

SECTION 01110

SUMMARY OF WORK
09/99

PART 1 GENERAL

1.1 SUMMARY

The work to be performed under this project consists of providing the labor, equipment, and materials to install a single-ply roofing system on the following buildings:

Building 113

Building 200

Building 201

Building 203

at Johnson Space Center, White Sands Test Facility.

Furnish and install single-ply membrane roofing systems on the buildings listed above.

Test existing roof insulation for moisture damage.

Remove and properly discard of all debris, ballast material, and if necessary any damaged roofing or insulation.

Remove and re-install existing metal walkways, add membrane walkways and working platforms from roof access to/around roof top mounted equipment. With same material provide platform at roof access.

Install two-way vents at the rate of one per 1000 square feet to allow any moisture trapped below the membrane to escape.

Owner will remove existing lightning protection system and will install new lightning systems on all roofs. Contractor will coordinate all efforts with owner.

Contractor shall install 8 (eight) inch wide walkpad where conductor and air terminals for lightning protection system are going to be installed. Roofing contractor also shall provide adhesive and any part needed, approved by the roofing system manufacturer, for attachment of lightning protection system to the new roof. There will be lightning protection for all equipment units on the roof.

Install permanent fall protection system per specifications on all new roofs before roofing work begins. Install guardrails on buildings 200 and 203 per drawings and specifications.

WSTF will provide crane and crane operators for material lifting purposes. Contractor will provide schedule when crane support is needed.

All reasonably required amounts of water, gas, and electricity, will be made available without charge to the Contractor from existing system outlets and supplies. The Contractor will provide portable generators for electrical power needed on roofs, where facility power is not available.

1.2 SECURITY

The Contractor will furnish a list of individuals assigned to work on the contract to the Contracting Officer for site clearance and gate access at least 3 days in advance of start of work. If Contractor personnel are non-US Citizen, contractor needs to provide list of Resident Alien personnel for clearance processing. It will take 30 days or more to receive clearance for Resident Alien to gain access to the site. Personnel shall provide valid picture identification, such as driver license, at guard gate.

Access to WSTF shall be through main access gate only. The work areas are within a security-controlled environment. The Contractor shall comply with all applicable security requirements imposed by NASA. The following paragraphs describe some of the Contractor's responsibility:

- a) All Contractor personnel will be issued a visitor identification badge. The badges shall be worn at all times while on government property.
- b) The immediate work areas for this project will be limited to each designated roof and access ways. All construction material shall be stored as close as possible to each work area as designated by the Contracting Officer.
- c) Contractor personnel will be allowed to the WSTF Cafeteria, located in the 100 Area. No access to other buildings or facilities will be allowed.
- d) WSTF on-site personnel shall escort contractor personnel at all times, unless a "non-escort required" badge is issued for an individual. Resident Alien personnel shall be escorted at all times.
- e) All vehicles (including personal and commercial vehicles) shall obtain a WSTF vehicle pass. Requirements for a vehicle pass shall include proof of valid and current registration, insurance, and valid driver license. All vehicles shall be inspected by WSTF security personnel.
- f) All delivery personnel shall be escorted or be in visual contact from the entrance gate to the next escort.

1.3 SUBMITTALS

Submittals shall be submitted in accordance with Section 01330.

1.4 CONTRACT DRAWINGS

The following drawings accompany this specification and are a part thereof.

Drawing No. 4072
Sheets 1 through 11

Five sets of full-scale contract drawings, maps, and specifications will be furnished to the Contractor without charge. Reference publications will not be furnished.

Contractor shall immediately check furnished drawings and notify the Government of any discrepancies.

1.5 WORK RESCHEDULING

Contractor shall allow for a maximum of 15 days where construction activity is prohibitive. Further allowance for 5 days of excavation and subsurface activity abeyance shall be imposed where other construction activities are permitted. Government will provide 24-hour notification each time the restrictions are invoked.

Normal duty hours for work shall be from 07:00 a.m. to 3:30 p.m., Monday through Friday. Requests for additional work shall require written approval from the Contracting Officer 7 days in advance of the proposed work period.

1.6 OCCUPANCY OF PREMISES

Building(s) will be occupied during performance of work under this Contract.

Before work is started, the Contractor shall arrange with the Contracting Officer a sequence of procedure, means of access, space for storage of materials and equipment, and use of approaches, corridors, and stairways.

The contractor shall check with Contracting Officer on a daily basis before accessing roofs to ensure that no tests are being conducted that exhaust onto roofs. All warning signs at roof access ladders shall be followed.

1.7 BEST VALUE CRITERIA

1. Warranty (15 year minimum)
2. Past performance record
3. Experience with single-ply membrane roof system installation
4. Proposed Safety Plan and safety procedures used during roof work
5. Proposed Fall Protection System Design
6. Safety Performance Record for past three years
7. Proposed Construction Schedule (Start date, detailed schedule for each building, list major milestones, crane usage identified on schedule)
8. Authorized Installer/Contractor Certification from Roofing System Manufacturer

1.8 PERFORMANCE

Contractor will be required to commence work under this contract within 10 calendar days after the date of receipt by him of notice to proceed. The Contractor shall prosecute work diligently, and complete entire work ready for use within 120 calendar days after the date of receipt by him of the notice to proceed. The stated time for completion shall include final cleanup of the premises. Work shall be performed during normal WSTF business hours, Monday through Friday 07:00 AM to 03:30 PM. Any deviation shall be coordinated with the Contracting Officer.

Before work is started, the Contractor shall arrange with the Contracting Officer a sequence of procedure, means of access, space of storage of materials and equipment, and use of access ways to work locations. Job sites will be kept clean at all times, with trash hauled on a daily basis.

Scheduling shall be coordinated with the approved construction progress chart. Contractor shall maintain, revise, and update schedule as directed.

1.8.1 Utility Outages and Connection Requests (Not applicable)

1.8.2 Borrow, Excavation, Welding, and Burning Permits (Not applicable)

1.9 SALVAGE MATERIAL AND EQUIPMENT (NOT APPLICABLE)

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

-- End of Section --

SECTION 01330

SUBMITTAL PROCEDURES

09/99

PART 1 GENERAL

1.1 SUMMARY

Requirements of this Section apply to, and are a component part of, each section of the specifications.

1.2 REFERENCES (NOT APPLICABLE)

1.3 SUBMITTALS

A standard transmittal form provided by the Government shall be used to transmit each submittal.

Submittal Description (SD): Safety Plan, Drawings, diagrams, layouts, schematics, descriptive literature, illustrations, project schedules, performance and manufacturer specifications of roofing system, samples of roofing system components, and similar materials to be furnished by the Contractor explaining in detail specific portions of the work required by the contract.

The following items, SD-01 through SD-11, are descriptions of data to be submitted for the project. The requirements to actually furnish the applicable items will be called out in each specification.

SD-01 Pre-construction Submittals

Submittals that are required prior to a notice to proceed on a new contract. Submittals required prior to the start of the next major phase of the construction on a multi-phase contract. Schedules or tabular list of data or tabular list including location, features, or other pertinent information regarding products, materials, equipment, or components to be used in the work, submitted prior to contract notice to proceed or next major phase of construction.

SD-02 Shop Drawings

Submittals which graphically show relationship of various components of the work, schematic diagrams of roofing system components, details of roofing membrane fabrications, layout of membrane installations on specific roofs, details of corner and roof edge installations of membrane to ensure wind load resistance, welding connections, and other relational aspects of the work.

SD-03 Product Data

Data composed of catalog cuts, brochures, circulars, roofing system manufacturer specifications and product data, and printed information in sufficient detail and scope to verify compliance with requirements of the contract documents.

SD-04 Samples

Samples, including both fabricated and not fabricated physical examples of roofing systems materials, products, and units of work as complete units or as portions of units of work.

SD-05 Design Data

Design calculations, supporting literature and installation procedures to ensure roof will withstand up to 150-mph winds.

