651

WRCLA Western Red Cedar Lumber Association
 P.O. Box 120786
 New Brighton, MN 55112
 (612) 633-4334

WWPA Western Wood Products Association
 <http://www.wwpa.org>

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SECTION 01 45 29
TESTING LABORATORY SERVICES

PART I - GENERAL

1.01 DESCRIPTION:

This section specifies materials testing activities and inspection services required during project construction to be provided by a Testing Laboratory retained and paid for by Contractor.

1.02 APPLICABLE PUBLICATIONS:

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.
- B. American Association of State Highway and Transportation Officials (AASHTO):
 - T27-06.....Sieve Analysis of Fine and Coarse Aggregates
 - T96-02 (R2006).....Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
 - T99-01 (R2004).....The Moisture-Density Relations of Soils Using a 2.5 Kg (5.5 lb.) Rammer and a 305 mm (12 in.) Drop
 - T104-99 (R2003).....Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate
 - T180-01 (R2004).....Moisture-Density Relations of Soils using a 4.54 kg (10 lb.) Rammer and a 457 mm (18 in.) Drop
 - T191-02(R2006).....Density of Soil In-Place by the Sand-Cone Method
- C. American Concrete Institute (ACI):
 - 506.4R-94 (R2004).....Guide for the Evaluation of Shotcrete
- D. American Society for Testing and Materials (ASTM):
 - A325-06.....Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
 - A370-07.....Definitions for Mechanical Testing of Steel Products
 - C31/C31M-06.....Making and Curing Concrete Test Specimens in the Field

- C33-03.....Concrete Aggregates
- C39/C39M-05.....Compressive Strength of Cylindrical Concrete
Specimens
- C109/C109M-05.....Compressive Strength of Hydraulic Cement
Mortars
- C138-07.....Unit Weight, Yield, and Air Content
(Gravimetric) of Concrete
- C140-07.....Sampling and Testing Concrete Masonry Units and
Related Units
- C143/C143M-05.....Slump of Hydraulic Cement Concrete
- C172-07.....Sampling Freshly Mixed Concrete
- C173-07.....Air Content of freshly Mixed Concrete by the
Volumetric Method
- C330-05.....Lightweight Aggregates for Structural Concrete
- C780-07.....Pre-construction and Construction Evaluation of
Mortars for Plain and Reinforced Unit Masonry
- C1019-08.....Sampling and Testing Grout
- C1064/C1064M-05.....Freshly Mixed Portland Cement Concrete
- C1077-06.....Laboratories Testing Concrete and Concrete
Aggregates for Use in Construction and Criteria
for Laboratory Evaluation
- C1314-07.....Compressive Strength of Masonry Prisms
- D698-07.....Laboratory Compaction Characteristics of Soil
Using Standard Effort
- D1143-07.....Piles Under Static Axial Compressive Load
- D1188-07.....Bulk Specific Gravity and Density of Compacted
Bituminous Mixtures Using Paraffin-Coated
Specimens
- D1556-07.....Density and Unit Weight of Soil in Place by the
Sand-Cone Method
- D1557-07.....Laboratory Compaction Characteristics of Soil
Using Modified Effort
- D2166-06.....Unconfined Compressive Strength of Cohesive
Soil
- D2167-94(R2001).....Density and Unit Weight of Soil in Place by the
Rubber Balloon Method

- D2216-05.....Laboratory Determination of Water (Moisture)
Content of Soil and Rock by Mass
- D2922-05.....Density of soil and Soil-Aggregate in Place by
Nuclear Methods (Shallow Depth)
- D2974-07.....Moisture, Ash, and Organic Matter of Peat and
Other Organic Soils
- D3666-(2002).....Minimum Requirements for Agencies Testing and
Inspection Bituminous Paving Materials
- D3740-07.....Minimum Requirements for Agencies Engaged in
the Testing and Inspecting Road and Paving
Material
- E94-04.....Radiographic Testing
- E164-03.....Ultrasonic Contact Examination of Weldments
- E329-07.....Agencies Engaged in Construction Inspection
and/or Testing
- E543-06.....Agencies Performing Non-Destructive Testing
- E605-93(R2006).....Thickness and Density of Sprayed Fire-Resistive
Material (SFRM) Applied to Structural Members
- E709-(2001).....Guide for Magnetic Particle Examination
- E1155-96(R2008).....Determining FF Floor Flatness and FL Floor
Levelness Numbers

E. American Welding Society (AWS):

- D1.1-07.....Structural Welding Code-Steel

1.03 REQUIREMENTS:

A. Accreditation Requirements: Testing Laboratory retained and paid for by Contractor, must be accredited by one or more of the National Voluntary Laboratory Accreditation Program (NVLAP) programs acceptable in the geographic region for the project. Furnish to the COR a copy of the Certificate of Accreditation and Scope of Accreditation. For testing laboratories that have not yet obtained accreditation by a NVLAP program, submit an acknowledgement letter from one of the laboratory accreditation authorities indicating that the application for accreditation has been received and the accreditation process has started, and submit to the COR for approval, certified statements, signed by an official of the testing laboratory attesting that the proposed laboratory, meets or conforms to the ASTM standards listed below as appropriate to the testing field.

1. Laboratories engaged in testing of construction materials shall meet the requirements of ASTM E329.
 2. Laboratories engaged in testing of concrete and concrete aggregates shall meet the requirements of ASTM C1077.
 3. Laboratories engaged in testing of bituminous paving materials shall meet the requirements of ASTM D3666.
 4. Laboratories engaged in testing of soil and rock, as used in engineering design and construction, shall meet the requirements of ASTM D3740.
 5. Laboratories engaged in inspection and testing of steel, stainless steel, and related alloys will be evaluated according to ASTM A880.
 6. Laboratories engaged in non-destructive testing (NDT) shall meet the requirements of ASTM E543.
 7. Laboratories engaged in Hazardous Materials Testing shall meet the requirements of OSHA and EPA.
- B. Inspection and Testing: Testing laboratory shall inspect materials and workmanship and perform tests described herein and additional tests requested by COR. When it appears materials furnished, or work performed by Contractor fail to meet construction contract requirements, Testing Laboratory shall direct attention of COR to such failure.
- C. Written Reports: Testing laboratory shall submit test reports to COR, Contractor, and Local Building Authority within 24 hours after each test is completed unless other arrangements are agreed to in writing by the COR. Submit reports of tests that fail to meet construction contract requirements on colored paper.
- D. Verbal Reports: Give verbal notification to COR immediately of any irregularity.
- E. Test Standards: The Testing Laboratory shall include a lump sum allowance of \$5000 for furnishing published standards (ASTM, AASHTO, ACI, ANSI, AWS, ASHRAE, UL, etc.) referred to or specifically referenced which are pertinent to any Sections of these specifications. Furnish one set of standards in single copies or bound volumes to the COR within 60 days. Photocopies are not acceptable. Billings for the standards furnished shall be at the net cost to Testing Laboratory. A preliminary list of test standards, with the estimated costs, shall be

submitted to the COR for review before any publications of reference standards are ordered.

PART II - EXECUTION

2.01 MASONRY:

A. Mortar Tests:

1. Laboratory compressive strength test:
 - a. Comply with ASTM C780.
 - b. Obtain samples during or immediately after discharge from batch mixer.
 - c. Furnish molds with 2 inch, 3 compartment gang cube.
 - d. Test one sample at 7 days and 2 samples at 28 days.
2. Two tests during first week of operation; one test per week after initial test until masonry completion.

B. Grout Tests:

1. Laboratory compressive strength test:
 - a. Comply with ASTM C1019.
 - b. Test one sample at 7 days and 2 samples at 28 days.
 - c. Perform test for each 2500 square feet of masonry.

C. Masonry Unit Tests:

1. Laboratory Compressive Strength Test:
 - a. Comply with ASTM C140.
 - b. Test 3 samples for each 5000 square feet of wall area.

- D. Prism Tests: For each type of wall construction indicated, test masonry prisms per ASTM C1314 for each 5000 square feet of wall area. Prepare one set of prisms for testing at 7 days and one set for testing at 28 days.

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SECTION 01 51 00
TEMPORARY FACILITIES AND CONTROLS

PART I - GENERAL

1.01 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.

1.02 TEMPORARY UTILITIES

- A. Water and electrical power shall be furnished by the Owner for construction use; however the Contractor will bear the cost of any expenses in the installation and / or removal of any temporary services that are required. The Contractor shall be responsible for providing all hoses, electrical cords or others items necessary to get power to the point of use. Contractor shall be responsible for providing for and the associated expenses for all necessary permits, meters, water used, hook-up and disconnects for water used in the mixing, application and cleanup of all Lightweight Insulating Concrete applications if Lightweight Insulating Concrete is used.

1.03 CONSTRUCTION FACILITIES

- A. Outside toilet facilities shall be provided by the Contractor. In no case shall toilets in the building be used by the Contractor. The toilet shall be set and properly secured in a space designated by the Owner.

1.04 CONSTRUCTION AIDS

- A. Temporary scaffolding, ladders, mechanical lifts, swing staging and cranes shall be provided by the Contractor for access to perform the required work. Protection of the roof, building and pavement areas shall be provided by the Contractor. Damage caused to the Owners property shall be repaired at the Contractor's cost. The Contractor shall provide trash chutes as necessary to safely remove debris from elevated portions of the building. The Contractor shall videotape the grounds surrounding the building prior to project start and provide a copy to the Department of Veterans Affairs.

1.05 VEHICULAR ACCESS AND PARKING

- A. The Owner will designate parking spaces for the Contractor's employees.

1.06 TEMPORARY BARRIERS AND ENCLOSURES

- A. The Contractor shall provide temporary 8 foot tall chain link fencing around the designated staging areas.
- B. The Contractor shall provide temporary barriers around the work area, staging areas and equipment. During overhead construction barriers shall be adequate to protect pedestrians and vehicles from falling debris. The Contractor shall provide signage indicating the sidewalk is closed and to redirect pedestrians to alternate routes. The signage shall be installed at both ends of the staging area.

- - END - -

SECTION 01 57 19
TEMPORARY ENVIRONMENTAL CONTROLS

PART I - GENERAL

1.01 DESCRIPTION

- A. This section specifies the control of environmental pollution and damage that the Contractor must consider for air, water, and land resources. It includes management of visual aesthetics, noise, solid waste, radiant energy, and radioactive materials, as well as other pollutants and resources encountered or generated by the Contractor. The Contractor is obligated to consider specified control measures with the costs included within the various contract items of work.
- B. Environmental pollution and damage is defined as the presence of chemical, physical, or biological elements or agents which:
1. Adversely effect human health or welfare,
 2. Unfavorably alter ecological balances of importance to human life,
 3. Effect other species of importance to humankind, or;
 4. Degrade the utility of the environment for aesthetic, cultural, and historical purposes.
- C. Definitions of Pollutants:
1. Chemical Waste: Petroleum products, bituminous materials, salts, acids, alkalis, herbicides, pesticides, organic chemicals, and inorganic wastes.
 2. Debris: Combustible and noncombustible wastes, such as leaves, tree trimmings, ashes, and waste materials resulting from construction or maintenance and repair work.
 3. Sediment: Soil and other debris that has been eroded and transported by runoff water.
 4. Solid Waste: Rubbish, debris, garbage, and other discarded solid materials resulting from industrial, commercial, and agricultural operations and from community activities.
 5. Surface Discharge: The term "Surface Discharge" implies that the water is discharged with possible sheeting action and subsequent soil erosion may occur. Waters that are surface discharged may terminate in drainage ditches, storm sewers, creeks, and/or "water of the United States" and would require a permit to discharge water from the governing agency.

6. Rubbish: Combustible and noncombustible wastes such as paper, boxes, glass and crockery, metal and lumber scrap, tin cans, and bones.
7. Sanitary Wastes:
 - a. Sewage: Domestic sanitary sewage and human and animal waste.
 - b. Garbage: Refuse and scraps resulting from preparation, cooking, dispensing, and consumption of food.

1.02 QUALITY CONTROL

- A. Establish and maintain quality control for the environmental protection of all items set forth herein.
- B. Record on daily reports any problems in complying with laws, regulations, and ordinances. Note any corrective action taken.

1.03 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.
- B. U.S. National Archives and Records Administration (NARA):
33 CFR 32 Definitions

1.04 SUBMITTALS

- A. In accordance with Section, 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, furnish the following:
 1. Environmental Protection Plan: After the contract is awarded and prior to the commencement of the work, the Contractor shall meet with the COR to discuss the proposed Environmental Protection Plan and to develop mutual understanding relative to details of environmental protection. Not more than 20 days after the meeting, the Contractor shall prepare and submit to the COR for approval, a written and/or graphic Environmental Protection Plan including, but not limited to, the following:
 - a. Name(s) of person(s) within the Contractor's organization who is (are) responsible for ensuring adherence to the Environmental Protection Plan.
 - b. Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from the site.
 - c. Name(s) and qualifications of person(s) responsible for training the Contractor's environmental protection personnel.
 - d. Description of the Contractor's environmental protection personnel training program.

- e. A list of Federal, State, and local laws, regulations, and permits concerning environmental protection, pollution control, noise control and abatement that are applicable to the Contractor's proposed operations and the requirements imposed by those laws, regulations, and permits.
 - f. Methods for protection of features to be preserved within authorized work areas including trees, shrubs, vines, grasses, ground cover, landscape features, air and water quality, fish and wildlife, soil, historical, and archeological and cultural resources.
 - g. Procedures to provide the environmental protection that comply with the applicable laws and regulations. Describe the procedures to correct pollution of the environment due to accident, natural causes, or failure to follow the procedures as described in the Environmental Protection Plan.
 - h. Permits, licenses, and the location of the solid waste disposal area.
 - i. Drawings showing locations of any proposed temporary excavations or embankments for haul roads, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials. Include as part of an Erosion Control Plan approved by the Department of Veterans Affairs.
 - j. Environmental Monitoring Plans for the job site including land, water, air, and noise.
 - k. Work Area Plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. Plan should include measures for marking the limits of use areas. This plan may be incorporated within the Erosion Control Plan.
 - l. VPDES GENERAL PERMIT REGISTRATION STATEMENT shall be completed by the Contractor and submitted to the Virginia Department of Conservation and Recreation (DCR) in accordance with DCR instructions and regulations. Contractor shall coordinate with the COR as needed to complete this requirement. Contractor shall submit evidence of DCR approval prior to starting work.
- B. Approval of the Contractor's Environmental Protection Plan will not relieve the Contractor of responsibility for adequate and continued control of pollutants and other environmental protection measures.

1.05 PROTECTION OF ENVIRONMENTAL RESOURCES

- A. Protect environmental resources within the project boundaries and those affected outside the limits of permanent work during the entire period of this contract. Confine activities to areas defined by the specifications and drawings.
- B. Protection of Land Resources: Prior to construction, identify all land resources to be preserved within the work area. Do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, top soil, and land forms without permission from the COR. Do not fasten or attach ropes, cables, or guys to trees for anchorage unless specifically authorized, or where special emergency use is permitted.
 1. Work Area Limits: Prior to any construction, mark the areas that require work to be performed under this contract. Mark or fence isolated areas within the general work area that are to be saved and protected. Protect monuments, works of art, and markers before construction operations begin. Convey to all personnel the purpose of marking and protecting all necessary objects.
 2. Protection of Landscape: Protect trees, shrubs, vines, grasses, land forms, and other landscape features shown on the drawings to be preserved by marking, fencing, or using any other approved techniques.
 - a. Box and protect from damage existing trees and shrubs to remain on the construction site.
 - b. Immediately repair all damage to existing trees and shrubs by trimming, cleaning, and painting with antiseptic tree paint.
 - c. Do not store building materials or perform construction activities closer to existing trees or shrubs than the farthest extension of their limbs.
 3. Reduction of Exposure of Unprotected Erodible Soils: Plan and conduct earthwork to minimize the duration of exposure of unprotected soils. Clear areas in reasonably sized increments only as needed to use. Form earthwork to final grade as shown. Immediately protect side slopes and back slopes upon completion of rough grading.
 4. Temporary Protection of Disturbed Areas: Construct diversion ditches, benches, and berms to retard and divert runoff from the

- construction site to protected drainage areas approved under paragraph 208 of the Clean Water Act.
- a. Sediment Basins: Trap sediment from construction areas in temporary or permanent sediment basins that accommodate the runoff of a local 10 (design year) storm. After each storm, pump the basins dry and remove the accumulated sediment. Control overflow/drainage with paved weirs or by vertical overflow pipes, draining from the surface.
 - b. Reuse or conserve the collected topsoil sediment as directed by the COR. Topsoil use and requirements are specified in Section 31 20 00, EARTH MOVING.
 - c. Institute effluent quality monitoring programs as required by Federal, State, and local environmental agencies.
5. Erosion and Sedimentation Control Devices: The erosion and sediment controls selected and maintained by the Contractor shall be such that water quality standards are not violated as a result of the Contractor's activities. Construct or install all temporary and permanent erosion and sedimentation control features shown. Maintain temporary erosion and sediment control measures such as berms, dikes, drains, sedimentation basins, grassing, and mulching, until permanent drainage and erosion control facilities are completed and operative.
6. Manage borrow areas on and off Government property to minimize erosion and to prevent sediment from entering nearby water courses or lakes.
7. Manage and control spoil areas on and off Government property to limit spoil to areas on the Environmental Protection Plan and prevent erosion of soil or sediment from entering nearby water courses or lakes.
8. Protect adjacent areas from despoilment by temporary excavations and embankments.
9. Handle and dispose of solid wastes in such a manner that will prevent contamination of the environment. Place solid wastes (excluding clearing debris) in containers that are emptied on a regular schedule. Transport all solid waste off Government property and dispose of waste in compliance with Federal, State, and local requirements.

10. Store chemical waste away from the work areas in corrosion resistant containers and dispose of waste in accordance with Federal, State, and local regulations.
 11. Handle discarded materials other than those included in the solid waste category as directed by the COR.
- C. Protection of Water Resources: Keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters and sewer systems. Implement management techniques to control water pollution by the listed construction activities that are included in this contract.
1. Washing and Curing Water: Do not allow wastewater directly derived from construction activities to enter water areas. Collect and place wastewater in retention ponds allowing the suspended material to settle, the pollutants to separate, or the water to evaporate.
 2. Control movement of materials and equipment at stream crossings during construction to prevent violation of water pollution control standards of the Federal, State, or local government.
 3. Monitor water areas affected by construction.
- D. Protection of Fish and Wildlife Resources: Keep construction activities under surveillance, management, and control to minimize interference with, disturbance of, or damage to fish and wildlife. Prior to beginning construction operations, list species that require specific attention along with measures for their protection.
- E. Protection of Air Resources: Keep construction activities under surveillance, management, and control to minimize pollution of air resources. Burning is not permitted on the job site. Keep activities, equipment, processes, and work operated or performed, in strict accordance with the State of Virginia's Air Pollution Control Act, and Federal emission and performance laws and standards. Maintain ambient air quality standards set by the Environmental Protection Agency, for those construction operations and activities specified.
1. Particulates: Control dust particles, aerosols, and gaseous by-products from all construction activities, processing, and preparation of materials (such as from asphaltic batch plants) at all times, including weekends, holidays, and hours when work is not in progress.