SD-06 Test Reports

Written reports of a manufacturer's findings of his product during field inspections, attesting that the products are installed in accordance with the manufacturer's installation instructions, shop drawings, or other manufacturer's requirements. Written reports by a general contractor or his subcontractors including daily logs reporting on the progress of daily activities or attesting that the work has been installed in accordance with the contract plans and specifications.

SD-07 Certificates

A document, required of the Contractor, or through the Contractor by way of a supplier, installer, manufacturer, or other Lower Tier Contractor, the purpose of which is to further the quality or orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel, qualifications, or other verification of quality.

Written confirmation from the system manufacturer that the installer is an Authorized Dealer/Contractor

SD-08 Manufacturer's Instructions

Preprinted material describing installation of a product, system, or material, including special notices and material safety data sheets, if any concerning impedance, hazards, and safety precautions.

SD-09 Manufacturer's Field Reports

Written reports of manufacturer's findings of his product during field inspections, attesting that the products are installed in accordance with the manufacturer's installation instructions, shop drawings, or other manufacturer's requirements. Written reports by the general contractor or his subcontractors attesting that the work has been installed in accordance with the contract plans and specifications. After the installation is complete, a Quality Assurance Specialist employed by the system manufacturer shall inspect the visible details of the roofing system for acceptability and for warranty issues. Any deficiencies shall be corrected by Contractor and made ready for re-inspection within five (5) working days. Upon acceptance by the Contracting Officer, the warranty shall be promptly issued.

SD-10 Safety Plan

Provide Company safety plan per OSHA 29 CFR and 01411 specifications, to include Hazcom and fall-protection plan. Also provide copies of MSDS of all hazardous materials or chemicals used in the process.

Data intended to be incorporated in an operations and maintenance manual.

SD-11 Closeout Submittals

Special requirements necessary to properly close out a construction contract. . For example maintenance procedure documents. Also, submittal requirements necessary to properly close out a major phase of construction on a multi-phase contract.

1.4 PREPARATION

1.4.1 Marking

Permanent marking shall be provided on each submittal to identify it by contract number; transmittal date; Contractor's, Subcontractor's, and supplier's name, address(es) and telephone number(s); submittal name; specification or drawing reference; and similar information to distinguish it from other submittals. Submittal identification shall include space to receive the review action by the Contracting Officer.

1.4.2 Drawing Format

Copies of each drawing shall have the following information clearly marked thereon:

- a. Job name, which shall be the general title of the contract drawings.
- b. Date of the drawings and revisions.
- c. Name of Contractor.
- d. Name of Subcontractor.
- e. Name of the item, material, or equipment detailed thereon.
- f. Number of the submittal (e.g., first submittal, etc.) in a uniform location adjacent to the title block.
- g. Government contract number shall appear in the margin, immediately below the title block.

Drawings shall be numbered in logical sequence. Contractor may use his own number system. Each drawing shall bear the number of the submittal in a uniform location adjacent to the title block. Government contract number shall appear in the margin, immediately below the title block, for each drawing.

1.4.3 Data Format

Required data submittals for each specific material, product, unit of work, or system shall be collected into a single submittal and marked for choices, options, and portions applicable to the submittal. Marking of each copy of product data submitted shall be identical. Partial submittals will not be accepted for expedition of construction effort.

1.4.4 Samples

Samples shall be physically identical with the proposed material or product to be incorporated in the work, fully fabricated and finished in the specified manner, and full scale. Where variations in color, finish, pattern, or texture are inherent in the material or product represented by the sample, multiple units of the sample, showing the near-limits of the variations and the "average" of the whole range (not less than 3 units), shall be submitted. Each unit shall be marked to describe its relation to the range of the variation. Where samples are specified for selection of color, finish, pattern, or texture, the full set of available choices shall be submitted for the material or product specified. Sizes and quantities of samples shall represent their respective standard unit.

1.5 SUBMISSION REQUIREMENTS

1.5.1 Schedules

At the Pre-construction conference, the Contractor shall provide, for approval by the Contracting Officer, the following schedule of submittals:

- a. A schedule of shop drawings and technical submittals required by the specifications and drawings. Schedule shall indicate the specification or drawing reference requiring the submittal; the material, item, or process for which the submittal is required; the "SD" number and identifying title of the submittal; the Contractor's anticipated submission date and the approval need date.
- b. A separate schedule of other submittals required under the contract but not listed in the specifications or drawings. Schedule will indicate the contract requirement reference; the type or title of the submittal; the Contractor's anticipated submission date and the approved need date (if approval is required).
- c. Copies of both schedules shall be re-submitted monthly annotated by the Contractor with actual submission and approval dates. When all items on a schedule have been fully approved, no further re-submittal of the schedule is required.

1.5.2 Drawings Submittals

One translucent reproducible copy and three blackline or blue-line opaque print(s) of each drawing shall be submitted. One print, marked with review notations by the Contracting Officer, will be returned to the Contractor.

1.5.3 Data Submittals

Three complete sets of indexed and bound product data shall be submitted. One set, marked with review notations by the Contracting Officer, will be returned to the Contractor.

1.5.4 Samples

One set of identified samples shall be submitted. A copy of the transmittal form, marked with review notations including selections by the Contracting Officer, will be returned to the Contractor.

Samples that are intended or permitted to be returned and actually incorporated in the work are so indicated in the individual technical sections. These samples will be returned to the Contractor, at his expense, to be clearly labeled, with installation location recorded. Samples shall be in undamaged condition at the time of installation.

1.6 GOVERNMENT'S REVIEW

1.6.1 Review Notations

Within 10 days after notice to proceed, Contractor shall submit proposed bar chart. Within 10 days after submittal, Contractor shall participate in a review of bar chart with Government representative. Within 10 days of review, Contractor shall submit the adjusted and proposed schedule.

Submittals will be returned to the Contractor with the following notations:

- a. Submittals marked "approved" authorize the Contractor to proceed with the work covered.
- b. Submittals marked "approved as noted" authorize the Contractor to proceed with the work covered provided he takes no exception to the corrections. Notes shall be incorporated prior to submission of the final submittal.
- c. Submittals marked "return for correction" require the Contractor to make the necessary corrections and revisions and to re-submit them for approval in the same routine as before, prior to proceeding with any of the work depicted by the submittal.
- d. Submittals marked "not approved" or "disapproved" indicate noncompliance with the contract requirements and shall be re-submitted with appropriate changes. No item of requiring a submittal shall be accomplished until the submittals are approved or approved as noted.
- e. Contractor shall make corrections required by the Contracting Officer. If the Contractor considers any correction or notation on the returned submittals to constitute a change to the contract drawings or specifications; notice as required under the clause entitled, "Changes" shall be given to the Contracting Officer. Approval of the submittals by the Contracting Officer shall not be construed as a complete check, but will indicate only that the general method of construction and detailing is satisfactory. Contractor shall be responsible for the dimensions and design of connection details and construction of work. Failure to point out

deviations may result in the Government requiring rejection and removal of such work at the Contractor's expense.

- f. If changes are necessary to approved submittals, the Contractor shall make such revisions and submission of the submittals in accordance with the procedures above. No item of work requiring a submittal change shall be accomplished until the changed submittals are approved.

1.6.2 Sample Approval

Contractor shall furnish, for the approval of the Contracting Officer, samples required by the specifications or by the Contracting Officer. The Contractor shall pay shipping charges. Materials or equipment requiring sample approval shall not be delivered to the site or used in the work until approved in writing by the Contracting Officer.

Each sample shall have a label indicating:

- a. Name of project
- b. Name of Contractor
- c. Material or equipment
- d. Place of origin
- e. Name of producer and brand
- f. Specification section to which samples applies
- g. Samples of furnished material shall have additional markings that will identify them under the finished schedules.

Contractor shall submit to the Contracting Officer two samples of materials where samples are requested. Contractor shall transmit with each sample a letter, original and two copies, containing the above information.

Approval of a sample shall be only for the characteristics or use named in such approval and shall not be construed to change or modify any contract requirements. Before submitting samples, the Contractor shall assure that the materials or equipment will be available in quantities required in the project. No change or substitution will be permitted after a sample has been approved.

Materials and equipment incorporated in the work shall match the approved samples. If requested, approved samples, including those that may be damaged in testing will be returned to the Contractor, at his expense, upon completion of the contract. Samples not approved will also be returned to the Contractor at its expense, if so requested.

Failure of any materials to pass the specified tests will be sufficient cause for refusal to consider, under this contract, any further samples of the same brand or make of that material. Government reserves the right to disapprove any material or equipment that previously has proved unsatisfactory in service.

Variations from contract requirements shall be specifically pointed out in transmittal letters. Failure to point out deviations may result in the Government requiring rejection and removal of such work at no additional cost to the Government.

The Contracting Officer for testing may take samples of various materials or equipment delivered on the site or in place. Samples failing to meet contract requirements will automatically void previous approvals. Contractor shall replace such materials or equipment to meet contract requirements.

Approval of the Contractor's samples by the Contracting Officer shall not relieve the Contractor of his responsibilities under the contract.

1.7 PROGRESS SCHEDULE

1.7.1 Bar Chart

Contractor shall:

- a. Submit the progress chart, for approval by the Contracting Officer, at the Pre-construction Conference in one reproducible and 4 copies.
- b. Prepare the progress chart in the form of a bar chart utilizing form "Construction Progress Chart" or using industry project software such as MS Project 98 or any comparable format acceptable to the Contracting Officer.
- c. Include no less than the following information on the progress chart:
 - (1) Break out by major headings for primary work activity.
 - (2) A line item break out under each major heading sufficient to track the progress of the work.
 - (3) A line item showing contract finalization task that includes punch list, clean-up and demolition, and final construction drawings.
 - (4) A materials bar and a separate labor bar for each line item. Both bars will show the scheduled percentage complete for any given date within the contract performance period.
 - (5) The estimated cost and percentage weight of total contract cost for each materials and labor bar on the chart.
 - (6) Separate line items for mobilization and drawing submittal and approval. (These items are to show no associated costs.)
- d. Update the progress schedule in one reproduction and 4 copies every 30 days throughout the contract performance period.

1.7.2 Project Network Analysis

Contractor shall submit the initial progress schedule within 10 days of notice to proceed. Schedule shall be updated and resubmitted monthly beginning 10 days after return of the approved initial schedule. Updating shall entail complete revision of the graphic and data displays incorporating changes in scheduled dates and performance periods. Redlined updates will only be acceptable for use as weekly status reviews.

Contractor shall provide a single point contact from his on-site organization as his Schedule Specialist. Schedule Specialist shall have the responsibility of updating and coordinating the schedule with actual job conditions. Schedule Specialist shall participate in weekly status meetings and present current information on the status of purchase orders, shop drawings, off-site fabrication, materials deliveries, Subcontractor activities, anticipated needs for Government furnished equipment, and any problem which may impact the contract performance period.

- a. Schedule shall be of sufficient detail to facilitate the Contractor's control of the job and to allow the Contracting Officer to readily follow progress for portions of the work.
- b. For any condition or action which impacts the schedule, the Contractor shall submit within 5 working days a report to define problem areas, anticipated delays, and impact on schedule. Report corrective action taken, or proposed, and its effect on schedule.

1.8 STATUS REPORT ON MATERIALS ORDERS

Within five days after notice to proceed, the Contractor shall submit, for approval by the Contracting Officer, an initial status report on materials orders.

Report shall list, in chronological order by need date, materials orders necessary for completion of the contract. The following information will be required for each material order listed:

- a. Material name, supplier, and invoice number.
- b. Bar chart line item or CPM activity number affected by the order.
- c. Delivery date needed to allow directly and indirectly related work to be completed within the contract performance period.
- d. Current delivery date agreed on by supplier.
- e. When item d exceeds item c, the effect that delayed delivery date will have on contract completion date.
- f. When item d exceeds item c, a summary of efforts made by the Contractor to expedite the delayed delivery date to bring it in line with the needed delivery date, including efforts made to place the order (or subcontract) with other suppliers.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

-- End of Section --

SECTION 01411

GENERAL SAFETY REQUIREMENTS
09/99

PART 1 GENERAL

1.1 SUMMARY

The requirements of this Section apply to, and are a component part of, each section of the specifications.

1.2 REFERENCES

The publications listed below form a part of this section to the extent referenced:

CODE OF FEDERAL REGULATIONS (CFR)

10 CFR 20 (1991) Standards for Protection against Radiation

29 CFR 1910 (1996) Occupational Safety and Health Standards

29 CFR 1926 (1996) Safety and Health Regulations for Construction

CORPS OF ENGINEERS (COE)

COE EM-385-1-1 (1981; Rev 1984) Safety and Health Requirements Manual

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

NASA NHB 1700.1 (1993) (V1-B) NASA Safety Policy and Requirements Documents

1.3 SUBMITTALS

The following shall be submitted in accordance with Section 01330, "Submittals," in sufficient detail to show full compliance with the specification:

SD-07 Certificates

Statements shall be submitted for the following items in accordance with paragraphs entitled, "Safety Plan" and "Protection Plan," of this section.

Safety Plan
Protection Plan

1.3.1 Safety Plan

Contractor shall submit a safety plan per OSHA 29 CFR to the Contracting Officer with bid package.

Safety plan shall include, as a minimum, the following:

- a. Safety program objectives.
- b. Methods to attain safety objectives.
- c. Responsibility of Contractor key personnel.
- d. Safety meetings, surveys, inspections, fall protection plan, and reports.
- e. Disaster, HazCom, and emergency programs.
- f. Lists of key personnel to be contacted in times of emergency.
- g. Program to show compliance with Federal OSHA Safety and Health Standards 29 CFR 1910 and 29 CFR 1926 and various safety requirements of NASA NHB 1700.1 COE EM-385-1-1.
- h. Methods to comply with the requirement for immediate reporting of mishaps to the Contracting Officer in accordance with NPD 8621.1G.
- i. Statement that the Contractor will not invalidate the integrity of safety systems without proper authorization.
- j. Procedures for emergency actions to be taken to secure dangerous conditions, to protect personnel, and secure work areas in the event of accident or an act of nature.
- l. Procedures for securing the mishap site so that the area remains secure until arrival of a safety investigator. Mishap site will remain secured until released by the Contracting Officer.

1.3.2 PROTECTION PLAN

Contractor shall provide MSDS for all hazardous material and chemicals used in the process.

Structures, utilities, sidewalks, pavements, and other facilities immediately adjacent to work areas shall be protected against damage.

The contractor shall not apply the roof assembly when the threat of inclement weather exists. Areas of uncompleted underlayment exposed to rain or other sources of moisture will be subject to removal and replacement.

The total roof/insulation assembly must be completed in one continual operation. Once the project is started the contractor shall complete the work vigorously.

1.4 GENERAL SAFETY PROVISIONS

Before any work can be performed at the White Sands Test Facility (WSTF) the contractor and his personnel are required to attend a 2-hour mandatory safety training session, provided by the WSTF Safety Department. All required engineering controls and Personal Protective Equipment (PPE) need to be discussed in this meeting. Contractor and contractor personnel shall abide to WSTF safety rules and regulations.

The safety briefing will be held in B101 and shall be coordinated with the Contracting Officer. The Contractor will ensure that all employees are dispatched to the NASA Facility with all necessary Personal Protective Equipment (i.e. hardhats, eye protection, fall protection, etc.) that will be necessary to accomplish the task at hand.

The Contractor shall adhere to and be aware of all NASA WSTF requirements during construction. If contractor or contractor employee knowingly violate WSTF safety rules, the employee shall be escorted off site and not allowed to return for work.

Contractor shall erect barricades around buildings, which are being worked on, to prevent accidents by debris or materials falling off roofs.

Contractor shall take safety and health measures in performing work under this Contract. Contractor shall meet with the Contracting Officer to develop a mutual understanding relative to administration of the safety plan. Contractor is subject to applicable federal, state, and local laws, regulations, ordinances, codes, and orders relating to safety and health in effect on the date of this Contract.