2. Particulates Control: Maintain all excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and all other work areas within or outside the project boundaries free from particulates which would cause a hazard or a nuisance. Sprinklering, chemical treatment of an approved type, light bituminous treatment, baghouse, scrubbers, electrostatic precipitators, or other methods are permitted to control particulates in the work area.
 3. Hydrocarbons and Carbon Monoxide: Control monoxide emissions from equipment to Federal and State allowable limits.
 4. Odors: Control odors of construction activities and prevent obnoxious odors from occurring.
- F. Reduction of Noise: Minimize noise using every action possible. Perform noise-producing work in less sensitive hours of the day or week as directed by the COR. Maintain noise-produced work at or below the decibel levels and within the time periods specified.
1. Perform construction activities involving repetitive, high-level impact noise only between 8:00 a.m. and 6:00 p.m unless otherwise permitted by local ordinance or the COR. Repetitive impact noise on the property shall not exceed the following dB limitations:

Time Duration of Impact Noise	Sound Level in dB
More than 12 minutes in any hour	70
Less than 30 seconds of any hour	85
Less than three minutes of any hour	80
Less than 12 minutes of any hour	75
 2. Provide sound-deadening devices on equipment and take noise abatement measures that are necessary to comply with the requirements of this contract, consisting of, but not limited to, the following:
 - a. Maintain maximum permissible construction equipment noise levels at 50 feet (dBA):

EARTHMOVING		MATERIALS HANDLING	
FRONT LOADERS	75	CONCRETE MIXERS	75
BACKHOES	75	CONCRETE PUMPS	75
DOZERS	75	CRANES	75
TRACTORS	75	DERRICKS IMPACT	75
SCAPERS	80	PILE DRIVERS	95
GRADERS	75	JACK HAMMERS	75
TRUCKS	75	ROCK DRILLS	80
PAVERS, STATIONARY	80	PNEUMATIC TOOLS	80
PUMPS	75		
GENERATORS	75	SAWS	75
COMPRESSORS	75	VIBRATORS	75

- b. Use shields or other physical barriers to restrict noise transmission.
 - c. Provide soundproof housings or enclosures for noise-producing machinery.
 - d. Use efficient silencers on equipment air intakes.
 - e. Use efficient intake and exhaust mufflers on internal combustion engines that are maintained so equipment performs below noise levels specified.
 - f. Line hoppers and storage bins with sound deadening material.
 - g. Conduct truck loading, unloading, and hauling operations so that noise is kept to a minimum.
3. Measure sound level for noise exposure due to the construction at least once every five successive working days while work is being performed above 55 dB(A) noise level. Measure noise exposure at the property line or 50 feet from the noise source, whichever is greater. Measure the sound levels on the A weighing network of a General Purpose sound level meter at slow response. To minimize the effect of reflective sound waves at buildings, take measurements at three to six feet in front of any building face. Submit the recorded information to the COR noting any problems and the alternatives for mitigating actions.
- G. Restoration of Damaged Property: If any direct or indirect damage is done to public or private property resulting from any act, omission,

neglect, or misconduct, the Contractor shall restore the damaged property to a condition equal to that existing before the damage at no additional cost to the Government. Repair, rebuild, or restore property as directed or make good such damage in an acceptable manner.

- H. Final Clean-up: On completion of project and after removal of all debris, rubbish, and temporary construction, Contractor shall leave the construction area in a clean condition satisfactory to the COR. Cleaning shall include off the station disposal of all items and materials not required to be salvaged, as well as all debris and rubbish resulting from demolition and new work operations.

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SECTION 01 58 16
TEMPORARY INTERIOR SIGNAGE

PART I - GENERAL

DESCRIPTION

This section specifies temporary interior signs.

PART II - PRODUCTS

2.01 TEMPORARY SIGNS

- A. Fabricate from 110 pound mat finish white paper.
- B. Cut to 4-inch wide by 12 inch long size tag.
- C. Punch 1/8-inch diameter hole centered on 4-inch dimension of tag. Edge of Hole spaced approximately 1/2-inch from one end on tag.
- D. Reinforce hole on both sides with gummed cloth washer or other suitable material capable of preventing tie pulling through paper edge.
- E. Ties: Steel wire 0.0120-inch thick, attach to tag with twist tie, leaving 6-inch long free ends.

PART III - EXECUTION

3.01 INSTALLATION

- A. Install temporary signs attached to room door frame or room door knob, lever, or pull for doors on corridor openings.
- B. Mark on signs with felt tip marker having approximately 1/8-inch wide stroke for clearly legible numbers or letters.
- C. Identify room with numbers as designated on floor plans.

3.02 LOCATION

- A. Install on doors that have room, corridor, and space numbers shown.
- B. Doors that do not require signs are as follows:
 1. Corridor barrier doors (cross-corridor) in corridor with same number.
 2. Folding doors or partitions.
 3. Toilet or bathroom doors within and between rooms.
 4. Communicating doors in partitions between rooms with corridor entrance doors.
 5. Closet doors within rooms.
- C. Replace missing, damaged, or illegible signs.

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SECTION 01 73 20
SELECTIVE DEMOLITION

PART 1 - GENERAL

1.01 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.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Demolition and removal of selected portions of building or structure.
 - 2. Salvage of existing items to be reused or recycled.
- B. Related Sections include the following:
 - 1. Division 1 Section "Temporary Facilities and Controls" for temporary construction and environmental-protection measures for selective demolition operations.

1.03 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Detach items from existing construction and deliver them to Owner.
- C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.04 MATERIALS OWNERSHIP

- A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from Project site.

1.05 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.
- B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Standards: Comply with ANSI A10.6 and NFPA 241.

1.06 PROJECT CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.
 - 1. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from authorities having jurisdiction.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Owner assumes no responsibility for condition of areas to be selectively demolished. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- E. Storage or sale of removed items or materials on-site will not be permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

PART II - EXECUTION

2.01 EXAMINATION

- A. Verify that utilities have been disconnected and capped.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

- D. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

2.02 UTILITY SERVICES

- A. Existing Utilities: Maintain services indicated to remain and protect them against damage during selective demolition operations.
- B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
 - 2. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 3. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.

2.03 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
 - 2. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
 - 3. Protect existing site improvements, appurtenances, and landscaping to remain.
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
3. Cover and protect furniture, furnishings, and equipment that have not been removed.
4. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 1 Section "Temporary Facilities and Controls."

2.04 POLLUTION CONTROLS

- A. Dust Control: Use water mist, temporary enclosures, and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations.
1. Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
- B. Disposal: Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- C. Cleaning: Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

2.05 SELECTIVE DEMOLITION

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.

3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 4. Maintain adequate ventilation when using cutting torches.
 5. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 6. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 7. Dispose of demolished items and materials promptly.
 8. Return elements of construction and surfaces that are to remain to condition existing before selective demolition operations began.
- B. Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 3. Protect items from damage during transport and storage.
 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- C. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

2.06 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site. Site shall be left clean of all demolished materials at the end of each work day.
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

ROOF REPLACEMENT
BUILDING 110
VA MEDICAL CENTER
HAMPTON, VA

PROJECT 590-11-508

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SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT

PART I - GENERAL

1.01 DESCRIPTION

- A. This section specifies the requirements for the management of non-hazardous building construction and demolition waste.
- B. Waste disposal in landfills shall be minimized to the greatest extent possible. Of the inevitable waste that is generated, as much of the waste material as economically feasible shall be salvaged, recycled or reused.
- C. Contractor shall use all reasonable means to divert construction and demolition waste from landfills and incinerators, and facilitate their salvage and recycle not limited to the following:
 - 1. Waste Management Plan development and implementation.
 - 2. Techniques to minimize waste generation.
 - 3. Sorting and separating of waste materials.
 - 4. Salvage of existing materials and items for reuse or resale.
 - 5. Recycling of materials that cannot be reused or sold.
- D. At a minimum the following waste categories shall be diverted from landfills:
 - 1. Soil.
 - 2. Inerts (eg, concrete, masonry and asphalt).
 - 3. Clean dimensional wood and palette wood.
 - 4. Green waste (biodegradable landscaping materials).
 - 5. Engineered wood products (plywood, particle board and I-joists, etc).
 - 6. Metal products (eg, steel, wire, beverage containers, etc).
 - 7. Cardboard, paper and packaging.
 - 8. Bitumen roofing materials.
 - 9. Plastics (eg, ABS, PVC).
 - 10. Carpet and/or pad.
 - 11. Gypsum board.
 - 12. Insulation.
 - 13. Paint.

1.02 RELATED WORK

- A. Section 02 41 00, DEMOLITION.

B. Section 01 00 00, GENERAL REQUIREMENTS.

1.03 QUALITY ASSURANCE

- A. Contractor shall practice efficient waste management when sizing, cutting and installing building products. Processes shall be employed to ensure the generation of as little waste as possible. Construction /Demolition waste includes products of the following:
1. Excess or unusable construction materials.
 2. Packaging used for construction products.
 3. Poor planning and/or layout.
 4. Construction error.
 5. Over ordering.
 6. Weather damage.
 7. Contamination.
 8. Mishandling.
 9. Breakage.
- B. Establish and maintain the management of non-hazardous building construction and demolition waste set forth herein. Conduct a site assessment to estimate the types of materials that will be generated by demolition and construction.
- C. Contractor shall develop and implement procedures to reuse and recycle new materials to a minimum of 50 percent.
- D. Contractor shall be responsible for implementation of any special programs involving rebates or similar incentives related to recycling. Any revenues or savings obtained from salvage or recycling shall accrue to the contractor.
- E. Contractor shall provide all demolition, removal and legal disposal of materials. Contractor shall ensure that facilities used for recycling, reuse and disposal shall be permitted for the intended use to the extent required by local, state, federal regulations. The Whole Building Design Guide website <http://www.wbdg.org> provides a Construction Waste Management Database that contains information on companies that haul, collect, and process recyclable debris from construction projects.
- F. Contractor shall assign a specific area to facilitate separation of materials for reuse, salvage, recycling, and return. Such areas are to be kept neat and clean and clearly marked in order to avoid contamination or mixing of materials.

- G. Contractor shall provide on-site instructions and supervision of separation, handling, salvaging, recycling, reuse and return methods to be used by all parties during waste generating stages.
- H. Record on daily reports any problems in complying with laws, regulations and ordinances with corrective action taken.

1.04 TERMINOLOGY

- A. Class III Landfill: A landfill that accepts non-hazardous resources such as household, commercial and industrial waste resulting from construction, remodeling, repair and demolition operations.
- B. Clean: Untreated and unpainted; uncontaminated with adhesives, oils, solvents, mastics and like products.
- C. Construction and Demolition Waste: Includes all non-hazardous resources resulting from construction, remodeling, alterations, repair and demolition operations.
- D. Dismantle: The process of parting out a building in such a way as to preserve the usefulness of its materials and components.
- E. Disposal: Acceptance of solid wastes at a legally operating facility for the purpose of land filling (includes Class III landfills and inert fills).
- F. Inert Backfill Site: A location, other than inert fill or other disposal facility, to which inert materials are taken for the purpose of filling an excavation, shoring or other soil engineering operation.
- G. Inert Fill: A facility that can legally accept inert waste, such as asphalt and concrete exclusively for the purpose of disposal.
- H. Inert Solids/Inert Waste: Non-liquid solid resources including, but not limited to, soil and concrete that does not contain hazardous waste or soluble pollutants at concentrations in excess of water-quality objectives established by a regional water board, and does not contain significant quantities of decomposable solid resources.
- I. Mixed Debris: Loads that include commingled recyclable and non-recyclable materials generated at the construction site.
- J. Mixed Debris Recycling Facility: A solid resource processing facility that accepts loads of mixed construction and demolition debris for the purpose of recovering re-usable and recyclable materials and disposing non-recyclable materials.

- K. Permitted Waste Hauler: A company that holds a valid permit to collect and transport solid wastes from individuals or businesses for the purpose of recycling or disposal.
- L. Recycling: The process of sorting, cleansing, treating, and reconstituting materials for the purpose of using the altered form in the manufacture of a new product. Recycling does not include burning, incinerating or thermally destroying solid waste.
 - 1. On-site Recycling - Materials that are sorted and processed on site for use in an altered state in the work, i.e. concrete crushed for use as a sub-base in paving.
 - 2. Off-site Recycling - Materials hauled to a location and used in an altered form in the manufacture of new products.
- M. Recycling Facility: An operation that can legally accept materials for the purpose of processing the materials into an altered form for the manufacture of new products. Depending on the types of materials accepted and operating procedures, a recycling facility may or may not be required to have a solid waste facilities permit or be regulated by the local enforcement agency.
- N. Reuse: Materials that are recovered for use in the same form, on-site or off-site.
- O. Return: To give back reusable items or unused products to vendors for credit.
- P. Salvage: To remove waste materials from the site for resale or re-use by a third party.
- Q. Source-Separated Materials: Materials that are sorted by type at the site for the purpose of reuse and recycling.
- R. Solid Waste: Materials that have been designated as non-recyclable and are discarded for the purposes of disposal.
- S. Transfer Station: A facility that can legally accept solid waste for the purpose of temporarily storing the materials for re-loading onto other trucks and transporting them to a landfill for disposal, or recovering some materials for re-use or recycling.

1.05 SUBMITTALS

- A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES, furnish the following:

- B. Prepare and submit to the COR a written demolition debris management plan. The plan shall include, but not be limited to, the following information:
1. Procedures to be used for debris management.
 2. Techniques to be used to minimize waste generation.
 3. Analysis of the estimated job site waste to be generated:
 - a. List of each material and quantity to be salvaged, reused, recycled.
 - b. List of each material and quantity proposed to be taken to a landfill.
 4. Detailed description of the Means/Methods to be used for material handling.
 - a. On site: Material separation, storage, protection where applicable.
 - b. Off site: Transportation means and destination. Include list of materials.
 - 1) Description of materials to be site-separated and self-hauled to designated facilities.
 - 2) Description of mixed materials to be collected by designated waste haulers and removed from the site.
 - c. The names and locations of mixed debris reuse and recycling facilities or sites.
 - d. The names and locations of trash disposal landfill facilities or sites.
 - e. Documentation that the facilities or sites are approved to receive the materials.
- B. Designated Manager responsible for instructing personnel, supervising, documenting and administer over meetings relevant to the Waste Management Plan.
- C. Monthly summary of construction and demolition debris diversion and disposal, quantifying all materials generated at the work site and disposed of or diverted from disposal through recycling.

1.06 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced by the basic designation only. In the event that criteria requirements conflict, the most stringent requirements shall be met.

1. U.S. Green Building Council (USGBC):
2. LEED Green Building Rating System for New Construction

1.07 RECORDS

Maintain records to document the quantity of waste generated; the quantity of waste diverted through sale, reuse, or recycling; and the quantity of waste disposed by landfill or incineration. Records shall be kept in accordance with the LEED Reference Guide and LEED Template.

PART II - PRODUCTS

2.01 MATERIALS

- A. List of each material and quantity to be salvaged, recycled, reused.
- B. List of each material and quantity proposed to be taken to a landfill.
- C. Material tracking data: Receiving parties, dates removed, transportation costs, weight tickets, tipping fees, manifests, invoices, net total costs or savings.

PART III - EXECUTION

3.01 COLLECTION

- A. Provide all necessary containers, bins and storage areas to facilitate effective waste management.
- B. Clearly identify containers, bins and storage areas so that recyclable materials are separated from trash and can be transported to respective recycling facility for processing.
- C. Hazardous wastes shall be separated, stored, disposed of according to local, state, federal regulations.

3.02 DISPOSAL

- A. Contractor shall be responsible for transporting and disposing of materials that cannot be delivered to a source-separated or mixed materials recycling facility to a transfer station or disposal facility that can accept the materials in accordance with state and federal regulations.
- B. Construction or demolition materials with no practical reuse or that cannot be salvaged or recycled shall be disposed of at a landfill or incinerator.

3.03 REPORT

- A. With each application for progress payment, submit a summary of construction and demolition debris diversion and disposal including beginning and ending dates of period covered.

- B. Quantify all materials diverted from landfill disposal through salvage or recycling during the period with the receiving parties, dates removed, transportation costs, weight tickets, manifests, invoices. Include the net total costs or savings for each salvaged or recycled material.
- C. Quantify all materials disposed of during the period with the receiving parties, dates removed, transportation costs, weight tickets, tipping fees, manifests, invoices. Include the net total costs for each disposal.

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**SECTION 01 77 00
CLOSEOUT PROCEDURES**

PART I - GENERAL

1.01 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
1. Inspection procedures.
 2. Project Record Documents.
 3. Operation and Maintenance Manuals.
 4. Warranties.
 5. Final cleaning.
- B. Related Sections include the following:
1. Division 1 Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
 2. Division 1 Section "Execution Requirements" for progress cleaning of Project site.
 3. Divisions 2 through 16 Sections for specific closeout and special cleaning requirements for products of those Sections.

1.03 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 2. Advise Owner of pending insurance changeover requirements.
 3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 4. Prepare and submit Documents (As-Built Drawings), operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.

5. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label these with manufacturer's name and model number where applicable.
 6. Make final changeover of permanent locks and deliver keys to Owner.
 7. Complete startup testing of systems.
 8. Terminate and remove temporary facilities from Project site, along with any mockups, construction tools, and similar elements.
 9. Advise Owner of changeover in heat and other utilities.
 10. Submit changeover information related to Owner's use, operation, and maintenance.
 11. Complete final cleaning requirements, including touchup painting.
 12. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 2. Results of completed inspection will form the basis of requirements for Final Completion.

1.04 FINAL COMPLETION

- A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:
1. Submit a final Application for Payment according requirements.
 2. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 3. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems installed in Work.
- B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will

notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.05 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Preparation: Submit three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
 1. Organize list of spaces in sequential order.
 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
 3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Page number.

1.06 PROJECT RECORD DOCUMENTS

- A. General: Do not use Project Record Documents for construction purposes. Protect Project Record Documents from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.
- B. Record Drawings - (As-Built Drawings): Maintain and submit one set of blue- or black-line white prints of Contract Drawings and Shop Drawings.
 1. Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
 - a. Give particular attention to information on concealed elements that cannot be readily identified and recorded later.
 - b. Accurately record information in an understandable drawing technique.
 - c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

- d. Mark Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. Where Shop Drawings are marked, show cross-reference on Contract Drawings.
- e. Include all sketches issued during bidding and construction.
2. Mark record sets in red. Use other colors to distinguish between changes for different categories of the Work at the same location.
3. Mark important additional information that was either shown schematically or omitted from original Drawings.
4. Note Construction Change Directive numbers, Change Order numbers, alternate numbers, and similar identification where applicable.
5. Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location. Organize into manageable sets; bind each set with durable paper cover sheets. Include identification on cover sheets.
6. Have the final Project Record Drawings scanned into digital PDF format and copied onto compact disks (CDs). Provide a copy of the CDs to the Owner and the architect. Insure that the copy process produces legible PDF files, in that all markings are visible and reproducible.

1.07 System, subsystem, and equipment descriptions, including OPERATION AND MAINTENANCE MANUALS

- A. Assemble two complete sets of operation and maintenance data indicating the operation and maintenance of each system, subsystem, and piece of equipment not part of a system. Include operation and maintenance data required in individual Specification Sections and as follows:
 1. Operation Data:
 - a. Emergency instructions and procedures.
 - b. System, subsystem, and equipment descriptions, including operating standards.
 - c. Operating procedures, including startup, shutdown, seasonal, and weekend operations.
 - d. Description of controls and sequence of operations.
 - e. Piping diagrams.
 2. Maintenance Data:
 - a. Manufacturer's information, including list of spare parts.
 - b. Name, address, and telephone number of Installer or supplier.