During the performance of work under this Contract, the Contractor shall comply with procedures prescribed for control and safety of persons visiting the project site. Contractor is responsible for his personnel and for familiarizing each of his subcontractors with safety requirements. Contractor shall advise the Contracting Officer of any special safety restriction he has established so that Government personnel can be notified of these restrictions.

The Contractor shall provide personnel that is trained in use of proper PPE and proper roofing safety procedures per OSHA regulations.

1.6 ACCIDENT TREATMENT AND RECORDS

Contractor personnel shall receive safety and health training from the White Sands Test Facility Safety Department before any work can be started.

Contractor employees may utilize Government dispensary facilities located in building 104 for injury and emergency medical treatment.

The Contractor shall immediately notify and promptly report to the Contracting Officer or his representative, any accident or incident or exposure resulting in fatality, disabling occupational injury or occupational disease or contamination of property.

The Contractor shall comply with any illness, incident, and injury experience reporting requirements. The Contractor will investigate all such

work related incidents or accidents to persons and property to the extent necessary to positively conclude what cause or causes resulted in said accident or incident, and furnish the Contracting Officer with a report, in such form as the Contracting Officer may require, of the investigative findings, together with proposed and/or completed corrective actions.

If the Contractor fails or refuses to institute prompt corrective action in accordance with the above, the Contracting Officer may "Stop Work", or may invoke whatever other rights are available to the Government.

The Contractor agrees that authorized Government representatives of the Contracting Officer shall have access to and the right to examine the sites or areas where work under his contract is being performed to determine the adequacy of the Contractor's safety and health measures.

1.7 FIRE PREVENTION AND PROTECTION

Open-flame heating devices will not be permitted except by approval in writing from the Contracting Officer. Approval for the use of open fires and open-flame heating devices will not relieve the Contractor from the responsibility for any damage incurred because of fires.

Burning trash, brush, or wood on the project site shall not be permitted.

1.12 FACILITY OCCUPANCY CLOSURE

Streets, walks, and other facilities occupied and used by the Government shall not be closed or obstructed without written permission from the Contracting Officer.

1.13 ROOFING AND COATING

At the beginning of each workday day the Contractor shall check with the Contracting Officer before proceeding to work on the roof to ensure safe work conditions.

1.14 SEVERE STORM PLAN

In the event of a severe storm warning, the Contractor shall:

- a. Secure outside equipment and materials and place materials possible to damage in protected locations.
- b. Check surrounding area, including roof, for loose material, equipment, debris, and other objects that could be blown away or against existing facilities.
- c. Ensure that temporary erosion controls are adequate.

1.15 HAZARDOUS WASTE

Contractor shall identify all wastes produced and dispose of them in the following approved manners:

Identify all wastes and waste producing processes including chemicals, paints, POL products and solvents, and their containers. Unknown wastes will be chemically identified by the Government.

Obtain a determination of whether the waste is hazardous from the Contracting Officer.

Notify the Contracting Officer prior to taking disposal action for any hazardous waste.

For disposal, provide either laboratory analysis data documenting the chemical content of the waste or certification by appropriate organization authority as to the chemical constituents of the waste. Technical assistance on disposal analysis requirements will be provided on request by contacting the Contracting Officer.

Document the waste type, quantity, location, and personnel/contractor/agency responsible so the material can be tracked from generation through ultimate disposal as required by Environmental Protection Agency under Resource Conservation and Recovery Act.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

-- End of Section --

SECTION 01600

PRODUCT REQUIREMENTS
03/01

PART 1 GENERAL

1.1 SUMMARY

Requirements of this Section apply to, and are a component part of, each section of the specifications.

1.2 REFERENCES (NOT APPLICABLE)

1.3 SUBMITTALS

During construction the Contractor shall maintain a current set of as-built drawings which reflect changes and deviations in the contract drawings as they are installed in the field. The as-built drawings shall be available for inspection by Contracting Officer at all times.

The as-built drawings and possible shop drawings for inclusion in the as-built drawings shall be reviewed on a monthly basis. This review will include all Government and Contractor personnel involved in the as-built process. Payment - or a portion of the payment, including final payment - may be withheld until the as-built drawings have been updated, and accepted by the Contracting Officer.

Before final payment is made under this contract, the Contractor shall provide as-built red lines that incorporate all changes and plan deviation. Additions or corrections to the drawings will be drawn to the scale of the contract drawings. The final as-built drawings, certified correct by the Contractor, shall be submitted to the Contracting Officer ten days prior to the contract completion date.

1.4 SHIPMENT AND PROTECTION OF MATERIAL AND EQUIPMENT

Shipments shall be addressed to the Contractor who shall be responsible for their receipt, unloading, handling, and storage at the site. Government will not accept deliveries on behalf of the Contractor or his subcontractors or assume responsibility for security of materials, equipment, or supplies delivered to the site.

Contractor shall protect and preserve materials, supplies, and equipment of every description (including property which may be Government-furnished or -owned) and work performed.

1.5 STORAGE AND PROTECTION OF MATERIAL

1.5.1 Salvage Material

Material to be salvaged and reinstalled by the Contractor shall be protected during removal and stored to prevent damage.

1.5.2 New Material and Construction Equipment

Only material and construction equipment designated for performance of contract work may be stored at the construction site or located in Government-controlled warehouses or shop facilities.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

Materials and equipment to be provided under this contract shall be standard catalogue products of manufacturers regularly engaged in the manufacture of the products. All material "cut sheets" and factory acceptance test data shall be provided to the Contracting Officer. Information and data shall have a cover letter/sheet clearly marked with the system name, date, and the words "Final Test Data - Forward to the Systems Engineer/Condition Monitoring Office/Predictive Testing Group for inclusion in the Maintenance Database."

Roofing System materials shall be on the project site before work is begun.

Materials shall be delivered to the site in the manufacturer's unbroken, labeled packages. Original packaging shall not be disturbed until materials are to be applied. Liquid materials shall be used directly from the fully labeled cans in which the manufacturer shipped them. Only manufacturer approved materials shall be brought to or stored at the site.

Material and equipment shall be installed in accordance with the requirements of the contract drawings, contract specifications and referenced standards and specifications.

PART 3 EXECUTION (NOT APPLICABLE)

-- End of Section --

SECTION 01780

CLOSEOUT SUBMITTALS
03/01

PART 1 GENERAL

1.1 SUMMARY

The requirements of this Section apply to, and are a component part of, each section of the specifications.

1.2 REFERENCES (NOT APPLICABLE)

1.3 SUBMITTALS

The following shall be submitted in accordance with Section 01330, "Submittals," in sufficient detail to show full compliance with each section of the project's specification:

SD-01 Pre-construction Submittals
Reproducible Drawings

CAD System Drawings

SD-02 Shop Drawings

As-Built Drawings

SD-03 Product Data

Spare Parts Data shall indicate manufacturer's name, part number, nomenclature, and stock level recommended for maintenance and repair. List those items that may be standard to the normal maintenance of the system.

SD-06 Warranty

Provide a 15 Year NDL (No Dollar Limit) roof systems warranty. This warranty must cover leaks in the roof membrane system due to defects in materials and workmanship. This warranty is to become effective at the completion of the work, including any punchlist items. Warranty exclusions for ponded roof areas are not acceptable.

SD-07 Certificates

A Work Plan shall be submitted in accordance with paragraph entitled, "General," of this section.

SD-08 Manufacturer's Instructions

The following shall be submitted in accordance with paragraph entitled, "General," of this section.

Preventative Maintenance and Condition Monitoring (Predictive Testing) and Inspection schedules shall be submitted by the Contractor with instructions that state when systems should be retested.

Posted Instructions

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals shall be submitted in accordance with paragraph entitled, "Operation and Maintenance," of this section.

1.4 GENERAL

Preventative Maintenance and Condition Monitoring (Predictive Testing) and Inspection schedules shall be submitted by the Contractor with instructions that state when systems should be retested.

A Work Plan shall be submitted to the Contracting Officer for project closeout. Plan shall include all scheduled inspections, instruction classes, items; closeout dates for all functions, and shall list the required Government and Contractor personnel that will be taking part in these functions.