- c. Maintenance procedures.
 - d. Maintenance and service schedules for preventive and routine maintenance.
 - e. Maintenance record forms.
 - f. Sources of spare parts and maintenance materials.
 - g. Copies of maintenance service agreements.
 - h. Copies of warranties and bonds.
- B. Organize operation and maintenance manuals into suitable sets of manageable size. Bind and index data in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, with pocket inside the covers to receive folded oversized sheets. Identify each binder on front and spine with the printed title "OPERATION AND MAINTENANCE MANUAL," Project name, and subject matter of contents.

1.08 WARRANTIES

- A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 - 1. Bind warranties and bonds in heavy-duty, 3-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 the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 - 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
- D. Provide additional copies of each warranty to be included in operation and maintenance manuals.

PART II - PRODUCTS

2.01 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART III - EXECUTION

3.01 FINAL CLEANING

- A. General: Provide 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 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, fencing, machinery, and surplus material from Project site.
 - e. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - f. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, manholes, attics, and similar spaces.
 - g. Sweep concrete floors broom clean in unoccupied spaces.

- h. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
 - i. Clean new vinyl floors and apply manufacturer's approved polish/sealer with two (2) coats.
 - j. Clean new tile finish surfaces.
 - k. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - l. Remove labels that are not permanent.
 - m. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
 - m. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - n. Replace parts subject to unusual operating conditions.
 - o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - q. Clean ducts, blowers, and coils if units were operated without filters during construction.
 - r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
 - s. Leave Project clean and ready for occupancy.
- C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous

ROOF REPLACEMENT
BUILDING 110
VA MEDICAL CENTER
HAMPTON, VA

PROJECT 590-11-508

materials into drainage systems. Remove waste materials from
Project site and dispose of lawfully.

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**SECTION 04 81 00
MASONRY REPAIR**

PART I - GENERAL

1.01 SUMMARY

- A. Provide all labor, materials, equipment, permits and supervision as outlined in the Specifications and Drawings. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section. The following is a brief description of the work:
 - 1. Removal of existing masonry units and replacement with new as required to raise the existing through wall flashing in preparation for the new roof system installation.
 - 2. Removal of existing masonry units and replacement with new as required to install new through wall roof overflow scuppers.

1.02 SUBMITTALS

- A. Product data: For each type of product indicated, include recommendations for application and use. Include color samples of mortar and replacement brick.

1.03 QUALITY ASSURANCE

- A. Restoration Specialist Qualifications: Engage an experienced masonry restoration and cleaning firm to perform work of this section. Firm shall have completed work similar in material, design, and extent to that included for this project with a record of successful in-service performance.
- B. Restoration Worker Qualifications: Persons who are experienced in restoration work of types they will be performing.
- C. Source Limitations: Obtain each type of material for masonry restoration (face brick, cement, sand, etc.) from one source with resources to provide materials of consistent quality in appearance and physical properties.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Delivery masonry units to Project site strapped together in suitable packs or pallets or in heavy-duty cartons.
- B. Deliver other materials to Project site in manufacture's original unopened containers, labeled with manufacturer's name and type of products.

- C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- D. Store hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.
- E. Store sand where grading and other required characteristics can be maintained and contamination avoided.

1.05 PROJECT CONDITIONS

- A. Repoint mortar joints and repair masonry only when air temperature is between 40 and 90 degrees F and is predicted to remain so for at least 7 days after completion of work.
- B. Cold-Weather Requirements: Comply with the following procedures for masonry repair and mortar-joint pointing:
 - 1. When air temperature is below 40 deg F, heat mortar ingredients, masonry repair materials, and existing masonry walls to produce temperatures between 40 and 120 deg F.
 - 2. When mean daily air temperature is below 40 deg F, provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for 7 days after repair and painting.
- C. Hot-Weather Requirements: Protect masonry repair and mortar joint pointing when temperature and humidity conditions produce excessive evaporation of water from mortar and repair materials. Provide artificial shade and wind breaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 90 deg F and above.
- D. Patch masonry only when air surface temperatures are between 55 and 100 deg F and are predicted to remain above 55 deg F for at least 7 days after completion of work. On days when air temperature is predicted to go above 90 deg F, schedule patching work to coincide with time that surface being patched will be in shade or during cooler morning hours.
- E. Clean masonry surfaces only when air temperature is 40 deg F and above and is predicted to remain so for at least 7 days after completion.

1.06 SEQUENCING AND SCHEDULING

- A. Order replacement materials at earliest possible date, to avoid delaying completion of work.

- B. Take delivery of store at Project site a sufficient quantity of sand to complete project.

PART II - PRODUCTS

2.01 MASONRY MATERIALS

- A. Face Brick and Accessories: Provide face brick and accessories where required to complete masonry work.
 - 1. Provide units with colors, surface texture, size, and shape to match existing brickwork and with physical properties not less than those determined from preconstruction testing of selected existing units.
 - a. For existing brickwork that exhibits a range of colors, provide brick that matches that range rather than brick that matches an individual color with that range.

2.02 MORTAR MATERIALS

- A. Masonry Mortar shall match the color of the existing mortar and consist of one of the following:
 - 1. Ready mix mortar, pre-colored conforming to ASTM C-270, Type N and six parts sand conforming to ASTM C144 and potable water.

2.03 MASONRY ANCHORS

- A. Provide stainless steel corrugated veneer ties, 22 gauge, 7/8" wide x 6" long.

2.04 FLASHING MATERIALS

- A. Self Adhering Rubberized Asphalt Masonry and Window Flashing: For flashing not exposed to the exterior, use the following, unless otherwise indicated:
 - 1. Self Adhering Rubberized-Asphalt Flashing: Manufacture's standard composite flashing product consisting of a pliable and highly adhesive rubberized-asphalt compound, bonded to high-density, cross-laminated polyethylene film to produce an overall thickness of 0.040 inch.
 - a. Provide flashing as a complete system with preformed corners, end dams, other special shapes, and seaming materials all produced by flashing sheet manufacture.
 - b. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacture's standard products or products recommended by flashing

manufacture for bonding flashing sheets to each other and to substrates.

c. Available Products

1) Self Adhering Rubberized-Asphalt Flashing:

- a) Grace, W.R. & Co., Construction Products Division: Perm-A-Barrier Wall Flashing.

2.05 CLEANING MATERIALS

A. Water for cleaning: Potable.

B. Mild Acidic Cleaner: Manufacture's standard mildly acidic cleaner containing no hydrochloric, hydrofluoric, or sulfuric acid: or chlorine bleaches.

1. Products:

- a. ProSoCo: Sure Klean Light-Duty Restoration Cleaner.
b. Approved equal.

2.06 ELASTOMERIC JOINT SEALANTS

A. Sealant: Single component polyurethane sealant meeting minimum requirements of ASTM C920, Type S, Class 25, Grade NS and Use NT, M and a color to be selected by Owner.

1. Available Products:

- a. Sonneborn NP-1
b. Sika Flex 1.
c. Pecora Dynatrol 1.
d. Approved equal

PART III - EXECUTION

3.01 PROTECTION

A. Protect persons, motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm resulting from masonry restoration work.

B. Comply with the chemical cleaner manufacture's written instructions for protecting building and other surfaces against damage from exposure to its products. Prevent chemical cleaning solutions from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.

C. Prevent mortar from staining face of surrounding masonry and other surfaces.

1. Cover sills, ledges, and projections to protect from mortar droppings.

2. Keep wall area wet below rebuilding and pointing work to discourage mortar from adhering.
 3. Immediately remove mortar in contact with exposed masonry and other surfaces.
 4. Clean mortar splatters from scaffolding at end of each day.
- D. Remove surface mounted ladders, conduits, brackets attached to masonry and store during masonry restoration and cleaning. Reinstall when masonry restoration and cleaning is complete.

3.02 UNUSED ANCHOR REMOVAL

- A. Remove masonry anchors, brackets, wood nailers, and other extraneous items no longer in use or indicated to remain.
1. Remove items carefully to avoid spalling or cracking masonry.
 2. If item cannot be removed without damaging surrounding masonry, cut off item flush with surface and core drill surrounding masonry and item as close around item as practical.
 3. Patch holes where items were removed unless directed to remove and replace units.

3.03 BRICK REMOVAL AND REPLACEMENT

- A. At locations indicated, remove bricks necessary to install the new through wall flashing with end dams above the new finished roof surface, Carefully demolish or remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units. Brick removal shall be performed in sections, not to exceed 30 INCHES in length per section.
1. When removing single bricks, remove material from center of brick and work toward outside edges.
- B. Support and protect remaining masonry that surrounds removal area. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.
- C. Notify Consultant of unforeseen detrimental conditions including voids, cracks, bulges, and loose masonry units in existing masonry backup, rotted wood, rusted metal, and other deteriorated items.
- D. Remove in an undamaged condition as many whole bricks as possible.
1. Remove mortar, loose particles, and soil from brick by cleaning with hand chisels, brushes, and water.
 2. Dispose of all removed brick.

- E. Deliver cleaned clean brick not required for reuse to Owner, unless otherwise directed.
- F. Clean bricks surrounding removal areas by removing mortar, dust, and loose particles in preparation for replacement.
- G. Install new through wall flashing in accordance with the Project Drawings.
- H. Install replacement brick into bonding and coursing pattern of existing brick. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.
- I. Lay replacement brick with completely filled bed, head, and collar joints. Butter ends with sufficient mortar to fill head joints and shove into place. Wet both replacement and surrounding bricks that have ASTM C67 initial rates of absorption (suction) of more than 30 g/ 30 sq. in. per min. Use wetting methods that ensure that units are nearly saturated but surface is dry when laid. Maintain joint width for replacement units to match existing joints.
 - 1. Tool exposed mortar joints in replaced areas to match joints of surrounding existing brickwork.
 - 2. Rake out mortar used for laying brick before mortar sets and point new mortar joints in repaired area to comply with requirements for repointing existing masonry, and at same time as repointing surrounding area.

3.04 REANCHORING VENEERS

- A. Install masonry repair anchors in horizontal mortar joints and according to manufacturer's written instructions. Install at not more than 16 inches o.c. vertically and 32 inches o.c. horizontally, unless otherwise indicated. Install at locations to avoid penetrating flashing.
- B. Recess anchors at least 5/8 inch (16mm) from surface of mortar joint and fill recess with pointing mortar.

3.05 CLEANING MASONRY, GENERAL

- A. Proceed with cleaning in an orderly manner: work from top to bottom and from one end of each elevation to the other. Perform all masonry repair and cleaning prior to installation of the new roofing system. Consult Roof System Manufacturer prior to beginning work for any additional requirements.

- B. Use only those cleaning methods indicated for each masonry material and location.
 - 1. Do not use wire brushes or brushes that are not resistant to chemical cleaner being used. Do not use plastic-bristle brushes if natural fiber-brushes will resist chemical cleaner being used.
 - 2. For chemical cleaner spray application, use low-pressure tank or chemical pump suitable for chemical cleaner indicated, equipped with cone-shaped spray tip.
- C. Chemical Cleaner Application Methods: Apply chemical cleaners to masonry surfaces to comply with chemical cleaner manufacture's written instructions; use brush or spray application methods, at contractors option. Do not spray at pressure exceeding 50 psi. Do not allow chemicals to remain on surface for periods longer than those indicated or recommended by manufacture.
- D. Rinse off chemical residue and soil by working upward from bottom to top of each treated area at each stage or scaffold setting. Periodically during each rinse, test ph of rinse water running off of cleaned area to be determined that chemical cleaner is completely removed.

3.06 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.

3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing the surfaces thoroughly with clear water.
5. Clean brick by the bucket-and-brush hand-cleaning method described in BIA Technical Notes No. 20, using job-mixed detergent solution.
6. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
7. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2 applicable to type of stain on exposed surfaces.
8. Clean limestone units to comply with recommendations in the Indiana Limestone Institute of America's "Indiana Limestone Handbook."

3.07 MASONRY WASTE DISPOSAL

- A. Recycling: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Disposal as Fill Material: Dispose of clean masonry waste, including broken masonry units, waste mortar, and excess or soil-contaminated sand, by crushing and mixing with fill material as fill is placed.
 1. Crush masonry waste to less than 4 inches (100 mm) in each dimension.
 2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Division 2 Section "Earthwork."
 3. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.
- C. Excess Masonry Waste: Remove excess, clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

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**SECTION 06 10 50
MISCELLANEOUS CARPENTRY**

PART I - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes the following:

Wood nailers and wood blocking

Related Sections include the following:

Division 7, Section 07 21 00 "Fluid Applied PMMA Liquid Resin Roofing"

Division 7, Section 07 22 00 "Roof Deck and Insulation"

Division 7, Section 07 55 00 "Modified Bituminous Membrane Roofing"

Division 7, Section 07 62 00 "Sheet Metal Flashing"

1.03 UNIT PRICES

A. Replacement of deteriorated wood blocking and nailers in excess of 500 linear feet for each of the following: 2" x 4", 2" x 6", 2" x 8" and 2" x 10", which is provided for in the base bid, will be considered an addition to the Contract. Wood blocking and nailers indicated as new in the Drawings are to be provided for in the base bid and will not be considered an addition to the Contract. The Consultant and Contractor verify all quantities prior to replacement. The following is a description of the Work to be included in the unit price:

1. Wood nailer and blocking replacement will include removal and disposal of existing, provide new wood nailers or blocking to match existing size, and new insulation height, secure in accordance with the specifications and details. The unit of measure shall be lineal feet.

1.04 DEFINITIONS

A. Miscellaneous carpentry includes carpentry work not specified as a part of other Sections and generally not exposed, unless otherwise specified.

1.05 WORK INCLUDED

- A. Provide all labor, materials, equipment and supervision necessary to provide wood nailers as outlined in the Specifications and on the enclosed Drawings. The following is a brief summary of the Work:
1. Provide new wood nailers to raise the height of all existing roof curbs on where necessary to provide 8" of flashing height above the finished roof.
 2. Provide new wood nailers to match the height of the new roof insulation at all curbs and perimeter locations.
 3. Provide new wood nailers under new edge gravel stop metal per specifications and details.

1.06 DELIVERY, STORAGE, AND HANDLING

Provide polyethylene tarps to keep all materials under cover and dry. Stack lumber with spacers between bundles to allow air circulation. Secure tarps at the end of each day or in the event of inclement weather.

1.07 SCHEDULING

Coordinate Work of this Section with interfacing and adjoining Work for proper sequencing of each installation. Ensure best possible weather resistance, durability of Work, and protection of materials and finishes.

PART II - PRODUCTS

2.01 MATERIALS

- A. Miscellaneous Fasteners: Provide fasteners as indicated on the Fastener Schedule in the Drawings. All fasteners shall be corrosion resistant.
- B. Wood Nailers/Blocking: Shop pressure-treated southern yellow pine using waterborne preservatives in accordance with American Wood Preservers Association (AWPA) Standard C2 with a minimum preservative retention of 0.25 lbs./cu. ft. Minimum of Grade No. 2 wood of the nominal dimensions indicated on the attached Drawings.
- C. Plywood: APA rated sheathing, ½" and ¾ inch thick, Exposure 1, one side C Grade, one side D Grade (CDX). Sizes are indicated on the drawings.
- D. Tapered Wood Shims: Exterior exposure rated wood, sized to provide ½" per foot slope towards roof.

- E. Sealant: A single component polyurethane sealant which meets the minimum requirements of Federal Specification TT-S-001543A, Class A and ASTM C 920, Type S, Grade NS, Class 25. No required color.

PART III - EXECUTION

3.01 EXAMINATION

- A. Verify measurements and dimensions shown before proceeding with carpentry work.
- B. Examine supporting structure and conditions to which carpentry will be installed. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 WOOD NAILER INSTALLATION

- A. Provide wood nailers and blocking where shown on the attached Drawings.
- B. Secure all wood blocking in accordance with the specifications and details.
- C. Countersink fasteners flush with surfaces.
- D. Provide washers under bolt heads and nuts in contact with wood.
- E. Interlace ends of boards at corners and stagger end laps between board layers.
- F. Cut boards to make tight connections between members. Replace any boards which split during fastening.
- G. Do not wax or lubricate fasteners that depend on friction for holding power.

3.03 CURB INSTALLATION

- A. Provide new wood roof curb extensions as required to maintain required 8" minimum height of finished roof, as indicated in the Drawings. Size the new curbs fit existing penetrations and curb mounted equipment. Construct new curbs from lumber with the nominal dimensions indicated on the drawings.
- B. Verify that the existing penetrations, nailers and roof-mounted equipment are properly secured. Provide fasteners to secure any equipment or nailers found to be loose. If deteriorated nailers are encountered, they should be replaced prior to installing the roof system. The Consultant will verify the quantity prior to replacement.

3.04 JOB SITE CLEANUP

- A. All debris shall be removed from the job site by the Contractor in accordance with Contract provisions.

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SECTION 07 22 00
ROOF DECK AND INSULATION

PART I - GENERAL

1.01 SCOPE OF WORK

- A. Provide all labor, equipment, and materials to install new roof insulation over the properly prepared deck substrates. The insulations required shall be as below:
- B. Install new 3" polyisocyanurate insulation per specifications and details.
- C. Install new 5/8" gypsum board over new insulation and insulation crickets, at curbs and walls, per specifications details.

1.02 RELATED SECTIONS

- A. Drawings and general provisions of the Contract, including General Supplementary Conditions and Division 1 Specification Sections apply to this section.
- B. Related work specified elsewhere:
 - 1. Division 7 Section "Modified Bitumen Roofing."
 - 2. Division 7 Section "Flashing and Sheet Metal."

1.03 REFERENCES

ASTM A-167-94a	Specification for Stainless and Heat-Resisting Chromium Nickel Steel Plate, Sheet and Strip
ASTM A-653	Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process
ASTM B-29	Pig Lead
ASTM B-32	Solder Metal
ASTM C-165-95	Test Method for Measuring Compressive Properties of Thermal Insulation
ASTM C-208-95	Specifications for Cellulosic Fiber Insulating Board
ASTM C-209-92	Test Method for Cellulosic Fiber Insulating Board
ASTM C-272-91	Test Method for Water Absorption of Core Materials for Structural Sandwich Constructions
ASTM C-36	Specification for Gypsum Wallboard
ASTM C-518-91	Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
ASTM C-578-92	Specification for Rigid, Cellular, Polystyrene Thermal Insulation

ASTM C-728-91	Specification for Perlite Thermal Insulation Board
ASTM D-5	Test Method for Penetration of Bituminous Materials
ASTM D-36	Test Method for Softening Point of Bitumen (Ring and Ball Apparatus)
ASTM D-312	Specification for Asphalt Used in Roofing
ASTM D-412-92	Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension
ASTM D-1621-94	Test Method for Compressive Properties of Rigid Cellular Plastics
ASTM D-1622	Test Method for Apparent Density of Rigid Cellular Plastics
ASTM D-1863	Specification for Mineral Aggregate Used on Built-Up Roofs
ASTM D-2126-94	Test Method for Response off Rigid Cellular Plastics to Thermal Humid Aging
ASTM D-2178	Standard Specification for Asphalt Glass Felts used in Roofing and Waterproofing
ASTM D-4601-94	Specification for Asphalt-Coated Glass Fiber Base Sheet Used in Roofing
ASTM D-5147	Sampling and Testing Modified Bituminous Sheet Material
CISPI	Cast Iron Soil Pipe Institute, Washington, D.C.
FM	Factory Mutual System, Norwood, Massachusetts
NRCA	National Roofing Contractors Association, Chicago, IL
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SDI	Steel Deck Institute, St. Louis, Missouri
SPIB	Southern Pine Inspection Bureau, Pensacola, Florida
UL	Underwriter's Laboratories, Inc., Northbrook, Illinois
FS HH-I-1972	Insulation Board, Polyisocyanurate
FS LLL-1-535B	Insulation Board, Thermal (Fiberboard)
WH	Warnock Hersey International, Inc., Middletown, Wisconsin

1.04 SUBMITTALS

- A. Submit under provisions of Section 01300 - Submittals.
- B. Product Data: Provide manufacturer's specification data sheets for each product in accordance with Section 01300.
- C. Provide approval letters from insulation manufacturer for use of their insulation within this particular roofing system type.

- D. Provide a sample of each insulation type.
- E. Shop Drawings
 - 1. Submit manufacturer's shop drawings indicating complete installation details of tapered insulation system, including identification of each insulation block, sequence of installation, layout, drain locations, roof slopes, thicknesses, crickets and saddles.
 - 2. Shop drawing shall include: Outline of roof, location of drains, complete board layout of tapered insulation components, thickness and the average "R" value for the completed insulation system.
- F. Certification
 - 1. Submit roof manufacturer's certification that insulation fasteners furnished are acceptable to roof manufacturer.
 - 2. Submit roof manufacturer's certification that insulation furnished is acceptable to roofing manufacturer as a component of roofing system and is eligible for roof manufacturer's system warranty.
 - 3. Submit certification that insulation and fastening system furnished is Tested and Approved by Factory Mutual for 1-90 Wind Up-Lift Requirements.

1.05 QUALITY ASSURANCE

- A. Fire Classification, ASTM E-108
- B. Submit certification that the roof system furnished is approved by Factory Mutual, Underwriters Laboratories or Warnock Hersey for external Fire E-108 Class 1A and that the roof system is adhered properly to meet or exceed 1-90.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site with seals and labels intact, in manufacturer's original containers, dry and undamaged.
- B. Store all insulation materials in a manner to protect them from the wind, sun and moisture damage prior to and during installation. Any insulation that has been exposed to any moisture shall be removed from the project site.
- C. Keep materials enclosed in a watertight, ventilated enclosure (i.e. tarpaulins).
- D. Store materials off the ground. Any warped, broken or wet insulation boards shall be removed from the site.

PART II - PRODUCTS

2.01 INSULATION MATERIALS

A. Provide thicknesses of insulation as indicated, provide combination of types and thicknesses to provide a complete system.

1. RIGID POLYISOCYANURATE ROOF INSULATION

a. Qualities: Rigid, closed cell polyisocyanurate foam core bonded to heavy duty glass fiber mat facers.

- 1) Thickness: 3 in.
- 2) R-Value: Minimum 15.0
- 3) Thickness: 1 in.
- 4) R-Value : Minimum 5.0

b. Source

- 1) AC-FoamII by Atlas Roofing Corporatoin
- 2) Paratherm by Siplast of Irving Texas
- 3) GAFTEMP Isotherm R by GAF
- 4) Approved Equivalent

c. Insulation board shall meet the following requirements

- 1) UL, WH or FM listed under Roofing Systems
- 2) Federal Specification HH-I-1972, Class 1

d. Physical Properties

Dimensional Stability	ASTM D-2126	2% max.
Compressive Strength	ASTM D-1621	25 psi min.
Vapor Permeability	ASTM E-96	1 perm max.
Foam Core Density	ASTM D-1622	2.0 pcf min.
Water Absorption	ASTM C-209	<1%
R-Factor	HR	per inch
Thickness	ASTM C-518	5.6 (Design Value)

PART III - EXECUTION

3.01 INSPECTION OF SURFACES

A. Roofing contractor shall be responsible for preparing an adequate substrate to receive insulation.

1. Verify that work which penetrates roof deck has been completed.
2. Verify that wood nailers are properly and securely installed.
3. Examine surfaces for defects, rough spots, ridges, depressions, foreign material, moisture, and unevenness.
4. Do not proceed until defects are corrected.

5. Do not apply insulation until substrate is sufficiently dry.
6. Broom clean substrate immediately prior to application.
7. Use additional insulation to fill depressions and low spots that would otherwise cause ponding water.
8. Verify that temporary roof has been completed.

3.02 INSTALLATION

- A. For concrete deck location on a clean concrete deck, install the following:
 1. Install 3" polyisocyanurate insulation in a low rise foam adhesive such as High Velocity Insulation Adhesive III as manufactured by Soprema, Inc., per manufacturer's application requirements, or as supplied and recommended by the roof membrane manufacturer.
 2. Install 5/8" gypsum board over polyisocyanurate insulation and in a low rise foam adhesive such as High Velocity Insulation Adhesive III as manufactured by Soprema, Inc., per manufacturer's application requirements, or as supplied and recommended by the roof membrane manufacturer.

3.03 CLEANING

- A. Remove debris and cartons from roof deck. Leave insulation clean and dry, ready to receive roofing membrane.

- - - E N D - - -

SECTION 07 55 00
MODIFIED BITUMINOUS MEMBRANE ROOFING

PART I - GENERAL

1.01 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.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Roof Demolition
 - 2. Modified Bitumen Roof Membrane System
- B. Related Sections include the following:
 - 1. Division 6, Section 06 10 50 "Miscellaneous Carpentry"
 - 2. Division 7, Section 07 21 00 "Fluid Applied PMMA Liquid Resin Roofing"
 - 3. Division 7, Section 07 22 00 "Roof Deck and Insulation"
 - 4. Division 7, Section 07 62 00 "Sheet Metal Flashing"
 - 5. Division 9, Section 09 25 00 "Gypsum Roof Board"
- C. Roofing Terminology: Refer to ASTM D 1079 for definition of terms related to roofing work not otherwise defined in this Section.

1.03 WORK INCLUDED

- A. This project involves replacing selected roof areas of the existing roof system at Building 110, Department of Veterans Affairs in Hampton, Virginia. Provide labor, materials, equipment and supervision to perform roof replacement as outlined in the Specifications and on the enclosed Drawings. The following is a brief summary of the work:
- B. The work covered by this contract shall include, but is not limited to the following:
- C. Remove existing roofing systems consisting of but not limited to roofing systems, gravel, roofing membranes, membrane flashings, insulations, metal and terminations.
- D. Remove obsolete equipment, roof drains, curbs and blocking as shown on DEMO PLAN. Where roof drains, roof curbs, obsolete mechanical equipment and pitch pockets were removed during demolition, provide and install new roof decking, gauge, thickness and type to match existing

at each location. All decking shall be installed as per specifications and details.

- E. Examine existing roof deck and bring to the COR's attention any defective, deteriorated or unsuitable roof decking. Examine existing wood blocking at curbs, penetrations and perimeters and replace any unsuitable blocking with new blocking as per specifications and details. Raise all penetrations and curbs and sleeper curbs to be a minimum of 8" above finished roof surface.
- F. For roof area with Gypsum deck substrate: Provide and install new type II base sheet to cleaned and vacuumed roof deck using approved Gypsum deck fasteners per 1-90 fastening requirements. Provide and install new specified Energy Star Compliant Modified Bitumen Roofing System with specified PMMA resin based flashings. Provide and install new PMMA resin based pipe, drain, wall, curb and penetration flashings as per specifications and drawings.
- G. For roof areas with concrete deck substrates: Provide and install new 3" Polyisocyanurate insulation in specified insulation adhesive and new 5/8" gypsum board on top of new Polyisocyanurate insulation in specified insulation adhesive. Prime gypsum board as required by roof membrane manufacturer, then provide and install new specified Energy Star Compliant Modified Bitumen Roofing System with specified PMMA resin based flashings. Provide and install new PMMA resin based pipe, drain, wall, curb and penetration flashings as per specifications and drawings.
- H. Provide all Electrical, Plumbing and Mechanical Disconnects and Reconnects as required to lift and reinstall existing HVAC units. Provide and install new sleeper curbs for all HVAC units on wood sleepers or fibrous plates, per specifications and drawings.
- I. Provide and install new .050 aluminum fascia, edge metals, HVAC counterflashing, coping caps and curb cap flashings, though wall and overflow roof scuppers and .063 aluminum continuous cleats, fasteners, membrane, sealants, terminations, wood blocking, per specifications and details. Provide and install new 26 gauge stainless steel through wall counterflashing and provide masonry professional to perform all required masonry removals and replacements per specifications and details.

- J. For all roof areas, provide and install new HVAC condensate lines, support blocking and slip sheet protection. For all roof areas (where gas lines are present), provide and install new Gas line support blocking and slip sheet protection. For all roof areas provide and install roof system manufacturer approved walk pads at the entry and exit points of all roof ladders, doors and steps. For all roof areas, clean and paint with rust inhibiting paint, all pipe penetrations, roof top ventilators roof top ventilator hoods, and access steps per specifications and drawings. For all roof areas provide and install new Cast Iron roof drain clamping rings, drain strainers and new stainless steel clamping ring bolts and washers.
- K. Provide a new 2-ply modified bitumen membrane: a smooth-surfaced torch applied modified bitumen base ply and LEED Certified Energy Star Compliant Modified Membrane cap sheet for all roof areas. (Basis for Design: SOPREMA SOPRASTAR). The cap sheet will be applied in cold membrane adhesive to the properly installed torch applied modified bitumen base ply for all roof areas. All end laps and side laps of the cap sheet shall be heat welded. For concrete deck roof areas, the modified bitumen base ply shall be installed over the primed and properly attached new gypsum insulation cover board and properly attached new Polyisocyanurate insulation.
- L. Provide new PMMA resin based flashing systems at all curbs, perimeters, walls, pipes and at all drain locations. PMMA resin based flashing systems to be installed per Roof System Manufacturer's requirements and detailing.
- M. All work shall be performed in accordance with the Specifications, Drawings, Details and following the membrane manufacturer's installation requirements.
- O. Provide Contractor's one-year and manufacturer's 20 year NDL roof system warranty.

1.04 SUBMITTALS

- A. Submit a list of manufacturer names and products to be utilized for the following materials.
 - 1. Energy Star Compliant, Modified Bitumen Membrane
 - 2. Smooth-Surfaced, Torch Applied Modified Bitumen Membrane
 - 3. Torch Applied Modified Bitumen Flashing
 - 4. Polyisocyanurate Insulation

5. Asphalt Primer
6. Reinforcing Fabric
7. Roof Cement
8. Type III Asphalt
9. Flashing Cement
10. Stripping Plies
11. Type II Fiberglass Base Sheet
12. PMMA Liquid Applied Flashing System
13. 5/8" Type "X" Gypsum Board
14. Low Rise Foam Insulation and Gypsum Board Adhesive
15. Gypsum Deck Base Sheet Fasteners
16. Cast Iron Roof Drain Clamping Rings, Cast Iron Roof Drain Strainers and Stainless Steel Clamping Ring Bolts and Washers.

1.05 QUALITY ASSURANCE

- A. Applicator: Company specializing in Cold Process Modified Bitumen roof application with five years experience and currently listed as an Approved Contractor for the roof system selected. Contractor must have at least five years as an Approved Contractor for the Roof System Manufacturer selected. Jobsite Foreman must have a minimum of three years documented experience installing Cold Process Modified Bitumen Roofing Systems. Foreman's resume shall be submitted with other submittals after award, in accordance with contract documents.
- B. Manufacturer: Energy Star Compliant Modified Bitumen Membrane Roof System and all of its components shall be obtained from a single manufacturer. Manufacturer shall have Energy Star Compliancy for a minimum of three years for the product submitted. A minimum solar reflectance of .71 after three years in the field is required. Factory Applied Coatings to achieve Energy Star Compliancy are not acceptable. PMMA Resin Based Flashing Systems shall be manufactured by the Roof System Manufacturer and included in the 20 year NDL roof system warranty. Secondary materials (adhesives, fasteners, etc.) shall be provided as specified and included in the warranty issued by the primary membrane manufacturer.
- C. Manufacturer's full time technical representative shall visit the site a minimum of every week during the installation of the roofing system for purposes of reviewing materials installation practices and adequacy of work in place. This representative shall not be the material

manufacturer's sales representative, but a full time employee of the material manufacturer whose primary duty is roofing inspections for the roof systems manufacturer. This representative must have at least 5 years documented experience with the roof system manufacturer, inspecting the installation of Cold Processed Modified Bitumen Roofing Systems as a Roof System Manufacturer's Field Inspector. After each inspection, a report of work in progress with digital images, signed by the manufacturer's full time technical representative shall be submitted to the Architect, Owner and the Architect's Roofing Consultant within 3 working days. The report shall note overall quality of work, deficiencies and any other concerns, and recommended corrective action. Manufacturer's Roofing Inspector's resume shall be submitted with other submittals in accordance with contract documents for review.

- D. No portion of the Roofing System or Roofing Insulation, Flashings, Terminations, Nailers, Copings or Edge Metal Applications shall be sub-contracted. All roofing related work shall be performed by the Contractor and their full time employees only. All Masonry, Plumbing, Mechanical and Electrical work shall be performed by licensed, qualified, competent firms specializing in the specified scope of work, supplied by the Contractor.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original containers, dry, undamaged, seals and labels intact.
- B. Store materials in staging area on pallets and cover with tarps, which are securely fastened to the pallets. All rolled goods shall be stored on pallets with all rolls standing upright, on end. Any rolled good stored lying on down (not upright on end) shall be discarded. **Do not store any materials on roof top.**
- C. Certify that all of the materials supplied for the modified bitumen membrane meet specified requirements. Certificates shall be signed by an official authorized to certify on behalf of the material supplier or product manufacturer and shall identify quantity and date or dates of shipment or delivery to which the certificates apply.
- D. The Contractor is responsible for protecting all materials from the elements. If any material, such as insulation, becomes wet, it cannot be installed and must be replaced at the Contractor's sole expense.

NOTE: Insulation and rolled roofing materials must be covered with waterproof tarps at the end of each work day. Plastic wrappers supplied by the insulation or rolled goods manufacturers are not acceptable substitutes for tarps. The Owner's Representative will reject any covering method or material which does not adequately protect roofing materials.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply roofing membrane during inclement weather or when air temperature may fall below 40 degrees F. Do not apply remove or apply roofing if the chance of precipitation is 30% or greater.
- B. Do not apply roofing membrane to damp, wet or frozen deck surface.
- C. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.
- D. All products utilized shall be asbestos free.

1.08 SCHEDULING

- A. Coordinate Work of this Section with interfacing and adjoining Work for proper sequencing of each installation. Ensure best possible weather resistance, durability of Work, and protection of materials and finishes.

1.09 GENERAL REQUIREMENTS

- A. The Contractor shall be responsible for not overloading the roof.
- B. The Contractor will not disturb the existing roof top equipment unless required for the proper installation of the roof system and will be responsible for immediate repairs should they be disturbed.

1.10 INSPECTION OF WORK IN PROGRESS AND UPON COMPLETION

- A. If directed by the Owner's Representative, the Contractor shall cut not more than four (4) cores, of approximately 200 square inches each, from every newly constructed roof area, in order to establish the amount of materials used per square foot, and shall restore all such areas to sound and watertight conditions as prior to the core testing.
- B. In the event that such core cuts disclose any deficiency in materials, or soundness of construction, the Contractor shall at his/her own expense apply additional materials or otherwise correct the deficiencies to the satisfaction of the Owner's Representative.

1.11 LEAKAGE DAMAGES

- A. Damages caused by water infiltration resulting from the failure of the Contractor to secure each day's work in a weather tight manner, will be

corrected at the Contractors sole expense. Included as damages will be all labor costs incurred the Owner as a result of such water infiltration.

1.12 WARRANTY

- A. Provide manufacturer's full system, twenty-year, no dollar limit roof system warranty for workmanship and materials, and damage to work resulting from failure of roofing membrane. Manufacturer's warranty shall cover but not limited to all through roof penetrations, edge metals, counterflashings, coping caps, insulation systems and gypsum board insulations, in the twenty-year, no dollar limit warranty.
 - 1. If within the warranty period the roof system, as installed for its intended use in the normal climatic and environmental conditions of the facility, becomes non-watertight, shows evidence of moisture intrusion within the assembly, develops blisters, splits, tears, delaminates, separates at the seams, or shows evidence of excessive weathering due to defective materials or installation workmanship, the repairs or replacement of the defective and damaged materials of the roof assembly and correction of defective workmanship shall be the responsibility of the roof membrane manufacturer. All costs associated with the repair or replacement work shall be the sole responsibility of the roof membrane manufacturer. Roof blisters shall be repaired by the roof system manufacturer before they burst or cause openings to the roof system and prior to water entry to the roofing assembly and into the building envelope.
 - 2. When the manufacturer or his approved applicator fail to perform the repairs within 72 hours of notification, emergency temporary repairs performed by others shall not void the warranty.
- B. Provide one-year Contractor's Roofing Warranty for materials and installation. This shall apply to defects regardless of whether leaks are occurring. Defects may include fishmouths, splits, open laps, delamination, blisters, insulation voids, improper securement, improper detailing, and defects in sheet metal work.

PART II - PRODUCTS

2.01 SHEET MATERIALS

ROOFING MEMBRANE ASSEMBLY: A roof membrane assembly consisting of 2 plies of a prefabricated, reinforced, homogeneous Styrene-Butadiene-Styrene (SBS) block copolymer modified asphalt membrane, secured to a

prepared substrate. Both reinforcement mats shall be impregnated and coated each side with a high quality SBS modified bitumen blend. The roof system shall pass 500 cycles of ASTM D 5849 Resistance to Cyclic Joint Displacement (fatigue) at 14°F (-10°C). Passing results shall show no signs of membrane cracking or interply delamination after 500 cycles. The roof system shall pass 200 cycles of ASTM D 5849 after heat aging. The assembly shall possess waterproofing capability, such that a phased roof application, with only the modified bitumen base ply in place, can be achieved for prolonged periods of time without detriment to the watertight integrity of the entire roof system. Provide a modified membrane cap sheet with a surface that is Energy Star rated with the following minimum requirements.