Posted Instructions shall be submitted by the Contractor with labels, signs, and templates of operating instructions that are required to be mounted or installed on or near the product for normal, safe operation.

Contractor shall submit 6 copies of the project operation and maintenance manuals 30 days prior to contract completion.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 OPERATION AND MAINTENANCE

Operation and Maintenance Manuals shall be consistent with the manufacturer's standard brochures, schematics, printed instructions, general operating procedures, and safety precautions. Information shall be bound in manual format and grouped by technical sections. Test data shall be legible and of good quality. Light-sensitive reproduction techniques are acceptable provided finished pages are clear, legible, and not subject to fading. Pages for vendor data and manuals shall have 10-millimeter holes and be bound in 3-ring, loose-leaf binders. Data shall be organized by separate index and tabbed sheets, in a loose-leaf binder. Binder shall lie flat with printed sheets that are easy to read. Caution and warning indications shall be clearly labeled.

-- End of Section --

SECTION 02220

DEMOLITION
09/99

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this section to the extent referenced:

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1926 (1996) Safety and Health
Regulations for Construction

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
(AASHTO)

AASHTO M 145 (1991) Recommended Practice for the
Classification of Soils and Soil-Aggregate
Mixtures for Highway Construction Purposes

AASHTO T 180 (1993) Standard Method of Test for Moisture-
Density Relations of Soils Using a 10-lb
(4.54 kg) Rammer and an 18-In. (457 mm) Drop

FEDERAL AVIATION ADMINISTRATION (FAA)

FAA AC 70/7460-1 (Rev H; Change 1 - 2) Obstruction Marking and
Lighting

1.2 SUBMITTALS

The following shall be submitted in accordance with Section 01330,
"Submittal Procedures," in sufficient detail to show full compliance with
the specification:

SD-01 Preconstruction Submittals

A Construction Equipment List shall be submitted

Contractor shall record Existing Conditions prior to starting work
in accordance with the paragraph entitled, "Existing Conditions,"
of this section.

Interruption of the following shall be submitted:
Traffic Interruptions

SD-07 Certificates

Contractor shall submit a detailed **Demolition Plan** of the work procedures and safety precautions to be used prior to the beginning of work.

A Safety Plan shall be submitted prior to the beginning of work.

1.3 DEMOLITION PLAN

Contractor shall prepare and submit a detailed Demolition Plan of the work procedures and safety precautions to be used in the identification, demolition, handling, removal, transportation, and reclamation or disposal of removed materials. Contractor shall meet with the Contracting Officer, prior to beginning work, to discuss in detail the demolition plan.

1.4 EXISTING CONDITIONS

Existing Conditions shall be recorded in the presence of the Contracting Officer showing the condition of structures and other facilities adjacent to areas of alteration or removal. Such record shall contain the elevation of the top of foundation walls, the location and extent of cracks and other damage and description of surface conditions that exist prior to the start of work. Copies of the record shall be submitted and the stated conditions before starting work shall be verified.

1.5 INTERRUPTION OF SERVICE

Written approval by the Contracting Officer **Traffic Interruptions** shall be submitted at least 48 hours prior to work.

There should be no Utility Systems affected by this work.

1.6 CONSTRUCTION EQUIPMENT LIST

A construction equipment list of all major equipment to be used in this section shall be submitted to the Contracting Officer prior to construction.

1.7 SAFETY PLAN

Contractor shall submit a Safety Plan in accordance with Section 01411, "General Safety Requirements"

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 DUST ABATEMENT

Dust and dirt rising during demolition operations shall be effectively controlled by water sprinkling or other approved method.

3.4 DEMOLITION AND REMOVAL WORK

3.4.1 Protective Measures

Existing construction shall not be disturbed beyond the extent indicated or necessary for installation of new work.

Protective measures shall be provided to control accumulation and migration of dust and dirt in all areas of work. Dust, dirt, and debris shall be removed from the areas of work daily.

3.4.2 Salvageable Materials and Equipment

Government will designate materials and equipment to be salvaged.

Salvageable materials and equipment shall be removed in a manner that will cause the least possible damage thereto. Contractor personnel shall handle, store, and protect removed items that are to be reused in the work or are to be retained by the Government.

Identification tags shall be provided on items boxed or placed in containers, indicating the type, size, and quantity of materials.

3.4.3 Scrap Metal (Not applicable)

3.4.4 Site Work

Salvaged items shall be removed and stored.

3.4.5 Buildings and Structures

Specified removal operations shall be performed in existing buildings as required to complete the work.

Miscellaneous metals:

Light-gage metal items, such as metal gutters, roofing and siding, and similar items, shall be salvaged unless designated as scrap metal by the Contracting Officer.

3.4.6 ELECTRICAL EQUIPMENT AND FIXTURES

Lightning Protection System :

All components of existing lightning protection systems on roofs identified in the specifications, shall be removed and salvaged by the owner.

3.5 DISPOSAL OF REMOVED MATERIALS

3.5.1 General

Debris, rubbish, scrap, and other non-salvageable materials resulting from removal operations shall be disposed of in accordance with all applicable

federal, state and local regulations as contractually specified. . Removed materials shall not be stored on the project site.

3.5.2 Burning on Government Property

Burning of materials removed from demolished structures will not be permitted on Government property.

3.5.3 Removal from Government Property

Waste materials removed from demolished structures, except waste soil, shall be transported from Government property and legally disposed of. Waste soil shall be disposed of as directed.

-- End of Section --

SECTION 07220

ROOF AND DECK INSULATION
03/02

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this section to the extent referenced:

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 1289	(1998) Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
ASTM C 150	(2000) Standard Specification for Portland Cement
ASTM C 208	(1995; R 2001) Standard Specification for Cellulosic Fiber Insulating Board
ASTM C 317/C 317M	(2000) Standard Specification for Gypsum Concrete
ASTM C 332	(1999) Standard Specification for Lightweight Aggregates for Insulating Concrete
ASTM C 552	(2000) Standard Specification for Cellular Glass Thermal Insulation
ASTM C 726	(2000a) Standard Specification for Mineral Fiber Roof Insulation Board
ASTM C 728	(1997) Standard Specification for Perlite Thermal Insulation Board
ASTM D 1190	(1997) Standard Specification for Concrete Joint Sealer, Hot-Poured Elastic Type
ASTM D 1227	(1995; R 2000) Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing
ASTM D 1751	(1999) Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D 1752	(1984; R 1992) Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

ASTM D 2178	(1997a) Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing
ASTM D 226	(1997a) Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
ASTM D 227	(1997a) Standard Specification for Coal-Tar-Saturated Organic Felt Used in Roofing and Waterproofing
ASTM D 2626	(1997b) Standard Specification for Asphalt-Saturated and Coated Organic Felt Base Sheet Used in Roofing
ASTM D 2822	(1991; R 1997) Standard Specification for Asphalt Roof Cement
ASTM D 312	(2000) Standard Specification for Asphalt Used in Roofing
ASTM D 41	(1994; R 2000) Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing
ASTM D 450	(1996; R 2000) Standard Specification for Coal-Tar Pitch used in Roofing, Dampproofing, and Waterproofing
ASTM E 96	(2000) Standard Test Methods for Water Vapor Transmission of Materials

FEDERAL SPECIFICATIONS (FS)

FS SS-S-200	(Rev E; Am 2) Sealants, Joint, Two-Component, Jet-Blast-Resistant, Cold-Applied, for Portland Cement Concrete Pavement
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1.2 SUBMITTALS

The following shall be submitted in accordance with Section 01330, "Submittals," in sufficient detail to show full compliance with the specification:

SD-03 Product Data

Manufacturer's catalog data shall be submitted for the following items:

Thermal Insulation Materials

Sheathing Paper
Vapor Barrier*
Fastening Materials
Bituminous Plastic Cement
Asphalt-Base Emulsion

SD-04 Samples

Contractor shall submit the following samples:

Three of each type of **Fasteners**

Three 1-quart containers of **Adhesives**.

Three pieces, full thickness by 12 inches by the width of roll of **Vapor Barrier** and **Insulation** (or underlayment).

After approval, full-sized samples may be used in the construction, provided each sample is clearly identified and its location recorded.