1. Highly reflective and emissive roof surface as listed with the CRRC (Cool Roof Rating Council).
 - a. Reflectivity: 0.76
 - b. Emissivity: 0.85
 - c. SRI (Solar Reflectance): 92

The basis for design of the Energy Star Compliant, Cool Roofing Rating Council Listed Modified Membrane Roofing System is Sopraplast as Manufactured by Soprema, Inc of Wadsworth, Ohio. Subject to compliance with requirements, manufacturers offering products that may be incorporated in Work include but are not limited to, the following:

1. Roofing System Membrane Manufacturer
 - a. Soprema, Inc.
 - b. Siplast, Inc
 - c. Tremco, Inc
 - d. Roofing System Membrane Manufacturer approved in advance by the owner and meeting all performance and warranty criteria of the products specified as basis for design or Roofing System Membrane Manufacturers as listed above.
- A. Base Sheet: ASTM D 4601 Type II (To be Used as Nailed Base Sheet over Existing Gypsum Roof Deck).
 1. Basis of Design: **Sopra-G** by SOPREMA.
 2. Description: Base Sheet shall have a sanded top and bottom surface.
 3. Components: Oxidized bitumen with fiberglass reinforcement.
 4. Application: This membrane is to be mechanically fastened.
 5. SBS Bitumen Physical Properties:

- a. Net Dry Mass (lb./100 sq. ft.): 27.7
 - b. Moisture (% max @ time of mfg.): <1
 - c. Mass of desaturated glass mat (lb./100 sq. ft.): 1.6
 - d. Asphalt (min. lb./100 sq. ft.): 10
 - e. Load strain properties @ 77 degrees F (MD/XD) 60/44
 - f. Pliability (1/2 in. radius failures): No Cracking
6. Membrane Weight and Measurement:
- a. Approximate Weight Per Square Foot of Coverage: 0.267 lb
 - b. Approximate Thickness: 48 Mils (1.2 mm)
- B. Membrane Base Ply: ASTM D 6163 Type I, Grade S (To be Torch Applied over new Nailed Type II Base Sheet for Gypsum Deck and over new 5/8" Gypsum Roof Board on Insulated Concrete Decks.
1. Basis of Design: **Elastophene Flam** by SOPREMA.
 2. Description: Field base ply shall have a plastic burn-off top and bottom surface.
 3. Components: Reinforcement shall be fiberglass. Elastomeric asphalt shall be a mix of selected bitumen and SBS thermoplastic polymer.
 4. Application: This membrane is adhered by heat welding.
 5. SBS Bitumen Physical Properties:
 - a. Tensile Strength @ 73.4 degree F, lbf/in (MD/XD): 57/57
 - b. Elongation @ 73.4 degree F, % (MD/XD): 4.0/4.0
 - c. Tear Strength @ 73.4 degree F, lbf (MD/XD): 82/73
 - d. Low Temperature Flex degree F, max. -15
 - e. Compound Stability Temp F (MD/XD) 215/215
 6. Membrane Weight and Measurement:
 - a. Approximate Weight Per Square Foot of Coverage: 0.8513 lb
 - b. Approximate Thickness: 116 Mils (2.9 mm)
- C. Membrane Cap Ply: ASTM D 6164 Type II, Grade S (To be Applied in Cold Process Asphalt over new Torch Applied Membrane Base Ply)
1. Basis of Design: **Soprastar Sanded** by SOPREMA.
 2. Description: Field cap ply shall have a reflective white top surface and a sanded underside with a Solar Reflectance of .78. SRI of 96 (Initial) and SRI of 85.9 (Weathered). Soprastar Sanded membrane is manufactured with **fire retardant** agents (FR) for UL and ASTM E-108 Class A.
 3. Components: Reinforcement shall be polyester. Elastomeric asphalt shall be a mix of selected bitumen and SBS thermoplastic polymer.

4. Application: This membrane is adhered by heat welding.
 5. SBS Bitumen Physical Properties:
 - a. Tensile Strength @ 73.4 degree F, lbf/in (MD/XD): 105/90
 - b. Elongation @ 73.4 degree F, % (MD/XD): 59/78
 - c. Tear Strength @ 73.4 degree F, lbf (MD/XD): 138/162
 - d. Low Temperature Flex degree F, max. -15
 - e. Compound Stability Temp F (MD/XD) 239/239
 6. Membrane Weight and Measurement:
 - a. Approximate Weight Per Square Foot of Coverage: 0.8866 lb
 - b. Approximate Thickness: 138 Mils (3.5 mm)
- D. Liquid Applied Flashings : Catalyzed PMMA resin, with encapsulated polyester fleece reinforcement, which is VOC compliant and solvent free. Apply in accordance with the roofing membrane manufacturer's printed application instructions. Must be included and covered in the roof system manufacturer's 20 year, full system, no dollar limit warranty. ONLY PMMA RESIN BASED PRODUCTS SHALL BE USED FOR FLASHING OF ROOF PENETRATIONS, CURBS, PERIMETERS, WALL FLASHINGS, AND DRAINS. NO ASPHALT BASED PRODUCTS SHALL BE ALLOWED FOR FLASHING IN LIEU OF PMMA RESIN BASED PRODUCTS.
1. Basis of Design: Alsan RS reinforced flashing system by Soprema, or approved equal.
 2. Catalyst: A reactive agent used to induce curing of polymethylmethacrylate (PMMA) resins.
 3. Resin for Flashing Applications: A multi-component, flexible, polymethylmethacrylate (PMMA) based resin combined with a thixotropic agent for use in combination with fleece fabric to form a monolithic, reinforced flashing membrane.
 4. Fleece for Membrane and Flashing Reinforcement: A non-woven, 100 g/m², needle-punched polyester fabric reinforcement as supplied by the membrane system manufacturer.
 5. Thixotropic Agent: a liquid additive used to increase the viscosity of the PMMA resin products, allowing the resins to be applied over sloped areas.

2.02 ADHESIVES

- A. Membrane Cold Adhesive: A blend of special adhesive asphalts and safe, high flash, quick drying solvents that meets or exceeds ASTM D 4479, Type II requirements, as provided by the roof systems manufacturer.

B. Flashing Cement: Meeting minimum requirements of ASTM D4586, Type II flashing cement or as required by primary roof membrane manufacturer.

C. Roof Cement: Meeting minimum requirements of ASTM D4586, Type II flashing cement or as required by primary roof membrane manufacturer.

2.03 PRIMER

A. Primer: Meeting minimum requirements of ASTM D41 primer or as required by primary roof membrane manufacturer.

B. Gypsum Board Primer: As required by roof membrane manufacturer.

2.04 COATINGS

A. Aluminized Coating: Meeting minimum requirements of ASTM D2824, Type III, non-asbestos fiber aluminized coating or as required by primary roof membrane manufacturer.

2.05 ACCESSORIES

A. Non-shrink Grout: Portland cement based, preblended grout meeting minimum requirements of ASTM C1107.

B. Cant Strips: Wood fiber strips. Tapered rigid wood fiber board meeting the minimum requirements of ASTM C 208 with a minimum compressive strength of 45 psi. The insulation must be approved by the primary membrane manufacturer for use with the roof system. The cant strip must have approximate dimensions of 1-1/2 inches by 3-7/8 inches by 48 inches.

C. Ceramic Granules: No. 11 Grade Ceramic granules of color matching the granule surfacing of the cap sheet (if Ceramic Granule Cap Sheet is Used).

2.06 SEALANTS

A. Polyurethane Sealant: Single component polyurethane sealant meeting minimum requirements of ASTM C920, Type S, Grade NS, Class 25 and Use NT, M and A; Color to be selected by the Owner from the manufacturers standard color chart.

B. Pitch Pockets: No conventional pitch pockets shall be accepted. All conduits, piping, plumbing vent pipes, wiring, wind screen support metals etc. shall be flashed with a PMMA resin based liquid applied flashing system as supplied by the primary roof membrane manufacturer.

C. Sealing Butyl Tape: Pliable, asbestos free, tacky, 100% solids, pressure sensitive, extruded tape made of butyl rubber polymers.

PART III - EXECUTION

3.01 PROTECTION

- A. Protect building surfaces against damage from roofing work.
- B. Where work must continue over finished roof membrane, protect surfaces.

3.02 EXISTING ROOF PREPARATION

- A. Within one working day, remove no more existing roofing materials than can be replaced and covered with roofing membrane BEFORE END OF WORKDAY, or BEFORE ONSET OF INCLEMENT WEATHER. PHASED ROOF CONSTRUCTION IS NOT PERMITTED FOR ANY REASON.
- B. On all roof sections remove and dispose of the existing membranes and components including but not limited to the roof membrane, gravel, flashing membranes, stripping plies, insulation, cant strips, mastics, coping caps, HVAC caps and flashings, edge metal, fasteners, metal accessories, vegetation and debris etc.
- C. Remove existing roofing materials by cutting into small manageable sections and lowering material into a dumpster with a hoist and bucket or use of a covered chute. **Do not stockpile debris on roof areas or building grounds.**
- D. Dispose of all debris in a landfill off-site in accordance with applicable regulations.
- E. Examine the existing roof deck and determine if it is in suitable condition for roof system installation. If unsuitable conditions are encountered, contact the Consultant. Examine for unsound material, incomplete work, or other conditions unsuitable for proper installation or performance of the insulation and membrane. Do not start roof system application until defective existing construction has been corrected. Replace damaged or defective wood nailers to match the height and slope of the new insulations at all locations, to attain proper attachment and performance of roofing.
- F. For roof areas with Gypsum deck substrates: Over a clean, sound and properly prepared Gypsum roof deck, provide and install a new type II base sheet with new Gypsum deck base sheet fasteners per FM 1-90 fastening requirements. Over the properly installed new type II base sheet, provide and install the new specified Leed Certified Energy Star Compliant Roof System per specifications and drawings.
- G. For roof areas with concrete deck substrates: Over a clean, sound and properly prepared concrete roof deck, (prime concrete roof deck and provide and torch apply new SBS base sheet vapor retarder) provide and install new Polyisocyanurate roof insulation in the specified low rise

adhesive, new gypsum board on top of the new Polyisocyanurate roof insulation in the specified low rise adhesive. Install new nailers to match new insulation heights as per specifications and drawings. Prime gypsum board as required by roof membrane manufacturer, then provide and install the new specified LEED Certified Energy Star Compliant Roof System per specifications and drawings.

- H. Beginning installation of roofing system indicates acceptance of substrate.

3.02 MEMBRANE APPLICATION

- A. For Gypsum Deck Roof Areas:

To the properly prepared gypsum roof deck, provide and install a new type II base sheet with new base sheet fasteners per FM 1-90 fastening requirements. Over the properly installed new type II base sheet, provide and install a new torch applied modified membrane base ply. Over the properly installed new modified membrane base ply, provide and install a new LEED Certified Energy Star Compliant Modified Membrane Cap Ply in cold process adhesive, heat welding all end and side laps with a mechanical membrane welding machine. Install new new PMMA Resin Based Flashings per Roof System Manufacturer's requirements and per specifications and drawings.

- B. For Metal Concrete Roof Areas:

To the properly prepared and inspected concrete roof deck, (clean concrete roof deck, prime with ASTM D-41 Primer, provide and install new SBS torch applied base sheet vapor barrier) provide and install new specified roof base insulations and gypsum cover board per sections 07 22 00 and 07 92 50. Prime the properly installed gypsum cover board with ASTM -D41 primer and allow to dry. Over the properly primed gypsum cover board, provide and install new a new torch applied modified membrane base ply. Over the properly installed modified membrane base ply, provide and install a new Energy Star Compliant Modified Membrane Cap Ply in cold process adhesive, heat welding all end and side laps with a mechanical membrane welding machine. Provide and install new PMMA Resin Based Flashings per Roof System Manufacturer's requirements and per specifications and drawings.

- C. For base sheet, unroll membrane and cut into approximately 15 foot lengths and allow to relax approximately one hour prior to installation. Beginning at the low point of the roof, unroll one-half

of the first roll for positioning, and re-roll. Position the heat welding operator in front of the roll and use a metal pole with a hook configuration to pull the roll towards installation as opposed to being positioned behind the roll being installed and pushing the roll. Beginning at the re-rolled portion of the base membrane, apply the heat evenly across the bottom of the roll and along the exposed side lap of the previously installed roll. Apply enough heat to melt the film on the bottom of the modified bitumen base membrane and the lap of the previously installed sheet. The modified bitumen base membrane has softened enough to roll into place when a small bead of bitumen can be seen in front of the roll and at the side lap. Re-roll the unadhered portion of the modified bitumen base membrane and repeat the above method to complete installation of the roll. Foot and machine traffic shall be kept to a minimum on freshly applied components of the system to reduce the possibility of asphalt displacement from point loading. Subsequent rolls of modified shall be installed across the roof, as above, with a minimum of 4 inch side laps and 8 inch end laps, making sure to fully overlap the first roll. Offset end laps a minimum of three feet. Care should be taken to eliminate air entrapment under the membrane.

- D. For cap sheet, unroll membrane and cut into approximately 15 foot lengths and allow to relax approximately one hour prior to installation. Beginning at the low point of the roof, apply the modified membrane cap sheet in the specified adhesive; utilize an application rate of 2 to 2 1/2 gal/sq (0.6 to 1.0 l/m²) per 100 square feet. Roll membrane into adhesive. Flying in or "Mopping and Flopping" of sheets is not allowed. Roll must be in full contact with adhesive. **Side and end laps shall be heat welded with a roofing lap welding machine designed for welding modified membranes.** Subsequent rolls of modified shall be installed across the roof as above with a minimum of 4 inch side laps and 12 inch end laps. The end laps shall be staggered a minimum of 3 feet. The modified bitumen membrane shall be laid in the same direction as the lower layer, but the laps shall not coincide with the laps of the base ply layer. Using a clean trowel, apply pressure to top seal all edges at T-laps. Care should be taken to eliminate air entrapment under the membrane. Broom the surface of the membrane to provide good contact of the mating surfaces. Provide

mechanical fasteners to secure membrane on sloped surfaces as required by primary membrane manufacturer.

- E. Immediately after welding side and end laps of cap sheet, (for cap sheets with ceramic granules) hand broadcast ceramic granules into bleed out for a monolithic appearance. Any areas of improper adherence of minerals will be aluminized and ceramic granules rebroadcast while still wet.
- F. Extend membrane 3 inches beyond top edge of all cants in full application of membrane adhesive as shown on the drawings.
- G. The modified membrane must be secured at vertical transitions such as curbs, parapet walls, roof edges in accordance with detail drawings and the membrane manufacturer's requirements.

3.03 BASE FLASHING (GENERAL)

- A. Provide PMMA Resin Based flashing material in accordance with Roof System Manufacturer's requirements and the details provided. Minimum flashing height is 8 inches.
- B. Apply the PMMA Resin Based flashing system, extending 4 inches onto field of roof. Apply all PMMA resin based flashings per Roof System Manufacturer's requirements and detail drawings.

3.05 PITCH POCKET

- A. Conventional Pitch Pockets shall not be allowed on this project.
- B. Per manufacturer's requirements and detail drawings, clean, prepare and flash all vent stack, through roof conduits and pipe supports with PMMA resin based liquid flashing system.

3.06 SOIL STACK/PIPE PENETRATION/CONDUIT PENETRATION

- A. Clean soil stack, pipe, mechanical support or conduit and field membrane with approved solvent. Sand all areas of pipe or conduit to receive the PMMA Flashing System with 80 grit sandpaper and clean with approved solvent.
- B. Install PMMA Flashing System per Roof System Manufacturer's requirements.

3.07 ALUMINIZED COATING (Ceramic Granule Energy Star Roofing Systems)

- A. Apply Aluminized Coating or Roof System Manufacturer's Approved Energy Star Compliant Coating over any areas showing poor coverage of granule or bitumen bleed out on the modified bitumen cap ply, broadcasting ceramic granules in the coating while it is still wet. Prepare

surfaces and apply coating in accordance with the manufacturer's written instructions.

3.08 FIELD QUALITY CONTROL

- A. Work observation and testing may be performed by the Owner.

3.09 TEMPORARY WATER CUT-OFFS

- A. Provide water cut-offs at the end of each day's work and when the threat of rain or snow is imminent.
- B. Remove temporary water cut-offs prior to resuming roofing installation.

3.10 CLEANING

- A. Remove any markings from finished surfaces. Consult manufacturer of surfaces for cleaning advice and conform to their instructions.

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SECTION 07 62 00
SHEET METAL FLASHING

PART I - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.01 SUMMARY

- A. This Section includes the following:
 - 1. Sheet metal flashing and sheet metal components.
 - 2. Sealants.
- B. Related Sections include the following:
 - 1. Division 6, Section 06105 "Miscellaneous Carpentry"
 - 2. Division 7, Section 07540 "Thermoplastic Membrane Roofing"
 - 3. Division 7, Section 07310 "Slate Roofing"

1.02 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D 1079 for definition of terms related to roofing work not otherwise defined in this Section.
- B. Sheet Metal Terminology: Refer to SMACNA'S "Architectural Sheet Metal Manual" for terms related to sheet metal work not otherwise defined in this Section.

1.03 WORK INCLUDED

- A. Provide labor, materials, equipment and supervision to perform the installation of the sheet metal flashing as outlined in the Specifications and on the enclosed Drawings. The following is a brief summary of the Work:
 - 1. Provide and install new surface and throughwall mounted counterflashings and counterflashing receivers, counterflashing extensions, HVAC curb, coping cap, sleeper cap flashings, through wall and overflow roof scuppers per specifications and details. Surface mounted counterflashings, counterflashing extensions, HVAC curb, coping cap, sleeper cap flashings, through wall and overflow roof scuppers to be manufactured using .050 aluminum, color to be selected by owner from manufacturer's standard colors. Cleats are to be continuous and a minimum of .063 aluminum. The cleats are to

be fastened at a minimum of 16" O. C. All metals and cleats are to be installed as specifications and details. New through wall flashings, flashing receivers and counterflashings and counterflashing extensions are to be manufactured using 26 gauge stainless steel.

2. All metal products used must approved by the membrane manufacturer to insure compatibility with membrane system and coverage under the manufacturer's warranty.
3. Install metal in strict accordance with detail drawings and manufacturer's requirements.
4. Install metal butt-joints with a maximum of 1/4" gap.
5. Install beveled cover plates (or sealed drainage plates min. 12" wide) to all coping butt-joints

1.04 SUBMITTALS

- A. Submit a list of manufacturer names and products to be utilized for the following materials.
 1. Color chart for Sheet Metal Components.
 2. Manufacturer's Color Chart for Sealant.

1.05 QUALITY ASSURANCE

- A. Applicator: Company specializing in sheet metal flashing installation with five years experience with work similar in material, design, and complexity.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials with manufacturer's protective film on the exposed side of all sheet metal. Remove protective film only after completion of the installation.
- B. Store materials on pallets and cover with tarps which, are securely fastened to the pallets. If materials are stored on the roof they must be placed on a protection board to prevent damage to the membrane.

1.07 SCHEDULING

- A. Coordinate Work of this Section with interfacing and adjoining Work for proper sequencing of each installation. Ensure best possible weather resistance, durability of Work, and protection of materials and finishes.

1.08 GENERAL REQUIREMENTS

- A. The Contractor shall be responsible for not overloading the roof.

- B. The Contractor will not disturb the existing roof top equipment unless required for the proper installation of the roof system and will be responsible for immediate repairs should they be disturbed.

1.09 WARRANTY

- A. Provide one-year Contractor's Warranty for materials and installation. This shall apply to defects regardless of whether leaks are occurring. Defects may include but are not limited to improper securement, improper detailing, and defects in sheet metal work.

PART II - PRODUCTS

2.01 SHEET METAL COMPONENTS

- A. HVAC sleeper caps, coping caps, through wall and overflow roof scuppers and curb counterflashings: .050 aluminum, with fluoropolymer finish (minimum 70% resin), color to be selected by Owner from a standard color chart.
- B. Cleats: .063 Aluminum, with mill or fluoropolymer (minimum 70% resin) finish.
- C. Through wall counterflashings, counterflashing receivers and reglet mounted counterflashings, counterflashing extensions: 26 gauge stainless steel.

2.02 ACCESSORIES

- A. Miscellaneous Fasteners: Provide fasteners as indicated in the drawings. All fasteners shall be corrosion resistant.
- B. Polyurethane Sealant: Single component polyurethane sealant meeting minimum requirements of ASTM C920, Type S, Grade NS, Class 25 and Use NT, M and A; color to be selected by Owner from Manufacturers Standard Color Chart.

PART III - EXECUTION

3.01 PROTECTION

- A. Protect building surfaces against damage from sheet metal work.
- B. Where work must continue over roof membrane, protect surfaces.

3.02 FABRICATION - GENERAL

- A. Field verify all dimensions prior to fabricating sheet metal components.
- B. Form sheet metal without excessive buckling and tool marks. All exposed edges shall be folded back to form a hem.
- C. All counterflashing shall be installed into a separate counterflashing receiver unless otherwise indicated on the drawings.

- D. Provide movement joints at a maximum of 10 feet with no joints located within 24 inches of corners. Provide back-up plates at all splices and seal with a 3/4 inch bead of sealant on both sides of the splice.
- E. Fabricate and install new gutter liners from 20 oz. copper per SMACNA guidelines and per these specifications and details. Fabricate and install new valley, hip and ridge cap flashings metals using 20 oz. copper per SMACNA guidelines and per these specifications and details.

3.03 SURFACE PREPARATION

- A. Examine substrate prior to installation of sheet metal work. Remove and dispose of all materials from the substrate to be covered which deviate in plane or which may result in an uneven or unlevel finished product. Remove and dispose of all asbestos containing material in accordance with applicable laws and regulations.
- B. Prime all embedded edge metal in accordance with roof manufacturer's recommendations.
- C. Beginning installation indicates acceptance of substrate.

3.04 INSTALLATION - GENERAL

- A. Provide sheet metal flashing in accordance with the enclosed drawings.
- B. Unless otherwise indicated, secure all sheet metal in accordance with the fastener schedule in the Drawings.
- C. Coordinate installation of counterflashings with installation of assemblies to be protected by counterflashing. Lap counterflashing a minimum of 3 inches, apply sealant along the top edge of surface-mounted counterflashing and tool to facilitate drainage.
- D. Notch and lap all inside corners and joints, weld all intersections. Notch and seam all outside corners and weld. Apply manufacturer's touch up primer and paint over all welded seams.
- E. Apply color matching sealant over the heads of all exposed fasteners on the exterior wall surfaces.

3.05 CLEANING

- A. Remove and dispose of all protective film on new metal surfaces, remove any markings from finished surfaces. Consult manufacturer of surfaces for cleaning advice and conform to their instructions.
- B. Apply color matching touch-up paint to any scratches as recommended by the sheet metal manufacturer.

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**SECTION 09 25 00
GYPSUM BOARD SHEATHING**

PART I - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this work section.

1.02 SUMMARY

- A. For all concrete roof deck areas provide and install new 5/8" type "X" gypsum board over new Polyisocyanurate roof insulation along the walls as indicated in the details, prior to the application of the LEED Certified, Energy Star Compliant SBS Modified Membrane System and PMMA Resin Based Flashing System.
- B. Related work specified elsewhere:
1. Division 7, Section 07 55 00 "Modified Bituminous Membrane Roofing"
 2. Division 7, Section 07 62 00 "Sheet Metal Flashing"

1.03 SUBMITTALS

Submit manufacturer's literature indicating material composition, sizes and fire resistance.

1.04 DELIVERY, STORAGE AND HANDLING

Deliver materials to the job site in manufacturer's original packaging, containers and bundles with manufacturer's brand name and identification intact and legible.

Store level and handle materials to protect against contact with damp and wet surfaces, exposure to weather, breakage and damage to edges.

Provide air circulation under covering and around stacks of materials.

PART II - PRODUCTS

2.01 MATERIALS

Gypsum Insulation Overlay Board and Masonry Wall Cover Board: Nominal 4 foot by 8 foot or 4 foot by 4 foot x 5/8 inch thick, nonstructural, glass mat faced gypsum panel with water-resistant core. Securock as manufactured by USG Corporation or approved equal.

Product shall have Flame Spread of 0, smoke developed 0 when tested in accordance with ASTM E 84. The product shall be classified as noncombustible when tested in accordance with ASTM E 136.

Product shall have Flame Spread of 0, smoke developed 0 when tested in accordance with ASTM E 84. The product shall be classified as noncombustible when tested in accordance with ASTM E 136.

PART III - EXECUTION

3.01 GYPSUM INSULATION OVERLAY BOARD INSTALLATION

Attach the boards onto the properly installed Polyisocyanurate insulation in the approved low rise foam adhesive All installations and adhesive patterns must be approved by the Roof System Manufacturer for the required I-90 wind uplift and warranty.

3.02 GYPSUM MASONRY WALL OVERLAY BOARD INSTALLATION

Attach the boards to the properly prepared masonry wall with masonry anchors and stress plates to achieve the required I-90 wind uplift requirements.

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PART I - GENERAL

1.01 DESCRIPTION

A. The requirements of this Section apply to all sections of Division 23.

B. Definitions:

1. Exposed: Piping, ductwork, and equipment exposed to view in finished rooms.
2. Option or optional: Contractor's choice of an alternate material or method.
3. RE: Resident Engineer
4. COR: Contracting Officer's Technical Representative.

1.02 RELATED WORK

Section 01 00 00, GENERAL REQUIREMENTS

Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES

Section 23 07 11, HVAC, PLUMBING, and Boiler Plant Insulation

Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS: Requirements for commissioning, systems readiness checklists, and training

1.03 QUALITY ASSURANCE

A. Mechanical, electrical and associated systems shall be safe, reliable, efficient, durable, easily and safely operable and maintainable, easily and safely accessible, and in compliance with applicable codes as specified. The systems shall be comprised of high quality institutional-class and industrial-class products of manufacturers that are experienced specialists in the required product lines. All construction firms and personnel shall be experienced and qualified specialists in industrial and institutional HVAC

B. Products Criteria:

1. Standard Products: Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products for at least 3 years (or longer as specified elsewhere). The design, model and size of each item shall have been in satisfactory and efficient operation on at least three installations for approximately three years
2. All items furnished shall be free from defects that would adversely affect the performance, maintainability and appearance of individual components and overall assembly.

3. Conform to codes and standards as required by the specifications.
Conform to local codes, if required by local authorities such as the natural gas supplier, if the local codes are more stringent than those specified. Refer any conflicts to the Resident Engineer.
- C. Equipment Service Organizations:
1. HVAC: Products and systems shall be supported by service organizations that maintain a complete inventory of repair parts and are located within 50 miles to the site.
- D. HVAC Mechanical Systems Welding: Before any welding is performed, contractor shall submit a certificate certifying that welders comply with the following requirements:
1. Qualify welding processes and operators for piping according to ASME "Boiler and Pressure Vessel Code", Section IX, "Welding and Brazing Qualifications".
 2. Comply with provisions of ASME B31 series "Code for Pressure Piping".
 3. Certify that each welder has passed American Welding Society (AWS) qualification tests for the welding processes involved, and that certification is current.
- E. Execution (Installation, Construction) Quality:
1. Apply and install all items in accordance with manufacturer's written instructions. Refer conflicts between the manufacturer's instructions and the contract drawings and specifications to the Resident Engineer for resolution. Provide written hard copies or computer files of manufacturer's installation instructions to the Resident Engineer at least two weeks prior to commencing installation of any item. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations is a cause for rejection of the material.
 2. Provide complete layout drawings required by Paragraph, SUBMITTALS. Do not commence construction work on any system until the layout drawings have been approved.
- F. Upon request by Government, provide lists of previous installations for selected items of equipment. Include contact persons who will serve as references, with telephone numbers and e-mail addresses.

1.04 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, and with requirements in the individual specification sections.
- B. Contractor shall make all necessary field measurements and investigations to assure that the equipment and assemblies will meet contract requirements.
- C. If equipment is submitted which differs in arrangement from that shown, provide drawings that show the rearrangement of all associated systems. Approval will be given only if all features of the equipment and associated systems, including accessibility, are equivalent to that required by the contract.
- D. Prior to submitting shop drawings for approval, contractor shall certify in writing that manufacturers of all major items of equipment have each reviewed drawings and specifications, and have jointly coordinated and properly integrated their equipment and controls to provide a complete and efficient installation.
- E. Submittals and shop drawings for interdependent items, containing applicable descriptive information, shall be furnished together and complete in a group. Coordinate and properly integrate materials and equipment in each group to provide a completely compatible and efficient.
- F. Manufacturer's Literature and Data: Submit under the pertinent section rather than under this section.

1.05 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American Society of Mechanical Engineers (ASME):
 - Boiler and Pressure Vessel Code (BPVC):
 - Section I-2007.....Power Boilers
 - Section IX-2007.....Welding and Brazing Qualifications
 - Code for Pressure Piping:
 - B31.1-2007.....Power Piping

- C. American Society for Testing and Materials (ASTM):
 - A36/A36M-08.....Standard Specification for Carbon Structural Steel
 - A575-96(2007).....Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades
- D. Manufacturers Standardization Society (MSS) of the Valve and Fittings Industry, Inc:
 - SP-58-2009.....Pipe Hangers and Supports-Materials, Design and Manufacture, Selection, Application, and Installation
 - SP 69-2003.....Pipe Hangers and Supports-Selection and Application
- E. National Fire Protection Association (NFPA):
 - 70-08.....National Electrical Code
 - 90A-09.....Standard for the Installation of Air Conditioning and Ventilating Systems
 - 101-09.....Life Safety Code

1.06 DELIVERY, STORAGE AND HANDLING

- A. Protection of Equipment:
 - 1. Equipment and material placed on the job site shall remain in the custody of the Contractor until phased acceptance, whether or not the Government has reimbursed the Contractor for the equipment and material. The Contractor is solely responsible for the protection of such equipment and material against any damage.
 - 2. Place damaged equipment in first class, new operating condition; or, replace same as determined and directed by the Resident Engineer. Such repair or replacement shall be at no additional cost to the Government.
 - 3. Protect interiors of new equipment and piping systems against entry of foreign matter. Clean both inside and outside before painting or placing equipment in operation.
 - 4. Existing equipment and piping being worked on by the Contractor shall be under the custody and responsibility of the Contractor and shall be protected as required for new work.
- B. Cleanliness of Piping and Equipment Systems:

1. Exercise care in storage and handling of equipment and piping material to be incorporated in the work. Remove debris arising from cutting, threading and welding of piping.
2. Piping systems shall be flushed, blown or pigged as necessary to deliver clean systems.
3. Clean interior of all tanks prior to delivery for beneficial use by the Government.
4. Boilers shall be left clean following final internal inspection by Government insurance representative or inspector.
5. Contractor shall be fully responsible for all costs, damage, and delay arising from failure to provide clean systems.

1.07 JOB CONDITIONS - work in existing Building

- A. Building Operation: Government employees will be continuously operating and managing all facilities, including temporary facilities, that serve the medical center.
- B. Maintenance of Service: Schedule all work to permit continuous service as required by the medical center.
- C. Chilled Water Service Interruptions: Limited chilled water service interruptions, as required for interconnections of new and existing systems, will be permitted by the Resident Engineer during periods when the demands are not critical to the operation of the medical center. These non-critical periods are limited to between 8 pm and 5 am in the appropriate off-season (if applicable). Provide at least one week advance notice to the Resident Engineer.
- D. Phasing of Work: Comply with all requirements shown on drawings or specified.
- E. Building Working Environment: Maintain the architectural and structural integrity of the building and the working environment at all times. Provide daily clean-up of construction and demolition debris on all floor surfaces and on all equipment being operated by VA.
- F. Acceptance of Work for Government Operation: As new facilities are made available for operation and these facilities are of beneficial use to the Government, inspections will be made and tests will be performed. Based on the inspections, a list of contract deficiencies will be issued to the Contractor. After correction of deficiencies as necessary for beneficial use, the Contracting Officer will process necessary

acceptance and the equipment will then be under the control and operation of Government personnel.

- G. Temporary Facilities: Refer to Article, TEMPORARY PIPING AND EQUIPMENT in this section.

PART II - PRODUCTS

2.01 COMPATIBILITY OF RELATED EQUIPMENT

Equipment and materials installed shall be compatible in all respects with other items being furnished and with existing items so that the result will be a complete and fully operational plant that conforms to contract requirements.

2.02 EQUIPMENT AND MATERIALS IDENTIFICATION

- A. Exterior (Outdoor) Equipment: Brass nameplates, with engraved black filled letters, not less than 48 mm (3/16-inch) high riveted or bolted to the equipment.
- B. Valve Tags and Lists:
1. Valve tags: Engraved black filled numbers and letters not less than 13 mm (1/2-inch) high for number designation, and not less than 6.4 mm(1/4-inch) for service designation on 19 gage 38 mm (1-1/2 inches) round brass disc, attached with brass "S" hook or brass chain.
 2. Valve lists: Typed or printed plastic coated card(s), sized 216 mm(8-1/2 inches) by 280 mm (11 inches) showing tag number, valve function and area of control, for each service or system. Punch sheets for a 3-ring notebook.
 3. Provide detailed plan for each floor of the building indicating the location and valve number for each valve. Identify location of each valve with a color coded thumb tack in ceiling.

2.03 GALVANIZED REPAIR COMPOUND

Mil. Spec. DOD-P-21035B, paint form.

2.04 hvac PIPE AND EQUIPMENT SUPPORTS AND RESTRAINTS

- A. Supports for Roof Mounted Items:
1. Equipment: Equipment rails shall be galvanized steel, minimum 1.3 mm (18 gauge), with integral baseplate, continuous welded corner seams, factory installed 50 mm by 100 mm (2 by 4) treated wood nailer, 1.3 mm (18 gauge) galvanized steel counter flashing cap with screws,

- built-in cant strip, (except for gypsum or tectum deck), minimum height 280 mm (11 inches). For surface insulated roof deck, provide raised cant strip to start at the upper surface of the insulation.
2. Pipe/duct pedestals: Provide a galvanized Unistrut channel welded to U-shaped mounting brackets which are secured to side of rail with galvanized lag bolts.
- B. Pipe Supports: Comply with MSS SP-58. Type Numbers specified refer to this standard. For selection and application comply with MSS SP-69. Refer to Section 05 50 00, METAL FABRICATIONS, for miscellaneous metal support materials and prime coat painting requirements.
- C. Attachment to Concrete Building Construction:
1. Concrete insert: MSS SP-58, Type 18.
 2. Self-drilling expansion shields and machine bolt expansion anchors: Permitted in concrete not less than 102 mm (four inches) thick when approved by the Resident Engineer for each job condition.
 3. Power-driven fasteners: Permitted in existing concrete or masonry not less than 102 mm (four inches) thick when approved by the Resident Engineer for each job condition.
- D. Attachment to Steel Building Construction:
1. Welded attachment: MSS SP-58, Type 22.
 2. Beam clamps: MSS SP-58, Types 20, 21, 28 or 29. Type 23 C-clamp may be used for individual copper tubing up to 23mm (7/8-inch) outside diameter.
- E. Attachment to existing structure: Support from existing floor/roof frame.
- F. Attachment to Wood Construction: Wood screws or lag bolts.
- G. Hanger Rods: Hot-rolled steel, ASTM A36 or A575 for allowable load listed in MSS SP-58. For piping, provide adjustment means for controlling level or slope. Types 13 or 15 turn-buckles shall provide 38 mm (1-1/2 inches) minimum of adjustment and incorporate locknuts. All-thread rods are acceptable.
- H. Hangers Supporting Multiple Pipes (Trapeze Hangers): Galvanized, cold formed, lipped steel channel horizontal member, not less than 41 mm by 41 mm (1-5/8 inches by 1-5/8 inches), 2.7 mm (No. 12 gage), designed to accept special spring held, hardened steel nuts. Not permitted for steam supply and condensate piping.
1. Allowable hanger load: Manufacturers rating less 91kg (200 pounds).

2. Guide individual pipes on the horizontal member of every other trapeze hanger with 6 mm (1/4-inch) U-bolt fabricated from steel rod. Provide Type 40 insulation shield, secured by two 13mm (1/2-inch) galvanized steel bands, or preinsulated calcium silicate shield for insulated piping at each hanger.

I. Supports for Piping Systems:

1. Select hangers sized to encircle insulation on insulated piping. Refer to Section 23 07 11, HVAC, PLUMBING, AND BOILER PLANT INSULATION for insulation thickness. To protect insulation, provide Type 39 saddles for roller type supports or preinsulated calcium silicate shields. Provide Type 40 insulation shield or preinsulated calcium silicate shield at all other types of supports and hangers including those for preinsulated piping.
2. Piping Systems except High and Medium Pressure Steam (MSS SP-58):
 - a. Standard clevis hanger: Type 1; provide locknut.
 - b. Riser clamps: Type 8.
 - c. Wall brackets: Types 31, 32 or 33.
 - d. Roller supports: Type 41, 43, 44 and 46.
 - e. Saddle support: Type 36, 37 or 38.
 - f. Turnbuckle: Types 13 or 15. Preinsulate.
 - g. U-bolt clamp: Type 24.
 - h. Copper Tube:
 - 1) Hangers, clamps and other support material in contact with tubing shall be painted with copper colored epoxy paint, plastic coated or taped with non adhesive isolation tape to prevent electrolysis.
 - 2) For vertical runs use epoxy painted or plastic coated riser clamps.
 - 3) For supporting tube to strut: Provide epoxy painted pipe straps for copper tube or plastic inserted vibration isolation clamps.
 - 4) Insulated Lines: Provide pre-insulated calcium silicate shields sized for copper tube.

2.05 PIPE PENETRATIONS

- A. To prevent accidental liquid spills from passing to a lower level, provide the following:

1. For sleeves: Extend sleeve 25 mm (one inch) above finished floor and provide sealant for watertight joint.
 2. For blocked out floor openings: Provide 40 mm (1-1/2 inch) angle set in silicone adhesive around opening.
 3. For drilled penetrations: Provide 40 mm (1-1/2 inch) angle ring or square set in silicone adhesive around penetration.
- B. Penetrations are not allowed through beams or ribs, but may be installed in concrete beam flanges. Any deviation from these requirements must receive prior approval of Resident Engineer.
- C. Sheet Metal, Plastic, or Moisture-resistant Fiber Sleeves: Provide for pipe passing through floors, interior walls, and partitions, unless brass or steel pipe sleeves are specifically called for below.
- D. Sleeve Clearance: Sleeve through floors, walls, partitions, and beam flanges shall be one inch greater in diameter than external diameter of pipe. Sleeve for pipe with insulation shall be large enough to accommodate the insulation. Interior openings shall be caulked tight with fire stopping material and sealant to prevent the spread of fire, smoke, and gases.
- E. Sealant and Adhesives: Shall be as specified in Section 07 92 00, JOINT SEALANTS.

2.06 ASBESTOS

Materials containing asbestos are not permitted.

PART III - EXECUTION

3.01 ARRANGEMENT AND INSTALLATION OF EQUIPMENT AND PIPING

- A. Coordinate location of piping, sleeves, inserts, hangers, ductwork and equipment. Locate piping, sleeves, inserts, hangers, ductwork and equipment clear of windows, doors, openings, light outlets, and other services and utilities. Prepare equipment layout drawings to coordinate proper location and personnel access of all facilities. Submit the drawings for review as required by Part 1. Follow manufacturer's published recommendations for installation methods not otherwise specified.
- B. Operating Personnel Access and Observation Provisions: Select and arrange all equipment and systems to provide clear view and easy access, without use of portable ladders, for maintenance and operation of all devices including, but not limited to: all equipment items, valves, filters, strainers, transmitters, sensors, control devices. All

gages and indicators shall be clearly visible by personnel standing on the floor or on permanent platforms. Do not reduce or change maintenance and operating space and access provisions that are shown on the drawings.