SD-06 Test Reports

Test reports for water resistance and permeance shall be submitted for **Vapor Barrier**.

SD-07 Certificates

Certificates for the following items shall exactly identify each item by the designation that will appear on the packaging for that item. Certificates shall be submitted for all materials that are identified by a referenced specification.

Fiberboard Roof Insulation

Gypsum Board With (Without) Fiber Roof Insulation
Mineral-Fiber Roof Insulation
Fibrous-Glass Roof Insulation
Expanded-Perlite Roof Insulation
Polyisocyanurate Roof Insulation
Phenolic Roof Insulation
Concrete Roof Insulation
Expansion Joint Filler Strips
Compound
Polyvinylchloride Sheet Vapor Barriers
Roofing Felts
Base Sheet
Asphalt Primer
Steep Asphalt
Coal-Tar Pitch
Bituminous Plastic Cement
Asphalt-Base Emulsion

SD-08 Manufacturer's Instructions

Manufacturer's instructions for the following items shall indicate fastener and adhesive instructions for each type of installation.

Vapor Barrier

Roof Insulation
Fiberboard Roof Insulation

SD-11 Closeout Submittals

Warranty

1.3 QUALIFICATIONS FOR ROOF AND DECK INSULATION WORK

Roof and deck insulation shall be performed by Contractor personnel certified by the insulation manufacturer to install their products.

Insulating concrete contractor shall be certified in the application of the materials by the aggregate manufacturer.

1.4 DELIVERY AND STORAGE OF MATERIALS

Materials shall be delivered to the project site in their original, unopened packages or containers bearing labels identifying the manufacturer's name, brand name, material, and other information.

Materials shall be stored in their original, unbroken packages or containers in a weathertight and dry area and protected from damage until needed for use.

PART 2 PRODUCTS

2.1 THERMAL INSULATION MATERIALS (OR UNDERLAYMENT)

Low thermal conductive polystyrene underlayment as approved by manufacturer with R-Value of 1.5.

2.2 SHEATHING PAPER

Sheathing paper shall be rosin-sized weighing not less than 5 pounds per 100 square feet unsaturated felt weighing approximately 7-1/2 pounds per 100 square feet.

2.3 VAPOR BARRIER

2.3.1 Polyvinylchloride Sheet

Polyvinylchloride sheet vapor barriers shall be unplasticized virgin polyvinylchloride and shall be not less than 0.004 inch thick, with water vapor permeance of not more than 0.10 on a spot-by-spot basis, not as an average. Permeance shall be measured in accordance with ASTM E 96, Water Method.

2.4 FASTENING MATERIALS

2.4.1 Adhesives

Adhesives as approved by manufacturer

2.4.1.2 Polyvinyl-Sheet

Adhesive for application of film polyvinyl-sheet vapor barriers shall be rubber-base water-resistant material with a nontoxic vehicle especially prepared for application of polyvinyl-sheet membrane to roof decks. Holding

power of the adhesive shall be not less than 100 psi. Adhesive shall be certified by the manufacturer on the basis of tests by an independent testing laboratory to have a tunnel flame spread of not more than 10 when applied to a noncombustible surface.

2.4.2 Fasteners

Roofing nails or screws shall be approved by roofing system manufacturer

2.5

2.6

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

Roof insulation shall be installed in accordance per roofing system manufacturer's specifications

Before penetrating roof deck contractor shall verify that there is nothing attached below the roof deck that could be damaged by protruding nails or screws.

Contractor shall verify that all work that penetrates roof decks or that requires men and equipment to traverse a roof deck has been completed prior to underlayment or roof insulation installation.

Contractor shall examine deck surfaces for inadequate anchorage, foreign material, moisture, and unevenness, any condition which would prevent the execution and quality of application of underlayment or roof insulation system as specified shall be corrected before beginning work. Work shall not proceed with underlayment or insulation application until defects are corrected.

Insulation shall be installed only after building construction has progressed to the point that inclement weather will not damage or wet the insulation material.

Starting work designates acceptance of the surfaces by the Contractor.

Underlayment or insulation material shall be cut and fit as necessary to fully insulate small areas and to accommodate piping, scuttles, skylights, vents, and other construction penetrating the insulation material.

Vapor barriers shall be installed to provide a continuous vapor-barrier seal. Tears, breaks, or ruptures that might interfere with effectiveness of the vapor barrier shall be repaired.

3.2 PREPARATION

3.2.1 Protection of Property

Before starting work, paving and faces of building walls adjacent to hoist shall be protected and this protection maintained for duration of work.

3.2.2 Preparation of Surfaces

Surfaces on which thermal insulation materials are to be applied shall be clean, smooth, dry, and free from projections which might puncture the vapor barriers. Condition of surfaces shall be inspected and approved by the Contracting Officer prior to the start of roof insulation work.

3.3 APPLICATION

3.3.1 General Procedures

Underlayment or insulation installation shall be continuous, with all operations proceeding together. No gap between underlayment/insulation boards shall exceed 1/4" in width.

No more underlayment/insulation will be installed that can be covered with membrane and completed before the end of the day's work or before the onset of inclement weather. Before cessation of work on each working day or when work is interrupted due to rainfall or other causes, the roof shall be sealed against intrusion of water. Insulation or underlayment shall not be left exposed during rainfall or overnight.

Traffic over partially or completely finished underlayment or insulation shall be only on planks, or on plywood not less than 5/8-inch thick and 2-foot wide.

Materials temporarily stored on the roof shall be distributed to stay within the live-load limits of the roof. Ample bases shall be provided under equipment to distribute the weight to conform to the live-load limits.

3.3.3 Vapor-Barrier Application

Polyvinylchloride sheet vapor barriers shall be applied as follows:

Vapor barriers shall be applied to the deck by adhesive applied in ribbons at a minimum rate of 0.4 gallon per 100 square feet 1.6 liter per 10 square meter in accordance with the printed instructions of the manufacturer. Vapor-barrier seaming may be either by heat welding or by adhesive bonding as recommended by the manufacturer. Application of adhesive shall be by a multiple-nozzle wheeled applicator.

Vapor-barrier installation shall proceed progressively directly ahead of the advancing insulation installation. Work shall be organized to eliminate walking over the vapor barrier; traffic over the installed vapor barrier shall be confined to areas where plywood sheets have been laid to protect the vapor barrier.

3.3.4 Insulation Application

Insulation shall be installed in accordance with the manufacturer's requirements and as specified below. Method of hold down used by the manufacturer in areas subject to hurricane velocity winds shall be subject to approval prior to installation.

Care shall be taken not to rupture the vapor barrier during installation of insulation. No more insulation shall be installed at one time than can be protected from wetting or other damage by installation of roofing membranes on the same day or prior to rain or dew.

Joints of insulation board shall be taped, if required by manufacturers of insulation and roofing.

Temporary water cutoffs shall be installed at the completion of each day's work and removed upon resumption of work.

3.4 ACCEPTANCE

Prior to final acceptance, the Contractor shall provide construction (as-built) details and warranty information to the Contracting Officer. Construction details shall include, by building area, the material type, amount, and installation method. An illustration or map of the building may serve this purpose. Data shall have a cover letter/sheet clearly marked with the system name, date, and the words "As built insulation/material." Forward as-built and warranty information to the NASA Project Engineer.

Manufacturer quality representative shall inspect roofing system before acceptance and issuance of warranty.