- C. Equipment and Piping Support: Coordinate structural systems necessary for pipe and equipment support with pipe and equipment locations to permit proper installation.
- D. Location of pipe sleeves, trenches and chases shall be accurately coordinated with equipment and piping locations.
- E. Cutting Holes:
 - 1. Cut holes through concrete and masonry by rotary core drill. Pneumatic hammer, impact electric, and hand or manual hammer type drill will not be allowed, except as permitted by Resident Engineer where working area space is limited.
 - 2. Locate holes to avoid interference with structural members such as beams or grade beams. Holes shall be laid out in advance and drilling done only after approval by Resident Engineer. If the Contractor considers it necessary to drill through structural members, this matter shall be referred to Resident Engineer for approval.
 - 3. Do not penetrate membrane waterproofing.
- F. Interconnection of Instrumentation or Control Devices: Generally, electrical and pneumatic interconnections are not shown but must be provided.
- G. Minor Piping: Generally, small diameter pipe runs from drips and drains, water cooling, and other service are not shown but must be provided.
- H. Protection and Cleaning:
 - 1. Equipment and materials shall be carefully handled, properly stored, and adequately protected to prevent damage before and during installation, in accordance with the manufacturer's recommendations and as approved by the Resident Engineer. Damaged or defective items in the opinion of the Resident Engineer, shall be replaced.
 - 2. Protect all finished parts of equipment, such as shafts and bearings where accessible, from rust prior to operation by means of protective grease coating and wrapping. Close pipe openings with caps or plugs during installation. Tightly cover and protect

fixtures and equipment against dirt, water chemical, or mechanical injury. At completion of all work thoroughly clean fixtures, exposed materials and equipment.

- I. Concrete and Grout: Use concrete and shrink compensating grout 25 MPa (3000 psi) minimum, specified in Section 03 30 00, CAST-IN-PLACE CONCRETE.
- J. Install gages, thermometers, valves and other devices with due regard for ease in reading or operating and maintaining said devices. Locate and position thermometers and gages to be easily read by operator or staff standing on floor or walkway provided. Servicing shall not require dismantling adjacent equipment or pipe work.
- K. Work in Existing Building:
 1. Perform as specified in Article, OPERATIONS AND STORAGE AREAS, Article, ALTERATIONS, and Article, RESTORATION of the Section 01 00 00, GENERAL REQUIREMENTS for relocation of existing equipment, alterations and restoration of existing building(s).
 2. As specified in Section 01 00 00, GENERAL REQUIREMENTS, Article, OPERATIONS AND STORAGE AREAS, make alterations to existing service piping at times that will least interfere with normal operation of the facility.
 3. Cut required openings through existing masonry and reinforced concrete using diamond core drills. Use of pneumatic hammer type drills, impact type electric drills, and hand or manual hammer type drills, will be permitted only with approval of the Resident Engineer. Locate openings that will least effect structural slabs, columns, ribs or beams. Refer to the Resident Engineer for determination of proper design for openings through structural sections and opening layouts approval, prior to cutting or drilling into structure. After Resident Engineer's approval, carefully cut opening through construction no larger than absolutely necessary for the required installation.
- L. Inaccessible Equipment:
 1. Where the Government determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, equipment shall be removed and reinstalled or remedial action performed as directed at no additional cost to the Government.

2. The term "conveniently accessible" is defined as capable of being reached without the use of ladders, or without climbing or crawling under or over obstacles such as motors, fans, pumps, belt guards, transformers, high voltage lines, piping, and ductwork.

3.02 TEMPORARY PIPING AND EQUIPMENT

- A. Continuity of operation of existing facilities will generally require temporary installation or relocation of equipment and piping.
- B. The Contractor shall provide all required facilities in accordance with the requirements of phased construction and maintenance of service. All piping and equipment shall be properly supported, sloped to drain, operate without excessive stress, and shall be insulated where injury can occur to personnel by contact with operating facilities. The requirements of Paragraph 3.1 apply.
- C. Temporary facilities and piping shall be completely removed and any openings in structures sealed. Provide necessary blind flanges and caps to seal open piping remaining in service.

3.03 RIGGING

- A. Design is based on application of available equipment. Openings in building structures are planned to accommodate design scheme.
- B. Alternative methods of equipment delivery may be offered by Contractor and will be considered by Government under specified restrictions of phasing and maintenance of service as well as structural integrity of the building.
- C. Close all openings in the building when not required for rigging operations to maintain proper environment in the facility for Government operation and maintenance of service.
- D. Contractor shall provide all facilities required to deliver specified equipment and place on foundations. Attachments to structures for rigging purposes and support of equipment on structures shall be Contractor's full responsibility. Upon request, the Government will check structure adequacy and advise Contractor of recommended restrictions.
- E. Contractor shall check all clearances, weight limitations and shall offer a rigging plan designed by a Registered Professional Engineer. All modifications to structures, including reinforcement thereof, shall be at Contractor's cost, time and responsibility.

F. Rigging plan and methods shall be referred to Resident Engineer for evaluation prior to actual work.

G. Restore building to original condition upon completion of rigging work.

3.04 PIPE AND EQUIPMENT SUPPORTS

A. Where hanger spacing does not correspond with joist or rib spacing, use structural steel channels secured directly to joist and rib structure that will correspond to the required hanger spacing, and then suspend the equipment and piping from the channels. Drill or burn holes in structural steel only with the prior approval of the Resident Engineer.

B. Use of chain, wire or strap hangers; wood for blocking, stays and bracing; or, hangers suspended from piping above will not be permitted. Replace or thoroughly clean rusty products and paint with zinc primer.

C. Use hanger rods that are straight and vertical. Turnbuckles for vertical adjustments may be omitted where limited space prevents use. Provide a minimum of 15 mm (1/2-inch) clearance between pipe or piping covering and adjacent work.

D. HVAC Horizontal Pipe Support Spacing: Refer to MSS SP-69. Provide additional supports at valves, strainers, in-line pumps and other heavy components. Provide a support within one foot of each elbow.

E. HVAC Vertical Pipe Supports:

1. Up to 150 mm (6-inch pipe), 9 m (30 feet) long, bolt riser clamps to the pipe below couplings, or welded to the pipe and rests supports securely on the building structure.

2. Vertical pipe larger than the foregoing, support on base elbows or tees, or substantial pipe legs extending to the building structure.

F. Overhead Supports:

1. The basic structural system of the building is designed to sustain the loads imposed by equipment and piping to be supported overhead.

2. Provide steel structural members, in addition to those shown, of adequate capability to support the imposed loads, located in accordance with the final approved layout of equipment and piping.

3. Tubing and capillary systems shall be supported in channel troughs.

G. Floor Supports:

1. Provide concrete bases, concrete anchor blocks and pedestals, and structural steel systems for support of equipment and piping. Anchor and dowel concrete bases and structural systems to resist forces

- under operating and seismic conditions (if applicable) without excessive displacement or structural failure.
2. Do not locate or install bases and supports until equipment mounted thereon has been approved. Size bases to match equipment mounted thereon plus 50 mm (2 inch) excess on all edges. Boiler foundations shall have horizontal dimensions that exceed boiler base frame dimensions by at least 150 mm (6 inches) on all sides. Refer to structural drawings. Bases shall be neatly finished and smoothed, shall have chamfered edges at the top, and shall be suitable for painting.
 3. All equipment shall be shimmed, leveled, firmly anchored, and grouted with epoxy grout. Anchor bolts shall be placed in sleeves, anchored to the bases. Fill the annular space between sleeves and bolts with a granular material to permit alignment and realignment.

3.05 MECHANICAL DEMOLITION

- A. Rigging access, other than indicated on the drawings, shall be provided by the Contractor after approval for structural integrity by the Resident Engineer. Such access shall be provided without additional cost or time to the Government. Where work is in an operating plant, provide approved protection from dust and debris at all times for the safety of plant personnel and maintenance of plant operation and environment of the plant.
- B. In an operating facility, maintain the operation, cleanliness and safety. Government personnel will be carrying on their normal duties of operating, cleaning and maintaining equipment and plant operation. Confine the work to the immediate area concerned; maintain cleanliness and wet down demolished materials to eliminate dust. Do not permit debris to accumulate in the area to the detriment of plant operation. Perform all flame cutting to maintain the fire safety integrity of this plant. Adequate fire extinguishing facilities shall be available at all times. Perform all work in accordance with recognized fire protection standards. Inspection will be made by personnel of the VA Medical Center, and Contractor shall follow all directives of the RE or COR with regard to rigging, safety, fire safety, and maintenance of operations.

- C. Completely remove all piping, wiring, conduit, and other devices associated with the equipment not to be re-used in the new work. This includes all pipe, valves, fittings, insulation, and all hangers including the top connection and any fastenings to building structural systems. Seal all openings, after removal of equipment, pipes, ducts, and other penetrations in roof, walls, floors, in an approved manner and in accordance with plans and specifications where specifically covered. Structural integrity of the building system shall be maintained. Reference shall also be made to the drawings and specifications of the other disciplines in the project for additional facilities to be demolished or handled.
- D. All valves including gate, globe, ball, butterfly and check, all pressure gages and thermometers with wells shall remain Government property and shall be removed and delivered to Resident Engineer and stored as directed. The Contractor shall remove all other material and equipment, devices and demolition debris under these plans and specifications. Such material shall be removed from Government property expeditiously and shall not be allowed to accumulate.

3.06 CLEANING AND PAINTING

- A. Prior to final inspection and acceptance of the plant and facilities for beneficial use by the Government, the plant facilities, equipment and systems shall be thoroughly cleaned and painted
- B. In addition, the following special conditions apply:
 - 1. Cleaning shall be thorough. Use solvents, cleaning materials and methods recommended by the manufacturers for the specific tasks. Remove all rust prior to painting and from surfaces to remain unpainted. Repair scratches, scuffs, and abrasions prior to applying prime and finish coats.
 - 2. Material And Equipment Not To Be Painted Includes:
 - a. Motors, controllers, control switches, and safety switches.
 - b. Control and interlock devices.
 - c. Regulators.
 - d. Pressure reducing valves.
 - e. Control valves and thermostatic elements.
 - f. Lubrication devices and grease fittings.
 - g. Copper, brass, aluminum, stainless steel and bronze surfaces.
 - h. Valve stems and rotating shafts.

- i. Pressure gauges and thermometers.
 - j. Glass.
 - k. Name plates.
3. Control and instrument panels shall be cleaned, damaged surfaces repaired, and shall be touched-up with matching paint obtained from panel manufacturer.
 4. Pumps, motors, steel and cast iron bases, and coupling guards shall be cleaned, and shall be touched-up with the same color as utilized by the pump manufacturer
 5. Temporary Facilities: Apply paint to surfaces that do not have existing finish coats.
 6. Final result shall be smooth, even-colored, even-textured factory finish on all items. Completely repaint the entire piece of equipment if necessary to achieve this.

3.07 IDENTIFICATION SIGNS

- A. Provide laminated plastic signs, with engraved lettering not less than 5 mm (3/16-inch) high, designating functions, for all equipment, switches, motor controllers, relays, meters, control devices, including automatic control valves. Nomenclature and identification symbols shall correspond to that used in maintenance manual, and in diagrams specified elsewhere. Attach by chain, adhesive, or screws.

3.08 commissioning

- A. Provide commissioning documentation in accordance with the requirements of Section 23 08 00 - COMMISSIONING OF HVAC SYSTEMS for all inspection, start up, and contractor testing required above and required by the System Readiness Checklist provided by the Commissioning Agent.
- B. Components provided under this section of the specifications will be tested as part of a larger system. Refer to Section 23 08 00 - COMMISSIONING OF HVAC SYSTEMS and related sections for contractor responsibilities for system commissioning.

3.09 OPERATING AND PERFORMANCE TESTS

- A. Prior to the final inspection, perform required tests as specified in Section 01 00 00, GENERAL REQUIREMENTS and submit the test reports and records to the Resident Engineer.
- B. Should evidence of malfunction in any tested system, or piece of equipment or component part thereof, occur during or as a result of

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tests, make proper corrections, repairs or replacements, and repeat tests at no additional cost to the Government.

- C. When completion of certain work or system occurs at a time when final control settings and adjustments cannot be properly made to make performance tests, then make performance tests for heating systems and for cooling systems respectively during first actual seasonal use of respective systems following completion of work.

3.10 INSTRUCTIONS TO VA PERSONNEL

Provide in accordance with Article, INSTRUCTIONS, of Section 01 00 00, GENERAL REQUIREMENTS, and Section 23 08 11, DEMONSTRATIONS AND TESTS FOR BOILER PLANT.

- - - E N D - - -

PART I - GENERAL

1.01 DESCRIPTION

- A. Field applied insulation for thermal efficiency and condensation control for
 - 1. HVAC piping and equipment.
- B. Definitions
 - 1. ASJ: All service jacket, white finish facing or jacket.
 - 2. Exposed: Piping, ductwork, and equipment exposed to view in finished areas including mechanical and electrical equipment rooms or exposed to outdoor weather.
 - 3. Density: kg/m^3 - kilograms per cubic meter (Pcf - pounds per cubic foot).
 - 4. Thermal conductance: Heat flow rate through materials.
 - a. Flat surface: Watt per square meter (BTU per hour per square foot).
 - b. Pipe or Cylinder: Watt per square meter (BTU per hour per linear foot).
 - 5. Thermal Conductivity (k): Watt per meter, per degree C (BTU per inch thickness, per hour, per square foot, per degree F temperature difference).
 - 6. Vapor Retarder (Vapor Barrier): A material which retards the transmission (migration) of water vapor. Performance of the vapor retarder is rated in terms of permeance (perms). For the purpose of this specification, vapor retarders shall have a maximum published permeance of 0.1 perms and vapor barriers shall have a maximum published permeance of 0.001 perms.
 - 7. CH: Chilled water supply.
 - 8. CHR: Chilled water return.
 - 9. PVDC: Polyvinylidene chloride vapor retarder jacketing, white.

1.02 RELATED WORK

- A. Section 23 05 11, COMMON WORK RESULTS FOR HVAC: General mechanical requirements and items, which are common to more than one section of Division 23.
- B. Section 23 08 00, COMMISSIONING OF HVAC SYSTEMS. Requirements for commissioning, systems readiness checklists, and training.

1.03 QUALITY ASSURANCE

A. Refer to article QUALITY ASSURANCE, in Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

B. Criteria:

1. Comply with NFPA 90A, particularly paragraphs 4.3.3.1 through 4.3.3.6, 4.3.10.2.6, and 5.4.6.4, parts of which are quoted as follows:

4.3.3.1 Pipe insulation and coverings, duct coverings, duct linings, vapor retarder facings, adhesives, fasteners, tapes, and supplementary materials added to air ducts, plenums, panels, and duct silencers used in duct systems, unless otherwise provided for in 4.3.3.1.1 or 4.3.3.1.2., shall have, in the form in which they are used, a maximum flame spread index of 25 without evidence of continued progressive combustion and a maximum smoke developed index of 50 when tested in accordance with NFPA 255, Standard Method of Test of Surface Burning Characteristics of Building Materials.

4.3.3.1.1 Where these products are to be applied with adhesives, they shall be tested with such adhesives applied, or the adhesives used shall have a maximum flame spread index of 25 and a maximum smoke developed index of 50 when in the final dry state. (See 4.2.4.2.)

4.3.3.1.2 The flame spread and smoke developed index requirements of 4.3.3.1.1 shall not apply to air duct weatherproof coverings where they are located entirely outside of a building, do not penetrate a wall or roof, and do not create an exposure hazard.

4.3.3.2 Closure systems for use with rigid and flexible air ducts tested in accordance with UL 181, Standard for Safety Factory-Made Air Ducts and Air Connectors, shall have been tested, listed, and used in accordance with the conditions of their listings, in accordance with one of the following:

(1) UL 181A, Standard for Safety Closure Systems for Use with Rigid Air Ducts and Air Connectors

(2) UL 181B, Standard for Safety Closure Systems for Use with Flexible Air Ducts and Air Connectors

4.3.3.3 Air duct, panel, and plenum coverings and linings, and pipe insulation and coverings shall not flame, glow, smolder, or smoke when tested in accordance with a similar test for pipe covering, ASTM C 411, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation, at the temperature to which they are exposed in service.

4.3.3.3.1 In no case shall the test temperature be below 121°C (250°F).

4.3.3.4 Air duct coverings shall not extend through walls or floors that are required to be fire stopped or required to have a fire resistance rating, unless such coverings meet the requirements of 5.4.6.4.

4.3.3.5* Air duct linings shall be interrupted at fire dampers to prevent interference with the operation of devices.

4.3.3.6 Air duct coverings shall not be installed so as to conceal or prevent the use of any service opening.

4.3.10.2.6 Materials exposed to the airflow shall be noncombustible or limited combustible and have a maximum smoke developed index of 50 or comply with the following.

4.3.10.2.6.1 Electrical wires and cables and optical fiber cables shall be listed as noncombustible or limited combustible and have a maximum smoke developed index of 50 or shall be listed as having a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.5 m (5 ft) or less when tested in accordance with NFPA 262, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.

4.3.10.2.6.4 Optical-fiber and communication raceways shall be listed as having a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.5 m (5 ft) or less when tested in accordance with UL 2024, Standard for Safety Optical-Fiber Cable Raceway.

4.3.10.2.6.6 Supplementary materials for air distribution systems shall be permitted when complying with the provisions of 4.3.3.

5.4.6.4 Where air ducts pass through walls, floors, or partitions that are required to have a fire resistance rating and where fire dampers are not required, the opening in the construction around the air duct shall be as follows:

(1) Not exceeding a 25.4 mm (1 in.) average clearance on all sides

(2) Filled solid with an approved material capable of preventing the passage of flame and hot gases sufficient to ignite cotton waste when subjected to the time-temperature fire conditions required for fire barrier penetration as specified in *NFPA 251, Standard Methods of Tests of Fire Endurance of Building Construction and Materials*

2. Test methods: ASTM E84, UL 723, or NFPA 255.
3. Specified k factors are at 24 degrees C (75 degrees F) mean temperature unless stated otherwise. Where optional thermal insulation material is used, select thickness to provide thermal conductance no greater than that for the specified material. For pipe, use insulation manufacturer's published heat flow tables. For domestic hot water supply and return, run out insulation and condensation control insulation, no thickness adjustment need be made.
4. All materials shall be compatible and suitable for service temperature, and shall not contribute to corrosion or otherwise attack surface to which applied in either the wet or dry state.

- C. Every package or standard container of insulation or accessories delivered to the job site for use must have a manufacturer's stamp or label giving the name of the manufacturer and description of the material.

1.04 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.
- B. Shop Drawings:
 - 1. All information, clearly presented, shall be included to determine compliance with drawings and specifications and ASTM, federal and military specifications.
 - a. Insulation materials: Specify each type used and state surface burning characteristics.
 - b. Insulation facings and jackets: Each type used. Make it clear that white finish will be furnished for exposed ductwork, casings and equipment.
 - c. Insulation accessory materials: Each type used.
 - d. Manufacturer's installation and fitting fabrication instructions for flexible unicellular insulation.
 - e. Make reference to applicable specification paragraph numbers for coordination.

1.05 STORAGE AND HANDLING OF MATERIAL

Store materials in clean and dry environment, pipe covering jackets shall be clean and unmarred. Place adhesives in original containers. Maintain ambient temperatures and conditions as required by printed instructions of manufacturers of adhesives, mastics and finishing cements.