-- End of Section --

SECTION 07530

SINGLE PLY MEMBRANE ROOFING
03/01

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this section to the extent referenced:

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 532	(1988) Structural Insulating Formboard (Cellulosic Fiber)
ASTM D 1084	(1992) Viscosity of Adhesives
ASTM D 1148	(1995) Rubber Deterioration - Heat and Ultraviolet Light Discoloration of Light- Colored Surfaces
ASTM D 1149	(1991) Standard Test Method for Rubber Deterioration - Surface Ozone Cracking in a Chamber
ASTM D 1544	(1980; R 1989) Standard Test Method for Color of Transparent Liquids (Gardner Color Scale)
ASTM D 2240	(1991) Standard Test Method for Rubber Property - Durometer Hardness
ASTM D 2277	(1987) Fiberboard Nail-Base Sheathing
ASTM D 297	(1993) Rubber Products - Chemical Analysis
ASTM D 412	(1992) Rubber Properties in Tension
ASTM D 471	(1995) Rubber Property - Effect of Liquids
ASTM D 573	(1988; R 1994) Rubber-Deterioration in an Air Oven
ASTM D 624	(1991) Rubber Property - Tear Resistance
ASTM D 746	(1979; R 1987) Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact
ASTM D 828	(1993) Tensile Breaking Strength of Paper and Paperboard
ASTM E 96	(2000) Standard Test Methods for Water Vapor Transmission of Materials

1.2 SUBMITTALS

Prior to bidding this work, the roofing contractor must show proof that it is authorized by the roofing system manufacturer and qualifies to receive required roof systems warranty.

Prior to starting any work, the contractor shall submit copies of manufacturer's literature for each required product. This information shall include product description and applicable quality standards, and conform to the requirements of this specification.

The following shall be submitted in accordance with Section 01330, "Submittals," in sufficient detail to show full compliance with the specification:

SD-02 Shop Drawings

Installation drawings for elastic sheet roofing shall be in accordance with the paragraph entitled, "Application of Roofing," of this section.

SD-03 Product Data

Manufacturer's catalog data for the following items shall include roofing membrane, adhesives, roofing system details.

Adhesives
Base Sheet
Cants
Cement
Nails and Fasteners
Flashing Membranes
Roofing Membranes
Sheathing Paper
Roof Walkways
Fascia

SD-04 Samples

Contractor shall submit the following samples in accordance with the paragraph entitled, "Samples and Testing," of this section.

Construction Materials
Base Sheet
Roofing Membranes
Finish Coating
Flashing
Walkways
Fascia

SD-06 Test Reports

Test reports for the following items may be waived provided certified copies of test reports from approved laboratories

performed within the past year on materials representative of those proposed for use are approved.

Adhesives
Base Sheet
Cants
Cement
Nails and Fasteners
Finishing Tape
Flashing Membranes
Roofing Membranes
Sheathing Paper
Roof Walkways
Fascia

SD-07 Certificates

Certificates for the following items shall indicate the manufacturer and manufacturer's designation and shall exactly identify each item by the designation that will appear on the packaging for that item.

Roofing Membrane
Flashing Membranes
Insulation
Adhesives

SD-08 Manufacturer's Instructions

Manufacturer's instructions shall be submitted for the installation of the following items:

Roofing
Insulation
Roofing Membranes
Flashings

1.3 DELIVERY, HANDLING, AND STORAGE

Roofing materials shall be on the project site before work is begun.

Materials shall be delivered to the site in the manufacturer's unbroken, labeled packages. Membrane rolls shall be labeled to indicate grade, weight, and type. Original packaging shall not be disturbed until materials are to be applied. Only approved roofing materials shall be brought to or stored at the site.

Roofing materials shall be stored and protected from contact with soil, rain, or snow.

Not more than a 1-day's supply of **insulation/underlayment** shall be stored on the roof at any time. This 1-day's supply shall be stacked on pallets and completely covered with plastic sheeting whenever work is interrupted or when there is precipitation of any kind. Plastic sheeting shall be securely fastened to the pallets and be completely weathertight. Materials not so protected during inclement weather shall be permanently removed from the site.

Materials temporarily stored on the roof shall be distributed to stay within the indicated live-load limits of the roof construction. Ample bases shall be provided under equipment to distribute the weight to conform to these live-load limits. Materials stored shall be secured not to fly off the roofs during wind gusts. Storage locations shall be approved.

1.4 SAMPLES AND TESTING

Upon notification by the Contractor that the material is at the site, cutout sampling of the membrane shall be accomplished when specified.

Three pieces, 12 inches by the width of roll of the **Roofing Membrane**.

1.5 PROTECTION OF PROPERTY

Flame-heated equipment shall be located and used so it will not endanger the structure or other materials on the site or adjacent property. Fire extinguishers of an appropriate approved type shall be provided and maintained by the Contractor.

Flame-heated equipment shall not be placed on the roof of any structure.

Before starting work, paving and faces of building walls adjacent to the hoist and shall be protected and the protection maintained for duration of work.

Work or materials damaged during the handling and installation of materials shall be restored to the original condition or replaced with new materials at no cost to the Government.

Continuous protection to high cost computer equipment, test instrumentation, and machinery, housed in the building below, from water damage is the responsibility of the Contractor. The Contractor shall plan the tear off and re-roof activity such that water damage to the building interior is eliminated.

PART 2 PRODUCTS

2.1 ADHESIVES

Adhesives and **Mastics** shall be the types recommended by the roofing-membrane manufacturer. Adhesives shall have a working temperature range of 20 to 140 degrees F and shall be compatible with membranes and materials to which they are bonded.

2.2 ASPHALT PRIMER (NOT APPLICABLE)

2.3 ASPHALT (NOT APPLICABLE)

2.4 UNDER LAYMENT:

The underlayment shall be a low thermal conductive fanfold extruded polystyrene material for use over wide temperature ranges and shall not warp with normal use.

Thickness: 3/8" R-Value: 1.5 Density: 1.25#

2.5 CANTS

Cants shall be made from treated wood or treated fiberboard and shall reduce the angle covered into two equal angles. Fiberboard shall conform to [ASTM C 532](#) and [ASTM D 2277](#) and shall be treated for moisture resistance by an integral treatment with wax or other sizing materials. o

2.6 CEMENT

Cement for splicing laps and for flashings shall be a self-vulcanizing butyl compound workable at 20 degrees F. Cement shall be that recommended by the roofing membrane manufacturer.

2.7 NAILS AND FASTENERS

2.7.1 General

Nails and fasteners used must be authorized products of the roofing system manufacturer.

2.8.2 Color

Color shall be white.

2.10 FLASHING MEMBRANES

Flashing membranes shall be the same material specified for roofing membranes.

2.11 ROOFING MEMBRANES

Roofing membranes, described as follows, shall conform to the requirements specified.

Roofing membrane shall be a thermoplastic membrane based on plastic polymers. The membrane shall be mechanically fastened with manufacturer's approved fasteners and per roofing systems manufacturer's specifications.

The single-ply membrane material shall satisfy requirements of the EPA Energy Star Roof Products Program:

- Energy Efficiency - Initial Solar Reflectance > 65%
- Maintenance of Solar Reflectance => 50%
three years after installation under normal conditions

Reliability - Warranty on reflective roof products must be equal in all material respects to the product warranty offered by the same company or comparable non-reflective roof products. A company that sells only reflective roof products must offer a warranty that is equal in all material respects to the standard industry warranty for comparable non-reflective roof products.

Color shall be White.

REQUIREMENTS FOR ROOFING MEMBRANES

Weight ASTM D 751 - .25 lbs. per sq.ft

Total thickness, inch, minimum: 0.040

Tearing Strength - Tongue Method ASTM D 751 pounds: 130X110

Breaking Strength ASTM d 751 pounds: 435X350

Tensile Strength, ASTM D 751, ASTM D 882 psi: 7200

Elongation at Break, ASTM D 751, percent: 35

Dimensional Stability, ASTM D 1204 : < 0.1%

Permeability, ASTM E 96 Pro BW, ASTM E-96 WVT, Proc
B,M,A: .25 US

Water Vapor Transmission ASTM E-96 WVT Procedure B, Method A : <
0.25 Perms

Dynamic Impact (Puncturing) Fed. Std. 101B, Method B
pounds: 350

Accelerated Weathering ASTM G-5388 - no cracks,
crazing, or blistering

2.12 SHEATHING PAPER

Paper shall be rosin-sized weighing not less than 5 pounds per 100 square feet or unsaturated felt weighing approximately 7-1/2 pounds per 100 square feet.

2.13 ROOF WALKWAYS

The existing roof walkways will remain in place, or removed if necessary and then re-installed after the new roofing system is installed.

New membrane walkways, as specified by manufacturer, will be installed from roof access to existing walkways, and from existing walkways to/and around roof top equipment. Other walkways will be installed per drawing specifications.

Color of membrane walkways shall be Gray

PART 3 EXECUTION

3.1 PREPARATION OF SURFACES

Inspect all surfaces to receive roofing for any condition that will adversely affect execution, performance, or quality of work. All roof

surfaces and all sloped surfaces to drains and outlets shall be checked and approved by the roofing contractor prior to the start of the roofing work. Install roofing material only under satisfactory conditions as specified by the membrane manufacturer.

The roofing shall be examined thoroughly for moisture and insulation damage. If necessary, the roofing shall be removed completely to the decking. Insulation and a recovery board will be installed per specifications of the membrane roofing system manufacturer.

The roof shall be swept to remove loose gravel. A 3/8 inch minimum underlayment or 1 inch thick insulation board must be used, depending on the size of pea gravel or crushed stone (1/4 - 3/8 inches) remaining.

3.2 APPLICATION OF ROOFING

The membrane roofing system shall be installed by a contractor authorized by the membrane roofing system manufacturer.

The contractor shall follow guidelines of the Single Ply Roofing Institute (SPRI) and the National Roofing Contractors Association (NRCA).

The membrane shall be installed over properly prepared decks or underlayment. All materials must be products of the membrane roofing system manufacturer or accepted products as listed in the manufacturer's specifications. The contractor shall follow all applicable building, plumbing, and electrical codes.

The authorized contractor shall conduct an inspection of the identified roofs and perform core cuts to determine the condition and the moisture content of the existing roof system. The contractor is responsible for the repair of all core cuts made.

Contractor will provide drawings or sketches that show perimeter and corner enhancement plans for high wind zone installation.

The sheet installation shall be as follows: The prefabricated roof section is positioned on the deck to expose the first securement tab. The securement tab is mechanically fastened to the deck with approved fasteners. The roof section is then unrolled and pulled taut (to remove wrinkles) exposing the second securement tab. This process is repeated until the entire roof section has been mechanically attached to the deck, including all securement tabs and all edges. The next section of roofing membrane is then positioned to provide a minimum of 6-inch overlap. The membrane roofing sections are heat welded together. The above processes are repeated to completely cover the decking or insulation and decking.

1. Remove the debris from the roof and dispose of in an approved landfill. Test existing insulation and roofing systems for moisture content and damage. If the membrane system cannot be installed on top of existing roofs, the roof shall be removed to the decking and new insulation and roofing shall be installed.

2. Install one layer of 3/8" minimum, or thicker if necessary, fanfold board over the old roof surface to isolate the membrane from the roof. If the old roofing has been removed to the deck, install insulation material and recovery board as specified.

3. Install the custom prefabricated single ply membrane, color white, anchored to the roof deck through factory securement tabs 12" to 18" on center. Fasteners will be roofing system manufacturer approved fasteners with poly plates.

4. Flash all roof obstructions with custom-made components - stacks, vents, parapet walls, etc., per manufacturer's specifications. At the roof edge the membrane will be terminated with four-inch fascia bar and cover. At all other termination point the roof membrane will be set into a layer of strip mastic, then secured with termination bar fastened mechanically on six-inch centers with approved fasteners. Around roof edge and corners the membrane shall be mechanically attached using the manufacturer's specifications for high wind areas.

5. Install a membrane walk pad from the roof access, existing walkways, and around each mechanical unit and piece of equipment.

6. Install two way vents at the rate of one per 1000 square feet to allow the old roof to breath and to allow any existing moisture trapped in the roof to escape.

7. Job site will be kept clean at all times, with trash hauled on a daily basis.

3.3 ROOFING TYPE

The roofing membrane shall be a thermoplastic system. The membrane shall have UV stabilizers, flame retardants, lubricants and biocides.

The 0.40-inch thick single-ply roof membrane shall be supplied folded or rolled in sections up to 2,500 square feet in area and shall have no single linear dimension exceeding 100 feet. The membrane shall be mechanically fastened in place.

The roofing system shall consist of membrane; fasteners, prefabricated corners, parapet, stack and curb flashings, vents and other related manufacturer approved products necessary for the proper and warrantable installation of the roofing system. All materials used in the installation of the roofing system shall be products of the manufacturer or accepted products as defined and described in the manufacturer's specifications.

3.4 SUBSTRATE

3.4.4 Roofing on Insulation or Underlayment

Substrate shall be free of standing water, irregularities and sharp projections.

Insulation products must be neatly fitted to the roof deck and its penetrations. 4' X 8' insulation boards must have six fasteners/distribution

plates, min. No gap should exceed ¼" in width. No more insulation products will be installed than can be covered with membrane and completed before the end of the day's work, or before the onset of inclement weather. Manufacturers approved fastening patterns and fasteners are required for attachment of all insulation products.

3.5 FASTENING

3.5.1 Fasteners must penetrate into the decking a minimum of 1-inch (25mm) from the top surface of the decking.

Contractor ensures that there are no installations attached to the interior of the deck. Contractor is responsible for damages to installations or equipment caused by fastener penetrating through the deck.

Roof perimeters and corners need to be fastened per high wind zone design requirements of the roofing system manufacturer.

3.7 FLASHINGS

3.7.1 General

Flashings shall be provided in the angles formed at walls and other vertical surfaces and where required to make the work watertight, except where metal flashings are indicated.

Flashing and all parts needed for installation shall authorized parts of roofing system manufacturer.

3.7.3 Cants

Cants shall be installed in the angles formed at walls and other vertical surfaces as a backing for base flashing. Cants shall be laid in a solid coat of adhesive immediately before laying the roofing membrane. Cants shall have a 5-1/2-inch face dimension and shall be continuous and installed in lengths that are as long as practical. Installation of cants shall not be required at locations where cast-in-place cants have been integrally formed with the structural deck or roof fill.

3.7.4 Strip Flashing

Roof flanges of sheet metal flashing, such as fascias, base flashing, and plumbing flashing furnished and installed under other sections of the specifications, shall be stripped with flashing membrane. After installation of metal flashing over the roofing membrane, strip flashing membrane centered longitudinally at edges of roof flanges shall be installed and terminated in accordance with the roofing manufacturer's directions to form a waterproof joint between the roofing membrane and the metal flashings.

3.7.5 Valleys

Roofing shall be applied at valleys and waterways in the following manner:

Membrane shall continue across valleys. and shall terminate at approximately 18 inches from the valley.

Pre-manufactured boots shall be installed around valley gutter

3.7.6 Valley Application

Valleys: Roofing membrane shall be applied at valleys and waterways in the following manner:

The installation shall be completed without wrinkles, buckles, or fishmouths, and not face the direction of drainage.

3.7.7 Walkway Application

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Walkway systems for the protection of the roofing membrane shall be furnished and installed as indicated. Walkways shall be installed from roof access, from existing metal walkways to/and around roof mounted equipment.

3.7.8 Roof Vent Application

Roof vents shall be provided on the minimum basis of one roof vent for each 1,000 square feet, with no point on the roof more than 45 feet from a point of venting. Roof vents shall be two-way air vents supplied and specified by the roofing system manufacturer.

3.8 FIELD TESTING

3.8.1 Inspection and testing

After completion of the installation of the roofing system a quality inspector from the roofing system manufacturer shall inspect the new installation and test all field made seams. The inspector shall verify that only materials and parts were used, which were approved and authorized by the roofing system manufacturer. A written report of the inspection and resulting punch list shall be provided to the authorized installer and contracting officer. The manufacturer will issue the warranty once inspection and punch list items are complete.

3.9 ACCEPTANCE

Final acceptance will also depend upon completing all punch list items and providing construction (as-built) details to the Contracting Officer. Construction details shall include, by building area, the material type, amount, and installation method. An illustration or map of the building may serve this purpose. Data shall have a cover letter/sheet clearly marked with the system name, date, and the words "As built insulation/material - Forward to the Systems Engineer/Condition Monitoring Office/Predictive Testing Group for inclusion in the Maintenance Database."

-- End of Section --