1.06 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by basic designation only.
- B. Military Specifications (Mil. Spec.):
 - MIL-A-3316C (2)-90.....Adhesives, Fire-Resistant, Thermal Insulation
 - MIL-A-24179A (1)-87.....Adhesive, Flexible Unicellular-Plastic
Thermal Insulation
 - MIL-C-19565C (1)-88.....Coating Compounds, Thermal Insulation, Fire-and
Water-Resistant, Vapor-Barrier

- MIL-C-20079H-87.....Cloth, Glass; Tape, Textile Glass; and Thread,
Glass and Wire-Reinforced Glass
- C. American Society for Testing and Materials (ASTM):
- A167-99(2004).....Standard Specification for Stainless and
Heat-Resisting Chromium-Nickel Steel Plate,
Sheet, and Strip
- B209-07.....Standard Specification for Aluminum and
Aluminum-Alloy Sheet and Plate
- C449-07.....Standard Specification for Mineral Fiber
Hydraulic-Setting Thermal Insulating and
Finishing Cement
- C547-07.....Standard Specification for Mineral Fiber pipe
Insulation
- C1126-04.....Standard Specification for Faced or Unfaced
Rigid Cellular Phenolic Thermal Insulation
- D1668-97a (2006).....Standard Specification for Glass Fabrics (Woven
and Treated) for Roofing and Waterproofing
- E84-10.....Standard Test Method for Surface Burning
Characteristics of Building
Materials
- D. National Fire Protection Association (NFPA):
- 90A-09.....Standard for the Installation of Air
Conditioning and Ventilating Systems
- 255-06.....Standard Method of tests of Surface Burning
Characteristics of Building Materials
- E. Underwriters Laboratories, Inc (UL):
- 723.....UL Standard for Safety Test for Surface Burning
Characteristics of Building Materials with
Revision of 09/08

PART II - PRODUCTS

2.01 MINERAL FIBER OR FIBER GLASS

- A. ASTM C547 (Pipe Fitting Insulation and Preformed Pipe Insulation),
Class 1, $k = 0.037$ (0.26) at 24 degrees C (75 degrees F), for use at
temperatures up to 230 degrees C (450 degrees F) with an all service
vapor retarder jacket with polyvinyl chloride premolded fitting
covering.

2.02 RIGID CELLULAR PHENOLIC FOAM

- A. Preformed (molded) pipe insulation, ASTM C1126, type III, grade 1, k = 0.021(0.15) at 10 degrees C (50 degrees F), for use at temperatures up to 121 degrees C (250 degrees F) with all service vapor retarder jacket with polyvinyl chloride premolded fitting covering.

2.03 CELLULAR GLASS CLOSED-CELL

- A. Comply with Standard ASTM C177, C518, density 120 kg/m³ (7.5 pcf) nominal, k = 0.033 (0.29) at 240 degrees C (75 degrees F).
- B. Pipe insulation for use at temperatures up to 200 degrees C (400 degrees F) with all service vapor retarder jacket.

2.04 POLYISOCYANURATE CLOSED-CELL RIGID

- A. Preformed (fabricated) pipe insulation, ASTM C591, type IV, K=0.027(0.19) at 24 degrees C (75 degrees F), flame spread not over 25, smoke developed not over 50, for use at temperatures up to 149 degree C (300 degree F) with factory applied PVDC or all service vapor retarder jacket with polyvinyl chloride premolded fitting covers.

Insulation Characteristics		
ITEMS	TYPE I	TYPE II
Temperature, maximum degrees C (degrees F)	649 (1200)	927 (1700)
Density (dry), Kg/m ³ (lb/ ft ³)	232 (14.5)	288 (18)
Thermal conductivity: Min W/ m K (Btu in/h ft ² degrees F)@ mean temperature of 93 degrees C (200 degrees F)	0.059 (0.41)	0.078 (0.540)
Surface burning characteristics: Flame spread Index, Maximum	0	0
Smoke Density index, Maximum	0	0

2.05 INSULATION FACINGS AND JACKETS

- A. Aluminum Jacket-Piping systems: ASTM B209, 3003 alloy, H-14 temper, 0.6 mm (0.023 inch) minimum thickness with locking longitudinal joints. Jackets for elbows, tees and other fittings shall be factory-fabricated to match shape of fitting and of 0.6 mm (0.024) inch minimum thickness aluminum. Fittings shall be of same construction as straight run jackets but need not be of the same alloy. Factory-fabricated

stainless steel bands shall be installed on all circumferential joints. Bands shall be 13 mm (0.5 inch) wide on 450 mm (18 inch) centers. System shall be weatherproof if utilized for outside service.

2.06 PIPE COVERING PROTECTION SADDLES

- A. Cold pipe support: Premolded pipe insulation 180 degrees (half-shells) on bottom half of pipe at supports. Material shall be cellular glass or high density Polyisocyanurate insulation of the same thickness as adjacent insulation. Density of Polyisocyanurate insulation shall be a minimum of 48 kg/m³ (3.0 pcf).

Nominal Pipe Size and Accessories Material (Insert Blocks)	
Nominal Pipe Size mm (inches)	Insert Blocks mm (inches)
Up through 125 (5)	150 (6) long
150 (6)	150 (6) long
200 (8), 250 (10), 300 (12)	225 (9) long
350 (14), 400 (16)	300 (12) long
450 through 600 (18 through 24)	350 (14) long

2.07 ADHESIVE, MASTIC, CEMENT

- A. Mil. Spec. MIL-A-3316, Class 1: Jacket and lap adhesive and protective finish coating for insulation.
- B. Mil. Spec. MIL-A-3316, Class 2: Adhesive for laps and for adhering insulation to metal surfaces.
- C. Mil. Spec. MIL-A-24179, Type II Class 1: Adhesive for installing flexible unicellular insulation and for laps and general use.
- D. Mil. Spec. MIL-C-19565, Type I: Protective finish for outdoor use.
- E. Mil. Spec. MIL-C-19565, Type I or Type II: Vapor barrier compound for indoor use.
- F. ASTM C449: Mineral fiber hydraulic-setting thermal insulating and finishing cement.
- G. Other: Insulation manufacturers' published recommendations.

2.08 MECHANICAL FASTENERS

- A. Pins, anchors: Welded pins, or metal or nylon anchors with galvanized steel-coated or fiber washer, or clips. Pin diameter shall be as recommended by the insulation manufacturer.
- B. Staples: Outward clinching monel or galvanized steel.

- C. Wire: 1.3 mm thick (18 gage) soft annealed galvanized or 1.9 mm (14 gage) copper clad steel or nickel copper alloy.
- D. Bands: 13 mm (0.5 inch) nominal width, brass, galvanized steel, aluminum or stainless steel.

2.09 REINFORCEMENT AND FINISHES

- A. Glass fabric, open weave: ASTM D1668, Type III (resin treated) and Type I (asphalt treated).
- B. Glass fiber fitting tape: Mil. Spec MIL-C-20079, Type II, Class 1.
- C. Tape for Flexible Elastomeric Cellular Insulation: As recommended by the insulation manufacturer.
- D. Hexagonal wire netting: 25 mm (one inch) mesh, 0.85 mm thick (22 gage) galvanized steel.
- E. Corner beads: 50 mm (2 inch) by 50 mm (2 inch), 0.55 mm thick (26 gage) galvanized steel; or, 25 mm (1 inch) by 25 mm (1 inch), 0.47 mm thick (28 gage) aluminum angle adhered to 50 mm (2 inch) by 50 mm (2 inch) Kraft paper.

PART III - EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Required pressure tests of piping joints and connections shall be completed and the work approved by the Resident Engineer for application of insulation. Surface shall be clean and dry with all foreign materials, such as dirt, oil, loose scale and rust removed.
- B. Except for specific exceptions, insulate entire specified equipment, piping (pipe, fittings, valves, accessories), and duct systems. Insulate each pipe and duct individually. Do not use scrap pieces of insulation where a full length section will fit.
- C. Insulation materials shall be installed in a first class manner with smooth and even surfaces, with jackets and facings drawn tight and smoothly cemented down at all laps. Insulation shall be continuous through all sleeves and openings, except at fire dampers and duct heaters (NFPA 90A). Vapor retarders shall be continuous and uninterrupted throughout systems with operating temperature 16 degrees C (60 degrees F) and below. Lap and seal vapor retarder over ends and exposed edges of insulation. Anchors, supports and other metal projections through insulation on cold surfaces shall be insulated and vapor sealed for a minimum length of 150 mm (6 inches).

- D. Install vapor stops at all insulation terminations on either side of valves, pumps and equipment and particularly in straight lengths of pipe insulation.
- E. Protect all insulations outside of buildings with aluminum jacket using lock joint or other approved system for a continuous weather tight system. Access doors and other items requiring maintenance or access shall be removable and sealable.
- F. Apply insulation materials subject to the manufacturer's recommended temperature limits. Apply adhesives, mastic and coatings at the manufacturer's recommended minimum coverage.
- G. Elbows, flanges and other fittings shall be insulated with the same material as is used on the pipe straights. Use of polyurethane spray-foam to fill a PVC elbow jacket is prohibited on cold applications.
- H. Freeze protection of above grade outdoor piping (over heat tracing tape): 26 mm (10 inch) thick insulation, for all pipe sizes 75 mm(3 inches) and smaller and 25 mm(1inch) thick insulation for larger pipes. Provide metal jackets for all pipes. Provide for cold water make-up to cooling towers and condenser water piping and chilled water piping.
- I. Provide vapor barrier jackets over insulation as follows:
 - 1. All piping exposed to outdoor weather.
- J. Provide metal jackets over insulation as follows:
 - 1. All piping exposed to outdoor weather.
 - 2. A 50 mm (2 inch) overlap is required at longitudinal and circumferential joints.

3.02 INSULATION INSTALLATION

- A. Molded Mineral Fiber Pipe and Tubing Covering:
 - 1. Fit insulation to pipe or duct, aligning longitudinal joints. Seal longitudinal joint laps and circumferential butt strips by rubbing hard with a nylon sealing tool to assure a positive seal. Staples may be used to assist in securing insulation. Seal all vapor retarder penetrations on cold piping with a generous application of vapor barrier mastic. Provide inserts and install with metal insulation shields at outside pipe supports. Install freeze protection insulation over heating cable.
 - 2. Contractor's options for fitting, flange and valve insulation:

- a. Insulating and finishing cement for sizes less than 100 mm (4 inches) operating at surface temperature of 16 degrees C (61 degrees F) or more.
 - b. Factory premolded, one piece PVC covers with mineral fiber, (Form B), inserts. Provide two insert layers for pipe temperatures below 4 degrees C (40 degrees F), or above 121 degrees C (250 degrees F). Secure first layer of insulation with twine. Seal seam edges with vapor barrier mastic and secure with fitting tape.
 - c. Factory molded, ASTM C547 or field mitered sections, joined with adhesive or wired in place. For hot piping finish with a smoothing coat of finishing cement. For cold fittings, 16 degrees C (60 degrees F) or less, vapor seal with a layer of glass fitting tape imbedded between two 2 mm (1/16 inch) coats of vapor barrier mastic.
 - d. Fitting tape shall extend over the adjacent pipe insulation and overlap on itself at least 50 mm (2 inches).
3. Nominal thickness in millimeters and inches specified in the schedule at the end of this section.
- B. Rigid Cellular Phenolic Foam:
1. Rigid closed cell phenolic insulation may be provided for piping, ductwork and equipment for temperatures up to 121 degrees C (250 degrees F).
 2. Note the NFPA 90A burning characteristics requirements of 25/50 in paragraph 1.3.B
 3. Provide secure attachment facilities such as welding pins.
 4. Apply insulation with joints tightly drawn together
 5. Apply adhesives, coverings, neatly finished at fittings, and valves.
 6. Final installation shall be smooth, tight, neatly finished at all edges.
 7. Minimum thickness in millimeters (inches) specified in the schedule at the end of this section.
- C. Cellular Glass Insulation:
1. Pipe and tubing, covering nominal thickness in millimeters and inches as specified in the schedule at the end of this section.
 2. Cold equipment: 50 mm (2 inch) thick insulation faced with ASJ for chilled water pumps, water filters, chemical feeder pots or tanks, expansion tanks, air separators and air purgers.

D. Polyisocyanurate Closed-Cell Rigid Insulation:

1. Polyisocyanurate closed-cell rigid insulation (PIR) may be provided for exterior piping, equipment and ductwork for temperature up to 149 degree C (300 degree F).
2. Install insulation, vapor barrier and jacketing per manufacturer's recommendations. Particular attention should be paid to recommendations for joint staggering, adhesive application, external hanger design, expansion/contraction joint design and spacing and vapor barrier integrity.
3. Install insulation with all joints tightly butted (except expansion joints in hot applications).
4. If insulation thickness exceeds 63 mm (2.5 inches), install as a double layer system with longitudinal (lap) and butt joint staggering as recommended by manufacturer.
5. For cold applications, vapor barrier shall be installed in a continuous manner. No staples, rivets, screws or any other attachment device capable of penetrating the vapor barrier shall be used to attach the vapor barrier or jacketing. No wire ties capable of penetrating the vapor barrier shall be used to hold the insulation in place. Banding shall be used to attach PVC or metal jacketing.
6. Elbows, flanges and other fittings shall be insulated with the same material as is used on the pipe straights. The elbow/ fitting insulation shall be field-fabricated, mitered or factory prefabricated to the necessary size and shape to fit on the elbow/ fitting. Use of polyurethane spray-foam to fill PVC elbow jacket is prohibited on cold applications.
7. For cold applications, the vapor barrier on elbows/fittings shall be either mastic-fabric-mastic or 2 mil thick PVDC vapor barrier adhesive tape.
8. All PVC and metal jacketing shall be installed so as to naturally shed water. Joints shall point down and shall be sealed with either adhesive or caulking (except for periodic slip joints).
9. Minimum thickness in millimeter (inches) specified in the schedule at the end of this section.

3.03 COMMISSIONING

- A. Provide commissioning documentation in accordance with the requirements of section 23 08 00 - COMMISSIONING OF HVAC SYSTEMS for all inspection, start up, and contractor testing required above and required by the System Readiness Checklist provided by the Commissioning Agent.
- B. Components provided under this section of the specification will be tested as part of a larger system. Refer to section 23 08 00 - COMMISSIONING OF HVAC SYSTEMS and related sections for contractor responsibilities for system commissioning.

3.04 PIPE INSULATION SCHEDULE

Provide insulation for piping systems as scheduled below:

Insulation Thickness Millimeters (Inches)					
		Nominal Pipe Size Millimeters (Inches)			
Operating Temperature Range/Service	Insulation Material	Less than 25 (1)	25 - 32 (1 - 1¼)	38 - 75 (1½ - 3)	100 (4) and Above
4-16 degrees C (40-60 degrees F) (CH, CHR, GC, GCR and RS for DX refrigeration)	Rigid Cellular Phenolic Foam	38 (1.5)	38 (1.5)	38 (1.5)	38 (1.5)
4-16 degrees C (40-60 degrees F) (CH, CHR, GC, GCR and RS for DX refrigeration)	Cellular Glass Closed-Cell	38 (1.5)	38 (1.5)	38 (1.5)	38 (1.5)
4-16 degrees C (40-60 degrees F) (CH, CHR, GC and GCR (where underground))	Polyisocyanurate Closed-Cell Rigid	38 (1.5)	38 (1.5)	50 (2.0)	50 (2.0)
4-16 degrees C (40-60 degrees F) (CH, CHR, GC, GCR and RS for DX refrigeration)	Polyisocyanurate Closed-Cell Rigid (Exterior Locations only)	38 (1.5)	38 (1.5)	38 (1.5)	38 (1.5)
(40-60 degrees F) (CH, CHR, GC, GCR and RS for DX refrigeration)	Flexible Elastomeric Cellular Thermal (Above ground piping only)	38 (1.5)	38 (1.5)	38 (1.5)	38 (1.5)

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**SECTION 23 08 00
COMMISSIONING OF HVAC SYSTEMS**

PART I - GENERAL

1.01 DESCRIPTION

- A. The requirements of this Section apply to all sections of Division 23.
- B. This project will have selected building systems commissioned. The complete list of equipment and systems to be commissioned are specified in Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS. The commissioning process, which the Contractor is responsible to execute, is defined in Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS. A Commissioning Agent (CxA) appointed by the Department of Veterans Affairs will manage the commissioning process.

1.02 RELATED WORK

- A. Section 01 00 00 GENERAL REQUIREMENTS.
- B. Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS.
- C. Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

1.03 SUMMARY

- A. This Section includes requirements for commissioning the HVAC systems, subsystems and equipment.
- B. The commissioning activities have been developed to support the VA requirements to meet guidelines for Federal Leadership in Environmental, Energy, and Economic Performance.

1.04 COMMISSIONED SYSTEMS

- A. Commissioning of a system or systems specified in this Division is part of the construction process. Documentation and testing of these systems, as well as training of the VA's Operation and Maintenance personnel, is required in cooperation with the VA and the Commissioning Agent.
- B. The following HVAC systems will be commissioned:
 - 1. Chilled Water Systems (Chilled water pumps and motors, Variable Speed Drives, chiller motor/compressor, controls, instrumentation and safeties, isolation valves, blending valves, side stream water cleaners/scrubbers/filters).
 - 2. Exhaust Fans (Fan, motor, Variable Speed Drives, controls and safeties).
 - 3. Room Pressurization Equipment (Pressure sensors, terminal units/dampers, and controls and alarms).

1.05 SUBMITTALS

- A. The commissioning process requires review of selected Submittals. The Commissioning Agent will provide a list of submittals that will be reviewed by the Commissioning Agent. This list will be reviewed and approved by the VA prior to forwarding to the Contractor. Refer to Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, and SAMPLES for further details.
- B. The commissioning process requires Submittal review simultaneously with engineering review.

PART II - PRODUCTS (NOT USED)

PART III - EXECUTION

3.01 PRE-FUNCTIONAL CHECKLISTS

- A. The Contractor shall complete Pre-Functional Checklists to verify systems, subsystems, and equipment installation is complete and systems are ready for Systems Functional Performance Testing. The Commissioning Agent will prepare Pre-Functional Checklists to be used to document equipment installation. The Contractor shall complete the checklists. Completed checklists shall be submitted to the VA and to the Commissioning Agent for review. The Commissioning Agent may spot check a sample of completed checklists. If the Commissioning Agent determines that the information provided on the checklist is not accurate, the Commissioning Agent will return the marked-up checklist to the Contractor for correction and resubmission. If the Commissioning Agent determines that a significant number of completed checklists for similar equipment are not accurate, the Commissioning Agent will select a broader sample of checklists for review. If the Commissioning Agent determines that a significant number of the broader sample of checklists is also inaccurate, all the checklists for the type of equipment will be returned to the Contractor for correction and resubmission.

3.02 CONTRACTORS TESTS

- A. Contractor tests as required by other sections of Division 23 shall be scheduled and documented in accordance with Section 01 00 00 GENERAL REQUIREMENTS. The Commissioning Agent will witness selected Contractor tests. Contractor tests shall be completed prior to scheduling Systems Functional Performance Testing.

3.03 SYSTEMS FUNCTIONAL PERFORMANCE TESTING:

- A. The Commissioning Process includes Systems Functional Performance Testing that is intended to test systems functional performance under steady state conditions, to test system reaction to changes in operating conditions, and system performance under emergency conditions. The Commissioning Agent will prepare detailed Systems Functional Performance Test procedures for review and approval by the Resident Engineer. The Contractor shall review and comment on the tests prior to approval. The Contractor shall provide the required labor, materials, and test equipment identified in the test procedure to perform the tests. The Commissioning Agent will witness and document the testing. The Contractor shall sign the test reports to verify tests were performed.

3.04 TRAINING OF VA PERSONNEL

- A. Training of the VA's operation and maintenance personnel is required in cooperation with the Resident Engineer and Commissioning Agent. Provide competent, factory authorized personnel to provide instruction to operation and maintenance personnel concerning the location, operation, and troubleshooting of the installed systems. The instruction shall be scheduled in coordination with the Resident Engineer after submission and approval of formal training plans.

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